

Final

Pinon Canyon Maneuver Site Transformation Environmental Impact Statement

Prepared under contract for
U.S. Army Corps of Engineers, Mobile District



for

Fort Carson, Colorado



June 2007



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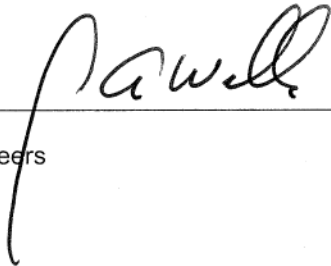


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Environmental Impact Statement**

Prepared by:

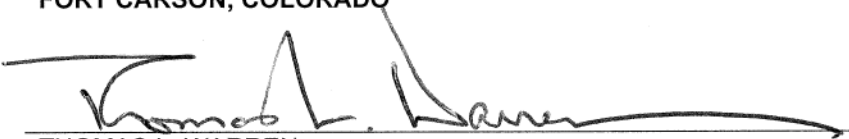
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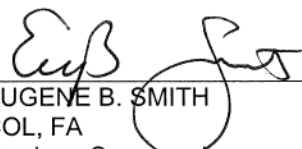
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Final Environmental Impact Statement

Lead Agency: Department of the Army, Office of the Secretary of the Army, Washington, D.C.

Cooperating Agencies: None

Coverage of Environmental Impact Statement (EIS): Implementation of Transformational Programs at the Pinon Canyon Maneuver Site (PCMS) and continued land and mineral withdrawal under Public Law 104-201

Affected Jurisdictions: Las Animas, Otero, and Huerfano counties, Colorado

Document Designation: Final Environmental Impact Statement (FEIS)

Abstract: This EIS evaluates the environmental effects of Army transformation programs at the PCMS in Colorado. The transformation programs, which are Base Realignment and Closure 2005; Integrated Global Presence and Basing Strategy (also known as Global Defense Posture Realignment); and the Army Modular Force, are needed to prepare the Army's combat forces for deployment around the world. The need for the proposed action is to support the training of approximately 8,500 additional Soldiers at the PCMS, and the action includes construction and increased use of training areas. This EIS also serves as the evaluation of the environmental effects, as required by Section 2908 of Public Law 104-201, of renewal of the current withdrawal and reservation of public lands and minerals at the PCMS. Both the Proposed Action, which is the Army's preferred alternative, and the No Action alternative are analyzed. The adverse impacts identified in this EIS include effects to land use, air quality, noise, soils, water resources, biological resources, cultural resources, transportation, utilities, and hazardous and toxic substances. With implementation of mitigation measures and best management practices there would be no significant impacts.

Final Environmental Impact Statement (FEIS) Publication: The U.S. Environmental Protection Agency announced the publication of the FEIS in the *Federal Register*. Not less than 30 days after publication of the *Federal Register*, the Army will sign a Record of Decision (ROD) that will include an overview of the range of alternatives considered for the PCMS, state which of the alternatives considered in the FEIS will be implemented, and include mitigation measures associated with the chosen alternative. During the period between publication of the *Federal Register* and the ROD, copies of the FEIS can be obtained by contacting the PCMS National Environmental Policy Act Coordinator, Directorate of Environmental Compliance and Management, 1638 Elwell Street, Building 6236, Fort Carson, Colorado 80913-4000; phone: 719-526-0912; fax: 719-526-1705; or e-mail: carsdecampcmsnepa@conus.army.mil. The document is available online at the following Web address: http://www.hqda.army.mil/acsim/brac/nepa_eis_docs.htm. Copies have also been provided to the libraries listed in Section 5.0 of the FEIS.

Executive Summary

Introduction

The U.S. Army (Army) is currently undergoing transformational activities across the full spectrum of military operations to respond more rapidly to enemy threats. These changes would affect most, if not all, aspects of the Army's doctrine, training, leader development, organizations, installations, materiel acquisition and fielding, and Soldiers. The Army proposes construct facilities and increase training at the Pinon Canon Maneuver Site (PCMS) in support of the realignment and transformation of Fort Carson. Changes are expected to occur between 2006 and 2011.

- The Army prepared the *Final PCMS Transformation Environmental Impact Statement (FEIS)* in compliance with its responsibilities under the National Environmental Policy Act (NEPA) to assess the direct, indirect, and cumulative environmental and socioeconomic effects of implementing three Army transformation programs at the PCMS. The Army's transformation plan, which was initiated in 1999 and is now known as the Army Campaign Plan, seeks to transform its forces and meet the emerging military needs of the 21st century. The particular transformation programs evaluated in this EIS are: 1) the Base Realignment and Closure (BRAC) Program (BRAC 2005), authorized under the Base Closure and Realignment Act of 1990 (Public Law 101-510), as amended; 2) the Integrated Global Presence and Basing Strategy (IGPBS), also called Global Defense Posture Realignment; and 3) the Army Modular Force (AMF).

Under the direction of these programs, the PCMS must support training for additional Active Component (AC) troops stationed at Fort Carson and support additional training for Reserve Component (RC) units. Implementing these requirements will involve constructing new facilities in the Cantonment to support longer-duration training exercises, constructing new facilities in the training areas, and increasing the frequency of use of the training areas at the PCMS.

The Army also has made a determination of a need for the continued withdrawal of 2,517.12 acres of public land and 130,139 acres of federally owned minerals within the existing PCMS from the public domain. Public Law 104-201, the National Defense Authorization Act for Fiscal Year 1997 extended until 2011 the withdrawal of these lands and mineral rights. The law requires that, if the Secretary of the Army determines that there is a continuing need for these withdrawals, he or she will evaluate the environmental effects of renewal of the withdrawals and hold at least one public hearing concerning that evaluation. This EIS provides the evaluation of the environmental effects of the continued military use of the withdrawn lands and mineral rights. The public meeting for review of the DEIS served as the required public hearing.

Relationship Between Transformation and the Potential Future Expansion of the PCMS

The Army recognizes that the issue regarding the potential future expansion of the PCMS is of considerable public interest. Subsequent to the release of the *PCMS Transformation DEIS*, the Department of Defense approved a waiver request to allow the Army to begin the potential future expansion process for approximately 418,000 acres of land in the vicinity of the PCMS. Analysis of the potential future expansion of the PCMS has not progressed to the point of being ready for NEPA analysis at this time. Although the decision has now been made to initiate an expansion EIS, neither a proposed action nor a set of reasonable and feasible alternatives has been developed. Expansion is not a reasonable alternative to the Proposed Action for PCMS transformation because it cannot be implemented in a reasonable timeframe to meet the needs of new Soldiers. The potential future expansion action is at such a preliminary stage that effective cumulative analysis of such a future action is not reasonable or feasible, but the Army will consider the cumulative effects of this transformation action in combination with expansion in the future expansion EIS.

Relationship Between the Transformation Action and Potential Stationing of a Stryker BCT at Fort Carson

Fort Carson is being considered as one of five possible alternative locations for the future stationing of the Stryker Brigade Combat Team (SBCT). These various locations are being assessed in the *Draft Supplemental Environmental Impact Statement for the Permanent Stationing of the 5th Stryker Brigade Combat Team (SBCT)*. If the Army makes the decision in the Record of Decision (ROD) for that Supplemental Environmental Impact Statement (SEIS) to station the SBCT at Fort Carson, the SBCT would train at the PCMS. It is unknown at this stage in the analysis whether Fort Carson is a likely or unlikely candidate for that SBCT or, if the SBCT did come to Fort Carson, that it would be an additional stationing action or if an existing BCT stationed at Fort Carson would be sent elsewhere. Because of the lack of available information on such a possible future action, the SBCT stationing at Fort Carson is not considered a reasonably foreseeable action, and the cumulative impacts of the unknown Stryker location and PCMS transformation are not considered in the *PCMS Transformation FEIS*. If a decision is made to station the SBCT at Fort Carson, a site-specific analysis of the impacts of that stationing decision would be conducted at a future date, including an analysis of the training at the PCMS. The site-specific NEPA analysis for the SBCT stationing action(s) would consider the cumulative effects of the PCMS transformation action (as part of the baseline) in combination with the SBCT action(s).

Installation Setting and Mission

The PCMS is the maneuver site for Fort Carson. It is administered and used by military units stationed at, or otherwise under the responsibility of, Fort Carson, Colorado. The PCMS also provides RC training. The PCMS is located approximately 150 miles (mi) southeast of Fort Carson near Colorado Springs, and consists of approximately 235,000 acres. Fort Carson is discussed throughout this EIS because of the interrelationship between personnel stationing and training needs at Fort Carson and the PCMS.

Training at the PCMS prepares Soldiers for operational deployments and missions, including small-arms live-fire training and maneuver training exercises. The PCMS supports large training exercises that cannot be accommodated on Fort Carson because of its size limitations. It also supports individual weapons qualifications, as needed. The primary PCMS mission is to support maneuver training for large ground forces. Ground forces need large contiguous maneuver and training areas with urban warfare training complexes to support “free-flowing” exercises that replicate the contemporary operating environment as much as possible. Many units in Iraq and Afghanistan have been required to provide security across vast operational areas while responding to the range of unpredictable enemy activities with a disciplined and measured response on a moment’s notice. The PCMS is an important training center and is vital to Fort Carson’s preparation of Soldiers for combat missions.

The Army recognizes the need and is mandated by law to manage its training lands in a sustainable manner, and has instituted land and environmental management programs that provide effective natural resource management practices while also instituting environmental stewardship principles of its training lands. These program goals seek optimal training regimes while providing sustainable land management techniques for training lands for future military use.

Alternatives

No Action Alternative

Under the No Action alternative, the changes required by BRAC 2005, IGPBS, and AMF would not be implemented at the PCMS. Force structure, assigned personnel, and equipment would be as they existed prior to the development of these programs. This alternative is not feasible because the Army and Congress have determined realignment is necessary, and troops will need to train at the PCMS. The BRAC 2005 realignment at Fort Carson has been directed by Congress and must occur. The No Action alternative is included as required by the Council on Environmental Quality (CEQ) and Army NEPA-implementing regulations. The No Action alternative provides a benchmark to compare the magnitude of the environmental effects under the Proposed Action.

Under the No Action alternative, construction of the Proposed Action facilities would not occur. No major capital improvements would be implemented because none is anticipated other than those associated with BRAC 2005, IGPBS, and AMF.

Under the No Action alternative, the PCMS would continue to support training for AC and RC units assigned to or under the control of Fort Carson. Mechanized training rotations at the PCMS have been scheduled, on average, approximately 12 to 16 weeks per year since the PCMS was established. Recent use of the PCMS has been lower because of overseas deployments to support the global war on terror. Large mechanized rotations have primarily occurred from January to March, from July to August, and from September to November.

Training resources requirements under the No Action alternative would be in accordance with standards outlined in Army Training Circular (TC) 25-1 and TC 25-8, which were adopted in 2004. These training standards changed the dimensions of required training

areas and require a greater number of training rotations. Training requirements under the No Action alternative, therefore, are increased over the historical levels of use of the PCMS. Under the No Action alternative, the PCMS would need to be used at more than twice the historical levels. Existing land and environmental management programs would continue to balance training requirements and land sustainability.

Proposed Action

Under the Proposed Action of implementing Army transformation programs, the Army would increase use of the PCMS to provide training for AC units and additional RC units assigned to, or otherwise under the responsibility of, Fort Carson. The Army also would construct facilities to support longer-duration training rotations in the Cantonment and training facilities in the training areas. The Proposed Action is the Army's preferred alternative.

At the completion of transformation activities associated with BRAC 2005, IGPBS, and AMF, approximately 23,000 military troops would be permanently stationed at Fort Carson and train at certain times at the PCMS. This represents a total increase of approximately 8,500 Soldiers, including two Brigade Combat Teams and other support units.

The training component of the Proposed Action is based on unit training resource requirements as prescribed in TC 25-1 and TC 25-8. Training and maneuver activities under the Proposed Action would be similar to the types of activities that occur now on the PCMS. The increased training requirements of additional AC and RC units, however, would result in increased frequency of use of the training areas. It is likely that more training rotations would occur and that the duration of training exercises would increase to support new training requirements and additional Soldiers (which also occur under the No Action alternative). The PCMS also may be responsible for providing training for thousands of National Guard and RC troops. Under the Proposed Action, the Army would continue to implement land and environmental management programs and practices to maintain its training lands for continued use.

No units would be permanently stationed at the PCMS; therefore, the PCMS would not support long-term Soldier care and would have no role in providing permanent support for dependents, civilian contractors, or personnel other than a small custodial staff. The permanent stationing of troops, civilians, and their dependents is at Fort Carson and the nearby community. The *Fort Carson Transformation FEIS* was prepared to evaluate the effects of that stationing decision. To support longer-duration training rotations under the (PCMS) Proposed Action, the Army proposes to construct several support facilities at the PCMS. Within the Cantonment, these facilities include a Brigade Support Complex, medical facilities, storage facilities, minimum Soldier support facilities, a vehicle maintenance facility, motor pools, and upgraded roads and utilities. Many of the new Cantonment facilities would be austere, as are the current facilities. Outside the Cantonment, the Army would construct and operate a live hand grenade range, ammunition holding area, protective equipment training facility, upgrades to an existing small-arms range, and communication facilities. These projects are necessary to certify Soldiers for operational deployments, as required by AR 350-1 and Commanders Guidance. The projects proposed for construction in the training areas involve little ground disturbance during construction and operation.

Other Alternatives

In developing the Proposed Action, the Army considered several alternatives to balance training requirements and land availability. These alternatives included training troops at other locales, acquiring additional land to expand the PCMS, and varying training schedules to account for operational deployments. None of these alternatives was determined to be reasonable because it either was not approved or unreasonably restricted the Army's ability to respond to changing conditions. Therefore, only the Proposed Action and No Action alternative were carried forward in this EIS for detailed environmental analyses.

Alternatives to realigning troops were not considered in this EIS. Under the Base Closure and Realignment Act of 1990, decisions regarding the closure of bases and realignment of installations are not analyzed in NEPA documents.

In 2002, the Army also prepared a *Programmatic EIS for Army Transformation* to address environmental impacts of transformation activities on a national level. This EIS tiers from that analysis and provides a site-specific analysis of impacts at the PCMS.

Public Outreach

The Army invites public participation in the NEPA process. The PCMS NEPA Coordinator (phone: 719-526-0912, fax: 719-526-1705, or e-mail: carsdecampcmsnepa@conus.army.mil) is available throughout the process to answer questions about the scope, status, and progress of the EIS.

To identify the issues to be addressed in this EIS, the Army conducted public and agency scoping meetings early in the project development. A NOI to prepare an EIS was published in the *Federal Register* on November 23, 2005, and agency and public scoping meetings were held in April 2006. An agency scoping meeting was held in Pueblo, Colorado, and public scoping meetings were held in La Junta, Colorado, and Trinidad, Colorado. Approximately 2 weeks before the public scoping meetings, a notice was published in 10 general circulation papers.

At the agency scoping meetings, several questions were raised regarding specific plans for training rotations and the continuation of existing Army policies regarding erosion control and sedimentation. During the public scoping period, written and verbal comments were received from individuals and organizations on a variety of topics, including noise, water resources, cultural resources, biological resources, traffic and transportation, and other general comments. The DEIS addressed those issues.

The DEIS was released for public review on October 13, 2006. The Army provided a 45-day public comment period that ended on November 27, 2006, which is in accordance with NEPA regulations. In response to public and elected officials' requests, the Army extended the public comment period an additional 45 days (to January 11, 2007). On February 2, 2007, the Army announced another extension of the comment period for the *PCMS Transformation DEIS* in response to elected officials' requests. The additional extension was made because of severe winter weather in southeastern Colorado could have prevented local residents from sending comments to the Army before the close of the second comment period. The comment period for the DEIS ended on February 16, 2007.

The Army held three public meetings on November 1, 2006, in Fountain, Colorado, on November 2, 2006, in Trinidad, Colorado, and on November 3, 2006, in La Junta, Colorado, to receive comments on the DEIS, as described in Section 1.4 of the final environmental impact statement (FEIS). Approximately 200 people attended the meeting in Fountain, Colorado, and 22 chose to provide oral comments by speaking during the meeting. Approximately 250 people attended the meeting in Trinidad, Colorado, and 27 chose to provide oral comments by speaking during the meeting. Approximately 400 people attended the meeting in La Junta, Colorado, and 33 chose to provide oral comments by speaking during the meeting. During the public comment period, approximately 5,000 individual comments were received. All comments have been considered in preparing the FEIS. Copies of comments received on the DEIS and the Army's response to those comments are presented in Appendix H of this FEIS.

Environmental Consequences

The Army determined that the actions associated with the BRAC 2005, IGPBS, and AMF transformation programs had the potential to result in adverse environmental impacts at the PCMS (see Table ES-1). The Army decided to prepare an EIS to evaluate the environmental consequences that could result from implementation of these programs.

Implementation of the Proposed Action would result in adverse impacts to some environmental resources at the PCMS. Nearly all of the vegetated areas and wildlife habitat on the maneuver training area (most of the land area, excluding canyons and cantonment area) at PCMS could be disturbed during training exercises. Less mobile and burrowing wildlife species could be directly affected by training exercises. Recreational use of the PCMS for hunting could become more limited because of conflicts with increased training activity. Air quality impacts could result from increased convoy traffic, construction of facilities, operation of additional combustion equipment, maneuver training, and prescribed burns. Archaeological or paleontological resources could be encountered and inadvertently impacted during training activities. Training activities could adversely affect soils and make them more prone to wind and water erosion. The Army would continue to conduct monitoring before and after training to identify potential impacts associated with specific training exercises and modify training exercises where possible to minimize or avoid damage to environmental resources. Training damage associated with maneuver activities would continue to be monitored and repaired to sustain the training lands for continued use.

There are no other planned projects in the area that would have effects similar to the Proposed Action. Cumulative environmental impacts, therefore, are not expected for the Proposed Action.

In response to public and agencies comments on the DEIS, additional information or clarification of information has been added to the FEIS in the Executive Summary, Land Use, Water Resources, Biological Resources, Utilities, Hazardous and Toxic Substances, and Cumulative Effect. The additional information does not change the findings and conclusions of the DEIS.

A summary of impacts and mitigation measures is presented in Table ES-1 below.

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Land Use, Plans, and Policies		
Increased training could degrade training lands and affect the long-term availability of training lands for military use.	Same as the No Action alternative, but the magnitude would be greater because of increased frequency of training actions.	Continue the use of the Army's land management and environmental programs to provide for sustainable land management.
Increased training activities would reduce the availability of the training areas for hunting.	Same as the No Action alternative.	No mitigation is required because other publicly accessible hunting grounds are available in southeast Colorado and additional methods can be used to maintain hunting as a viable management tool.
Noise increases outside the installation boundaries from training activities could preclude locating residences or other sensitive receptors in these areas in the future.	Same as the No Action alternative.	Follow Army Regulation (AR) 200-1 and the <i>Installation Environmental Noise Management Plan</i> to monitor noise.
Air Quality		
Air emissions would be below established air quality thresholds. Current procedures for prescribed burning would continue to be implemented.	Increased training under the Proposed Action would increase convoy traffic on existing paved roads between Fort Carson and the PCMS. Potential impact to air quality from additional training activities would result from increased traffic on dirt roads and trails. Existing prescribed burning would continue.	No mitigation is required because emissions from the increase in training would not exceed threshold values. Prescribed burning would continue to follow Colorado Air Quality Control Commission's Regulation No. 9 and the annual prescribed burn plan.
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Construction activities could result in impacts to air quality because of wind-blown dust created by construction equipment, exhaust emissions from construction equipment, and the increased number of vehicle trips by construction workers.	Disturbed areas over 25 acres or areas that have been disturbed 6 months or longer are subject to site-specific state permits, which implement best management practices (BMPs). Visibility impacts from construction would not exceed thresholds.
Additional combustion equipment would be neither installed nor operated.	Operations emissions would be generated by using additional combustion equipment.	No mitigation is required because construction at the PCMS would not alter the PCMS' classification as a minor source. Operation of new stationary sources would not exceed regulatory thresholds; therefore, operation of the proposed facilities would not require permitting pursuant to prevention of significant deterioration regulations.

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PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Noise		
Increased training would not result in a perceptible increase in noise from increased convoy traffic.	Increased convoy movements would not result in a perceptible increased traffic noise.	No mitigation is required because impacts would be imperceptible.
Increased training would result in a negligible increase in noise from increased training activities.	Training activity at the proposed hand grenade range could increase noise levels outside the installation.	No mitigation is required because no known noise-sensitive receptors (for example, residences, schools) are located in the noise-affected areas outside the PCMS boundaries (that is., noise contours are well outside any residences).
Noise increases off post could discourage future development.	Same as the No Action alternative, but the magnitude could be greater because of increased frequency of training actions.	Follow AR 200-1 and the <i>Installation Environmental Noise Management Plan</i> to evaluate noise.
No increase in existing noise levels from construction.	Increase in noise levels from building construction and road maintenance would be temporary, and they would occur within the PCMS boundary.	No mitigation is required because noise associated with construction would not extend off site.
Geology and Soils		
Increased training under the No Action alternative could result in direct impacts to soils, such as compaction resulting from repeated vehicle passes and bivouacking, ruts resulting from tank pivot turns (turns from a stopped position), hull and turret defilades, and tank traps. These impacts result in soils that are susceptible to erosion by water and wind.	Same as the No Action alternative, but the magnitude could be greater because of increased frequency of training actions. Use of live hand grenades (only permitted on 150m x 150m [492 ft x 492 ft] hand grenade range) could cause localized soil disturbance that would increase erosion.	Continue to implement erosion control projects, BMPs, maneuver damage repair, and reclamation projects for areas damaged by training activities. If these programs are insufficient to mitigate adverse impacts, additional mitigation measures could be implemented.
Training on wet soils could increase rutting.		
Increased wind and water erosion in areas where vegetative cover is compromised.		
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Construction and demolition would temporarily increase the potential for erosion from ground disturbance.	Continue to implement existing programs and regulations to minimize the potential for soil erosion during construction and demolition activities. Minimize areas of disturbance during construction. Landscaping and reseeding upon construction would follow applicable standards for the Cantonment and the training areas.

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Water Resources		
Increased erosion from increased training activities, including mechanized maneuvers, crossing dry drainages, and training in wet conditions, could result in increased erosion and subsequent sedimentation of surface waters.	Same as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.	Continue to implement erosion control projects, BMPs, maneuver damage repair, and reclamation projects for areas damaged by training activities. If these programs are insufficient to mitigate adverse impacts, additional mitigation measures could be implemented.
Increased use of fuels and solvents during training increases the chances for accidental spills and releases into the environment that could adversely affect surface water or groundwater resources.	Same as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.	Continue to implement all applicable hazards management plans and training to address leaks or spills of hazardous materials.
Personnel and equipment could be affected by floodwaters when training in flood-prone areas, especially during flash flooding.	Same as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.	Continue to implement training procedures that direct troops to relocate from flood-prone areas when conditions are favorable for sudden storms and flash-flooding.
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Ground disturbance from construction and demolition activities could result in erosion or sediment transport to surface waters. Spills of fuels, solvents, or other hazardous materials used during construction could adversely affect water resources.	Continue to implement existing BMPs, follow permitting requirements, and adhere to the Directorate of Environmental Compliance and Management's water resources management program. Continue to implement all applicable hazards management plans to address leaks or spills of hazardous materials. Develop and implement a stormwater pollution prevention plan and file an NOI with the Environmental Protection Agency for each construction project larger than 1 acre to avoid or minimize the potential for impacts attributable to stormwater runoff during construction.
Construction of the Proposed Action facilities would not occur, therefore, no impacts would result.	Dewatering could be required during construction and could result in minimal impacts to surface waters.	Implement dewatering in accordance with the requirements of the Clean Water Act.
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Because floodplains have not been mapped for the PCMS, new facilities in the training areas could be located in areas subject to flooding conditions.	Locate new facilities in the training areas outside of known flood-prone areas, including areas immediately adjacent to arroyos.

TABLE ES-1

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PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Biological Resources		
<p>Soil compaction from mechanized vehicles and foot traffic, and damage from ammunition impacts related to small-arms firing could result in soil and vegetation disturbances; disturbance to migratory birds, raptors, or other wildlife, and their habitats; and a potential increase in noxious weed infestations.</p> <p>Accidental wildfires could result from mechanized and live-fire military training.</p> <p>Dismounted military training could flush or startle small mammals, ground nesting birds, and reptiles.</p>	<p>For training, impacts to vegetation, wildlife, and sensitive species would be similar to the No Action alternative, but the magnitude of impacts could be greater because of increased training frequency.</p>	<p>Continue prescribed burning to create buffer areas to provide additional protection from wildfires.</p> <p>Continue weed prevention and control, and avoid nesting birds by restricting mowing of road shoulders and prescribed burns to the extent possible during the nesting season.</p> <p>Continue surveys of power lines and other infrastructure for potential structural failures that may harm birds, and make necessary repairs efficiently.</p> <p>Continue practice of identifying golden eagle nest sites annually, establishing 1,640-foot (500-meter) buffers around each nest site, and restricting training in buffer zones from April through June.</p>
<p>The Proposed Action construction would not occur, therefore, no impacts to biological resources would occur.</p>	<p>For construction, activities in the Cantonment and training areas would cause temporary ground disturbance and result in permanent loss of small areas of regularly mowed vegetation.</p>	<p>Areas of vegetation disturbed by construction activities would be reclaimed and revegetated with native or other suitable vegetation, as appropriate.</p>
Cultural Resources		
<p>Construction of The Proposed Action facilities would not occur, and no impacts would result.</p>	<p>Construction activity in the Cantonment would have no effect on known cultural or prehistoric resources.</p> <p>Construction activity in the training areas that have not been surveyed could adversely affect cultural resources.</p>	<p>No mitigation required for use of areas inventoried for cultural resources that contain no National Register-eligible historic properties.</p> <p>Any activities with the potential to adversely affect cultural resources will be evaluated and resolved under the Section 106 effect determination and mitigation processes.</p>

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
All training activities could result in adverse impacts to cultural resources. The extent of the impact is contingent on two factors: the type of training and the landform on which the training will take place.	For training, same as the No Action alternative but potential for impacts could be greater because of increased frequency of training activities.	Areas that contain known National Register-eligible historic properties or that have not yet been surveyed will be used for dismounted training only until the proposed use area has been evaluated to determine that cultural resources can be protected against adverse impacts. If impacts cannot be avoided, further consultation with the Colorado State Historic Preservation Office, Advisory Council on Historic Preservation, and/or Native American Tribes, if applicable, regarding mitigation would occur prior to ground-disturbing activities.
Potential for inadvertent impact to previously unidentified cultural materials and/or human remains uncovered in the course of training or construction activities.	Same as the No Action alternative but potential could be greater because of increased frequency of training activities.	The "Inadvertent Discovery of Archaeological Resources or Burials" standard operating procedure (SOP) and "Native American Graves Protection and Repatriation Act" SOP will be applied and enforced.
Socioeconomics		
No change to socioeconomic conditions.	No change to socioeconomic conditions as a result of increased training activities or operations.	No mitigation is required because socioeconomic conditions would not change.
The Proposed Action construction activity would not occur.	Temporary economic benefits to the region of influence associated with construction expenditures and employment. Temporary influx of construction workers from outside the region of influence.	No mitigation is required because socioeconomic impacts would be beneficial.
No adverse impacts to low-income and minority communities.	No adverse impacts to low-income and minority communities.	No mitigation is required because socioeconomic conditions would not change.

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Transportation		
<p>Increased traffic on regional roadways from training deployments to the PCMS.</p> <p>Impacts to regional traffic or rail transportation would be negligible.</p> <p>No impacts to aviation would occur.</p>	<p>Increased traffic on regional roadways from training deployments to the PCMS. Some of the increased traffic would be on regional roadways operating at or near capacity.</p> <p>No impacts to aviation would occur.</p>	<p>Schedule all PCMS-related traffic movements to occur during off-peak periods on roadways operating near capacity.</p> <p>Stagger convoy vehicles into groups of no more than 24 vehicles each, spaced at least 15 minutes apart.</p> <p>Schedule all roadway and rail convoy movements through the Installation Transportation Officer at least 60 days in advance of the training rotation.</p> <p>Coordinate with state and federal officials for the addition of passing lanes on U.S. 160 and U.S. 350 as recommended in the 2006 <i>PCMS Traffic Study</i>.</p>
<p>Minor additional use of the rail line connecting Fort Carson and the PCMS.</p>	<p>Increased frequency of rail shipments of up to 100 days per year.</p>	<p>All rail shipments would be scheduled through the Installation Transportation Officer at least 60 days in advance of the training rotation to allow adequate coordination with the rail lines.</p>
<p>The Proposed Action construction activity would not occur and no impacts would result.</p>	<p>Temporary increase in traffic from construction. Temporary road closures on the PCMS could occur.</p>	<p>Schedule construction activities so that they would not interfere with training. Use traffic control procedures, such as detours, when appropriate.</p>
Utilities		
<p>Increased training activities could result in an increase in potable water demand above the current system design for 5,000 personnel per day.</p> <p>Deteriorated water supply and distribution lines could result in adverse effects to water supply.</p>	<p>Similar training impacts as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p> <p>Repair and upgrade of the distribution pipeline system would result in a beneficial effect to the potable water system.</p>	<p>Truck additional potable water to the PCMS if more than 5,000 personnel are present in the Cantonment and training areas.</p> <p>Implement planned upgrades of water lines.</p>
<p>Increased training activities could result in increased generation of wastewater that could exceed the capacity of existing septic systems.</p>	<p>Similar training impacts as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p> <p>Includes installation of new sewer mains to provide sufficient collection capacity for increased wastewater and storm water volume.</p>	<p>Arrange for septic systems to be serviced at a greater frequency and contract for additional portable toilets.</p> <p>No mitigation is required because the recently completed treatment/oxidation pond upgrade provides sufficient wastewater treatment capacity.</p>

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Increased frequency of training would result in increased power demand.	Increased frequency of training would result in increased power and gas demand. Similar training impacts as the No Action alternative, but the magnitude could be greater because of increased frequency of training actions.	No mitigation is required because electricity demand on the Cantonment would be met by the available electrical supply; demand in the training areas would be met with continued use of batteries and portable generators. Installation of power distribution lines under the Proposed Action to provide electricity to training facilities located on the west side of the training areas and installation of natural gas lines, new electrical distribution, and transformer upgrade for the Cantonment to support increased demand for energy.
Increased training could increase the quantity of heating oil and propane used.	Similar training impacts as the No Action alternative, but magnitude could be greater because of increased frequency of training actions.	Available supply of heating oil or propane is adequate to meet increased demand. No mitigation is required.
Existing training communication needs would continue to be unmet.	Installation of communication facilities would result in an improved communication system for training activities. Because the PCMS would have an improved ability to carry out its training mission, this would be a beneficial effect.	No mitigation is required because the impacts to the communication system at the PCMS would be beneficial.
Increased training could increase solid waste generation at the Cantonment and the training areas.	Similar training impacts as the No Action alternative, but magnitude could be greater because of increased frequency of training actions.	Continue to implement appropriate policies and practices in the existing <i>Integrated Solid Waste Management Plan</i> to address increased solid waste generation.
The Proposed Action construction activity would not occur, and no impacts would result.	Impacts could occur to underground utilities at unknown locations during ground-disturbing activities associated with construction.	Implement standard engineering practices to precisely locate utilities prior to construction to avoid inadvertent utility damage.

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
Hazardous and Toxic Substances		
<p>A hazardous waste management plan (HWMP) has not been required for the PCMS.</p> <p>Increased training activities would result in an increase in the use and storage of hazardous materials associated with routine vehicle and equipment maintenance, specifically fuels, batteries, lubricants, and pesticides.</p>	<p>Similar types of training impacts as with the No Action alternative, but magnitude could be greater because of increased frequency of training actions and the addition of facilities (for example, vehicle maintenance and hazardous material pharmacy).</p>	<p>Document the PCMS as a Conditionally Exempt Small Quantity Generator under the Resource Conservation and Recovery Act (RCRA).</p> <p>Prepare and implement a HWMP for hazardous waste potentially generated at PCMS.</p> <p>Continue to implement <i>Integrated Pest Management Plan</i> for transporting, storing, and handling additional pesticides. Wastes would continue to be properly disposed of at an off-post, permitted hazardous waste facility.</p>
<p>A spill prevention, control and countermeasures (SPCC) plan has not been developed for the PCMS.</p> <p>Increased training would result in an increase in the use of munitions at the ranges.</p> <p>Increased training could result in an increase of lead wastes at the small-arms live-fire ranges.</p>	<p>An SPCC plan has not been developed for the PCMS.</p> <p>Similar types of training impacts as with the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p> <p>Additionally, live grenades could be used on the proposed hand grenade range.</p>	<p>Prepare and implement an SPCC plan to prevent oil and petroleum spills in compliance with Title 40 of the Code of Federal Regulations (CFR), Part 112.</p> <p>Continue to implement the "Ammunition Supply Point" SOP for storage and transportation of additional munitions and targets.</p> <p>Detonate all live grenades prior to leaving the proposed hand grenade range.</p>
<p>There is the potential that lead-contaminated soils would need to be remediated in the future.</p>		<p>Remediate lead-contaminated soils, if required, to mitigate effects to human health and the environment.</p>

TABLE ES-1

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternative	Impacts of Proposed Action	Standard Practice/Mitigation
<p>The Proposed Action construction activities would not occur and no impacts would result.</p>	<p>Implementation would result in an increase in the use of petroleum-based products.</p> <p>Increased generation of medical waste from one new medical facility and storage of hazardous material at one new hazardous material pharmacy.</p>	<p>Continue to implement the <i>Underground Storage Tanks and Aboveground Storage Tanks</i> for accidental leaks and the storage of additional petroleum products.</p> <p>Document the PCMS as a Conditionally Exempt Small Quantity Generator under the RCRA.</p> <p>Prepare and implement a HWMP for hazardous waste potentially generated at the PCMS.</p> <p>Wastes would continue to be properly disposed of at an off-post, permitted hazardous waste facility.</p>
<p>Due to the increased numbers of Soldiers training at the PCMS, additional medical waste could be generated.</p>	<p>Similar types of training impacts as with the No Action alternative, but the magnitude would be greater because of the increased frequency of training actions.</p>	<p>Continue to implement the Evans Army Community Hospital Hazardous Material/Hazardous Waste Management Program and Fort Carson Management of Regulated Medical Waste to address any medical waste generated.</p>

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1.0 Purpose, Need, and Scope

This section presents the purpose and need for the Proposed Action, the scope of the environmental analysis under the National Environmental Policy Act (NEPA), a summary of the public involvement conducted in support of this *Pinon Canyon Maneuver Site (PCMS) Transformation Environmental Impact Statement (EIS)*, and the legal framework for the EIS analysis.

1.1 Introduction

The U.S. Army (Army) is currently undergoing transformational activities to respond to the emerging challenges of the 21st century. Chief among these challenges is the need to respond more rapidly to enemy threats across the full spectrum of military operations. These changes would affect most, if not all, aspects of the Army's doctrine, training, leader development, organizations, installations, materiel acquisition and fielding, and Soldiers.

The realignment and transformation of the PCMS would occur between 2006 and 2011. The Army is preparing this EIS in compliance with its responsibilities under NEPA to assess the direct, indirect, and cumulative environmental and socioeconomic effects of implementing three major Army programs at the PCMS.

The PCMS is located approximately 150 miles (mi) southeast of Fort Carson and consists of approximately 235,000 acres. The PCMS is the maneuver site for Fort Carson. It is administered and used by military units stationed at, or otherwise under the responsibility of, Fort Carson, Colorado. The PCMS also provides Reserve Component (RC) training.

Fort Carson will be discussed throughout this EIS because of the interrelationship between personnel stationing and training needs at Fort Carson and the PCMS. The Army is assessing environmental impacts of implementing the three major Army transformation programs on Fort Carson in the *Fort Carson Transformation FEIS*. Fort Carson is discussed in this EIS in instances where doing so provides context for alternatives at the PCMS. The Army is assessing the potential need for expanding the PCMS but expansion of the PCMS is not part of transformation and is not evaluated in this EIS (see Section 1.3.3).

The three major Army programs affecting Fort Carson are the Base Realignment and Closure (BRAC) 2005; the Integrated Global Presence and Basing Strategy (IGPBS), also called the Global Defense Posture Realignment (GDPR); and the Army Modular Force (AMF). Under the direction of these programs, which are described below, the PCMS must support training for additional troops stationed at Fort Carson and support additional training for RC units throughout the western United States. Implementing these requirements will involve constructing new facilities in the Cantonment to support longer-duration training exercises, constructing new facilities in the training areas, and increasing the use of the training areas at the PCMS.

1.2 Purpose and Need for the Action

The purpose of the Proposed Action is to implement BRAC 2005, IGPBS, and the AMF programs at the PCMS. The needs associated with these programs are summarized below.

1.2.1 Base Realignment and Closure

BRAC provides a process by which military installations are closed or realigned to meet the infrastructure, training, and force structure requirements of the military and save taxpayers' money. In previous years, the explicit goal of BRAC was to save money and downsize the military to reap a "peace dividend." During BRAC 2005, the Department of Defense (DoD) reorganized its installation infrastructure to support its forces efficiently, increase operational readiness, and facilitate new ways of conducting business. Recommendations of the BRAC 2005 Commission, made in conformance with the Base Closure and Realignment Act of 1990, require the realignment of essential missions (that is, relocation of organizational units from one post to another).

The BRAC 2005 Commission sought to help the United States armed forces adapt to changing threats, evolving technology, reconfigured organizational structures, and developed new strategies. The Commission's goal was to ensure that the Army's infrastructure supported the process of adaptation. Thus, BRAC 2005 represents more than cost savings. It supports advancing the goals of transformation, improving military capabilities, and enhancing military value.

The BRAC 2005 Commission submitted its recommendations to President George W. Bush on September 8, 2005. On September 15, 2005, President Bush notified Congress of his approval of the Commission's recommendations. Under the Base Closure and Realignment Act of 1990, as amended, Congress had until November 9, 2005, to reject those recommendations. When it did not do so, those recommendations became law (Defense BRAC Commission, 2005). The approved recommendations included the following:

- Realign Fort Hood, Texas, by relocating a Brigade Combat Team (BCT) and Unit of Employment Headquarters (HQ) to Fort Carson, Colorado.
- Realign the U.S. Air Force Academy, Colorado Springs, Colorado, by relocating (to Fort Carson) the inpatient mission of the 10th Medical Group and convert it into a clinic with an ambulatory surgery center.

BRAC 2005 would result in a new Division headquarters at Fort Carson to provide command and control for four BCTs, including the Heavy BCT (HBCT) from Fort Hood. The PCMS would provide a venue for large scale (for example, company, battalion, and BCT) maneuvers for new and existing troops stationed at Fort Carson. Fort Carson would be responsible for housing troops and supporting the needs of the Soldiers and their dependents, including Soldiers involved in training activities at the PCMS.

1.2.2 Integrated Global Presence and Basing Strategy

The IGPBS is a blueprint of recommendations outlining the size, character, and location of long-term overseas force presence. Its recommendations were developed before the initiation of formal BRAC 2005 activities as part of an interagency assessment of the DoD's long-term overseas force projection and basing needs. On the basis of the IGPBS

recommendations, the Secretary of Defense announced that some forces currently based overseas would return to the United States over a period of years.

Following IGPBS recommendations, the Secretary of Defense made a decision to temporarily station an Infantry BCT (IBCT) from Korea to Fort Carson in 2005. The Army has determined that this IBCT will be stationed permanently at Fort Carson and will train at the PCMS. Under its NEPA requirements, the Army issued a Record of Environmental Consideration (REC) for the temporary stationing of the IBCT at Fort Carson in 2005. The REC concluded that no environmental impacts would result from the temporary stationing action because net troop strength would not increase as a result of deployments of other Fort Carson units to Iraq. Analyses were conducted to confirm that economic and traffic impacts did not result from the restationing action (Directorate of Public Works [DPW], 2005).

1.2.3 Army Transformation and the Army Modular Force

In 1999, the Army initiated the transformation process to restructure and transform its active duty forces. In 2002, the Army prepared a *Programmatic Environmental Impact Statement for Army Transformation* (U.S. Army Corps of Engineers [USACE], 2002a) and signed a Record of Decision (ROD) (Army, 2002) to proceed with a 30-year phased implementation of Army transformation. To ensure the Army would be properly positioned to fully support ongoing operations in the global war on terror, an initiative was implemented to restructure combat brigades into self-sufficient and standardized BCTs and increase the number of combat brigades. This restructuring is known as the AMF initiative. The AMF provides an operational Army that is more powerful, flexible, and rapidly deployable and allows the Army to continue its transformation to a campaign-quality force with joint and expeditionary capabilities that meet future demands. The Army plans to implement AMF and convert all Active Component (AC) and RC units to BCTs, including existing forces stationed at Fort Carson, by 2007 and increase the number of AC BCTs in the Army from 28 to 43 by 2008.

As part of AMF, the Army adopted a decision to realign the 3rd Armored Cavalry Regiment (3rd ACR) from Fort Carson to Fort Hood. Two HBCTs would be stationed at Fort Carson, and new engineering, explosive ordnance, and military police units would be activated. The Army would activate and inactivate other smaller supporting units throughout the implementation period to support AMF and transformation.

Transformation also addresses changes in weapons systems. Future weapons systems would be more lethal and have targeting capabilities that surpass current weapons systems. Both aerial- and ground-operated robotics would be integrated into the transformed force. Digital command and control of units will become the standard, and digital ranges must be built to support these units. These technological changes would enable BCTs to operate on expanded battlefields and would require larger maneuver training areas to train effectively.

One of the most substantive results of the AMF initiative is the growing and evolving training requirement. Because changes to training requirements affect the land area required for training at the PCMS, these requirements are addressed separately in Section 1.2.4.

1.2.4 Army Training Strategy and Doctrine

Current training needs have been shaped by AMF and transformation, operational experience in Afghanistan and Iraq, and new equipment capabilities. Training resource requirements are outlined in Training Circular (TC) 25-1 (Army, 2004a), and training firing range and other training facility requirements are in TC 25-8 (Army, 2004b).

Training in the current operational environment requires large maneuver and training areas of varying characteristics with complex terrain. The Army has an increased need to conduct urban training operations because of the trends toward greater urbanization in operational theaters across the globe. The military's experiences from Iraq and Afghanistan have demonstrated that Special Forces operations, intelligence gathering, and the use of joint multi-service and multinational assets (for example, sister service and coalition) are also critical to mission success and the defeat of a poorly defined and dispersed enemy force. Consequently, the Army is emphasizing urban Special Forces, intelligence gathering, and joint and multinational training at the PCMS.

High-quality training that prepares Soldiers for what will be encountered in the operational environment is essential to ensuring the success of the nation's strategic defense objectives, national security, and the safety of Soldiers. Home stations, such as Fort Carson, and their maneuver sites, such as the PCMS, must prepare Soldiers for operational deployments and missions. This preparation includes live-fire mission support and maneuver training, each of which is discussed below.

1.2.4.1 Live-Fire Mission Support Requirements

Neither high explosives (such as TNT) nor practice rounds fired from tanks are used in training activities at the PCMS, and there is no dudded impact area on the PCMS. That type of training takes place at Fort Carson. At the PCMS, small-arms live-fire ranges provide for live-fire training opportunities to develop and improve Soldier and team proficiency and competence in the use of small-arms weapons, up to .50 caliber (machine gun).

Small-arms live-fire ranges provide live-fire training opportunities to develop and improve Soldier and team proficiency and competence in the use of sophisticated weaponry. Many of these opportunities are provided through simulated weapons systems, such as the Multiple Integrated Laser Engagement System (MILES). Individual Soldier proficiency and training ranges realistically portray combat conditions to mold the team into an effective fighting unit. These capabilities can be validated only on a live-fire range or complex.

The PCMS must accommodate live-fire ranges and facilities needed to certify Soldiers for deployments. Small-arms live-fire ranges and a maneuver live-fire range have been constructed in the last 3 years to help Soldiers qualify at the PCMS and reduce travel between Fort Carson and the PCMS.

In addition to large maneuver areas, the PCMS provides RC Soldiers and other units stationed at Fort Carson with the capability to conduct individual weapons qualifications, as needed (although most of this training occurs at Fort Carson). Existing live-fire, individual qualification ranges at the PCMS include the 9 millimeter (mm) pistol range, M-16/M-4 rifle range, the M60/M240/M249/M2 machine gun range, the M203 grenade-launcher range (using only practice grenades), and the maneuver live-fire range.

1.2.4.2 Maneuver Training Tasks and Maneuver Area Requirements

Ground forces need large contiguous maneuver or training areas with urban training range complexes and road networks to support “free-flowing” exercises that replicate the contemporary operating environment. Aviation, communication, reconnaissance, and artillery units operate above the ground and over large areas of non-contiguous land that is remote from other units. The effective integration of these units with ground maneuvers is increasingly critical to the success of Army operations and requires intensive training and rehearsal at home stations.

Many units in Iraq and Afghanistan have been required to provide security across vast operational areas while responding to the range of unpredictable enemy activities with a disciplined and measured response on a moment’s notice. Army BCTs and battalions are required to conduct training missions across the spectrum of operations likely to be executed “in theater.” This includes peace support and stability operations (for example, humanitarian aid and riot control), low-intensity conflict response (for example, counter-insurgency operations), and missions simulating high-intensity conflict (for example, battlefield engagements against an equipped, armed, and organized opposing force). Effective live training, carried out to a high doctrinal standard, is the cornerstone of operational success. Simulating noncontiguous training increases the depth of the battlefield and requires increased reliance on command, control, communications, and reconnaissance and intelligence gathering systems. It requires flexibility and the movement of units to support combat maneuver elements of the BCT. Combat support and combat service support units could be located in brigade or battalion areas that are distant from the forward combat and maneuver elements; such units also must be prepared to provide security over large areas and respond to enemy actions as the operation and tactical situation changes. Extensive land areas (30 mi by 10 mi [48 kilometers [km] by 16 km]) are currently required to test such skills and capabilities. The BCT is responsible for areas approximately the same size as areas covered by an entire division during World War II.

Additional training considerations include the need to conduct realistic maneuver training at night without interference from point source light pollution. This is especially important because the Army uses night capabilities to its advantage. Operating at night is a critical task for both ground maneuver and aviation units, especially for aviation units using night-vision equipment. As with non-contiguous area training, night exercises require large areas and flight corridors located away from base camps and other light sources.

In addition to having adequate space to conduct maneuver exercises, effective and realistic training requires the types of terrain that could be encountered in various regions and ecosystems of the world where Army units might be deployed. Deserts, forests, plains, and mountains all present unique challenges to units conducting combat and support operations, and as discussed above, providing Soldiers with urban training complexes is becoming increasingly important to ensure operational readiness.

Army doctrinal training requirements for the maneuver sites of the two primary Army combat units (HBCT and IBCT) and their component units are presented in Table 1-1. These units represent the structure of the Army, after implementation of the AMF.

TABLE 1-1

Summary of Maneuver Training Requirements by Unit Type
PCMS Transformation EIS, PCMS, Colorado

Maneuver Unit Type	Number of Assigned Units	Size of Training Area Required		Training Rotation Duration (weeks)	Frequency of Training Required (number per year)
		miles	km		
HBCT	1	30 x 10	48 x 16	3	1
Battalion	3	30 x 5.0	48 x 8	3	1
Company	11	10 x 3.7	16 x 6	1	5
Platoon	35	3.7 x 2.5	6 x 4	1	5
IBCT	1	12 x 7.5	19 x 12	3	1
Battalion	3	24 x 7.5	38 x 12	3	1
Company	8	10 x 3.7	16 x 6	1	5
Platoon	26	3.7 x 2.5	6 x 4 km	1	5

Source: U.S. Army Forces Command (FORSCOM), 2006

Fort Carson can support the land-area requirements of platoon and limited company maneuver operations but does not have the contiguous maneuver acreage to support doctrinal battalion or BCT-level training. Training projections for Fort Carson (which are evaluated in the *Fort Carson Transformation FEIS*) establish that Fort Carson can meet platoon-level maneuver requirements, but most company and all battalion and BCT maneuver training will be supported by the PCMS. The implementation of maneuver training requirements at the PCMS under the No Action alternative and the Proposed Action analyzed in this EIS is described in detail in Sections 2.2.4 and 2.3.4, respectively.

1.2.5 Installation Sustainability

On October 1, 2004, the Secretary of the Army and the Chief of Staff issued *The Army Strategy for the Environment: Sustain the Mission, Secure the Future* (Army, 2004c). The strategy focuses on the interrelationships of mission, environment, and community. A sustainable installation simultaneously meets current and future mission requirements, safeguards human health, improves quality of life, and enhances the natural environment. A sustained natural environment is necessary to allow the Army to train and maintain military readiness. This strategy is reinforced by Army Regulation (AR) 200-1, Environmental Quality: Environmental Protection and Enhancement, and reinforces the Army's commitment to applying sustainable policies and practices to safeguard the environment. It builds upon the numerous environmental plans and policies that are developed and implemented to protect environmental resources at the PCMS. Appendix A summarizes key plans and policies in place at the PCMS.

The Army has implemented numerous voluntary programs to achieve a more sustainable installation at Fort Carson and the PCMS. Several goals have been established, both for short-term and long-term implementation, in areas such as energy/water, transportation, air quality, buildings, and training lands. The Army has received numerous awards and recognition both in the military community and from external organizations regarding its commitment to the environment and sustainability at both the PCMS and Fort Carson. Some

notable examples of the Army's sustainability program at the PCMS and Fort Carson are provided in Section 1.2.5 of the *Fort Carson Transformation FEIS*. Specifically related to operations at the PCMS are the following:

- Transport of maneuver training vehicles and equipment to the PCMS for training exercises by rail when possible to reduce highway wear and air emissions.
- Frequent monitoring and rehabilitation of training ranges to maintain training land sustainability (further described in Section 2.2.4.4 and throughout this EIS).
- Incorporation of pollution prevention principles at the PCMS using the *Pollution Prevention Plan* (DECAM, 2004b).

As noted throughout this EIS, the PCMS will operate in compliance with applicable environmental regulations. Additionally, the PCMS has committed to achieving a higher level of environmental performance through continued progress towards its sustainability goals. However, implementation of these voluntary measures may be subject to funding limitations. Additional information regarding the PCMS and Fort Carson sustainability achievements and future goals can be found at <http://sems.carson.army.mil/>.

The *Pollution Prevention Plan* (DECAM, 2004b) applies to both the PCMS and Fort Carson, and provides a comprehensive approach to waste and resource management that seeks to reduce the impact that an operation or activity has on the environment by reducing or eliminating the production of wastes, by using energy and raw materials more efficiently, and by promoting sustainable practices. Additional information regarding the *Pollution Prevention Plan* and its use at the PCMS is provided in Section 3.12 and in Appendix A.

The Army recognizes that executing training to doctrinal standards to maintain the readiness of its units results in impacts to training lands. To manage its training lands in a sustainable manner, the Army has instituted land and environmental management programs to support sound natural resource management practices and provide stewardship of its training lands. The Integrated Training Area Management (ITAM) program establishes procedures to achieve optimum, sustainable use of training lands by implementing a uniform land management program. Elements of the program include inventorying and monitoring land condition, integrating training requirements with land carrying capacity while training to standard, educating land users to minimize adverse impacts, and prioritizing and implementing rehabilitation and maintenance projects. The program seeks to optimize training while providing sustainable land management that would ensure that training lands continue to be available to support the Army's mission. ITAM is governed by AR 350-19 (Army, 2005a) and Fort Carson Regulation 350-9 (Fort Carson, 2001). Fort Carson also has promulgated Fort Carson Regulation 350-4, Training, the PCMS (Fort Carson, 1999a) and Fort Carson Regulation 350-10, Maneuver Damage Control (MDC) Program (Fort Carson, 2004) to protect training lands from permanent damage. Additional resource management procedures are provided in Fort Carson's *Integrated Natural Resource Management Plan* (INRMP) and *Environmental Assessment* (Directorate of Environmental Compliance and Management [DECAM], 2002a), *Integrated Cultural Resource Management Plan* (ICRMP) for Fort Carson and the Pinon Canyon Maneuver Site, 2002-2006 (ICRMP) (DECAM, 2002b), and other plans and procedures as summarized in Appendix A. Implementation of the ITAM and other environmental programs at the PCMS under the No

Action alternative and Proposed Action analyzed in this EIS is described in greater detail in Sections 2.2.4 and 2.3.4, respectively. The INRMP is reviewed and updated regularly, is approved by regulatory agencies, and is certified by the Wildlife Habitat Council, a non-profit group dedicated to restoring and enhancing wildlife habitat.

1.2.6 Public Law 104-201

Public Law 104-201, the National Defense Authorization Act for Fiscal Year (FY) 1997, extended for another 15 years the withdrawal from all forms of appropriation under the public land laws, including 2,517.12 acres of public land and approximately 130,139 acres of federally owned minerals. These areas, as described in Section 2903 of Public Law 104-201, are entirely located within the boundaries of the PCMS, and the land and minerals are withdrawn from public use for military purpose.

The withdrawals require the Secretary of the Army to determine at least 3 years before the termination (September 2008) whether the withdrawals will need to be extended because of continuing military need. The legislation requires the Secretary of the Army to determine if there will be a continuing military need, to “evaluate the environmental effects of renewal of such withdrawal and reservation,” and hold at least one public hearing regarding that evaluation. The results of BRAC 2005, along with the other transformation actions previously described, clearly reflect that the Army’s military need for the PCMS will continue.

The environmental effects of the renewal of the withdrawal are essentially the effects of the Army’s continued use of the PCMS. The two possibilities for how the land may be used are fully embodied in either the No Action alternative or the Proposed Action. Therefore, the Army will use the EIS as the required evaluation of the environmental effects of renewal of the withdrawal. The public meetings that were held after release of the DEIS served as the public hearing required by Public Law 104-201. The U.S. Department of Interior (USDI) had no comment on the land and mineral withdrawal (see Appendix H). Upon completion of this EIS, the Army will have satisfied its requirements under Public Law 104-201 as recited above. It will then have the authority to file an application to the USDI for extension or renewal of the withdrawal and reservation of the public lands and mineral rights at the PCMS. Such a renewal or extension will require congressional legislation, and such legislation will itself be subject to analysis under NEPA.

1.3 Scope of the EIS

The Army prepared this *PCMS Transformation FEIS* in compliance with its responsibilities under the NEPA to assess the direct, indirect, and cumulative environmental and socioeconomic effects of implementing transformation activities at the PCMS. The EIS was prepared in accordance with the requirements of NEPA, the Council on Environmental Quality (CEQ) NEPA-implementing regulations (40 Code of Federal Regulations [CFR] 1500), Army NEPA-implementing regulations (32 CFR 651), and other relevant environmental laws and regulations, Executive Orders (EOs), and Army regulations.

1.3.1 Context for Environmental Analysis Under NEPA

Under the Base Closure and Realignment Act of 1990, Congress limited the scope of NEPA as it applies to the decision to close and realign bases. NEPA does not apply to the

consideration of alternatives related to the realignment decisions. That is, for receiving posts such as Fort Carson, the NEPA analysis does not include considering alternative posts for realignment. Accordingly, this document does not address the need for restationing or the decision to send units to Fort Carson, but it does assess potential environmental impacts associated with implementing the BRAC 2005 recommendation.

The ROD resulting from the *Programmatic Environmental Impact Statement for Army Transformation* (USACE, 2002a) states that “Prior to implementation of transformation-related projects or proposed actions at specific sites, the Army will analyze each action to evaluate potential environmental effects. Identification of site-specific or project-specific mitigation will occur through this process.” Accordingly, this EIS tiers from the programmatic EIS and addresses the potential environmental impacts that could result from implementing transformation actions at the PCMS.

1.3.2 Scope of Environmental Analysis

The Army determined the new construction and training activities that are associated with supporting realigned and relocated troops have the potential to result in adverse environmental impacts to air quality, biological resources, cultural resources, and geology and soils at the PCMS. Consequently, the Army has prepared an EIS for this action.

For some of the transformation activities affecting the PCMS, such as planned construction projects, detailed plans have been initiated. For other actions, some information is known (for example, new weapons will be developed) but not enough detail is available to assess impacts of future actions. Therefore, this EIS may be used as a basis on which to tier subsequent environmental documentation for currently unforeseen future actions proposed in the mission, Cantonment, training areas, or environmental management programs.

This EIS includes, where applicable, appropriate measures to minimize and mitigate impacts that would result from implementing the Proposed Action. The ROD will specify mitigation measures to be implemented based on Army review of impacts and consultation with regulatory agencies.

1.3.3 Potential Future Expansion of the PCMS

The scope of this FEIS does not include potential land acquisition or expansion of the PCMS. The Proposed Action and alternatives included in this FEIS assess the environmental impacts associated with continued (and increased) use of the existing PCMS (i.e., conducting training and constructing facilities within the boundaries of the existing 235,000-acre Army training facility). The following discussion provides background on the planning that has occurred and an update on a recent Army decision related to potential future expansion of the PCMS. The relationship between the transformation action evaluated in this FEIS and the potential future expansion of the PCMS that will be evaluated in a subsequent EIS is discussed in more detail in Section 2.1.3.

Subsequent to the release of the *PCMS Transformation DEIS* in October 2006 (and prior to the release of this *PCMS Transformation FEIS*), the Under Secretary of Defense for Acquisition, Technology and Logistics (USD [AT&L]) approved a waiver request to allow the Army to “begin the Real Estate Planning Report and the Environmental Impact Study including the

Environmental Baseline Study” for acquisition of approximately 418,000 acres of land in the vicinity of PCMS (U.S. Army, *Major Land Acquisition Moratorium Request*, February 7, 2007.

Now that the waiver has been approved, the Army is formulating a NOI for an EIS. The NOI is the first step in the NEPA process, and it must contain a description of the proposed action and alternatives to the proposed action.

Once the NOI is completed, it will be published and followed by the entire EIS process, which will undoubtedly be lengthy, culminating in the signing of a Record of Decision (ROD). Even then, though, the Army cannot by law (10 United States Code [U.S.C.] 2676) purchase any property unless the acquisition is expressly authorized by Congress. As noted in Army Regulation 405-10 (Acquisition of Real Property and Interests Therein), “[w]hile the Federal Government has the inherent power to acquire land for its constitutional purposes, this power can be exercised only at the discretion of Congress.

Preliminary planning identifying considered training land shortfalls at the PCMS and Fort Carson began prior to 2003 with the Revision to Section 7 of Fort Carson’s *Range and Training Land Program Development Plan* (Nakata Planning Group, LLC, 1999). From 2003 to 2007, Fort Carson continued to prepare documents to demonstrate the need to expand the PCMS and satisfy the requirements of the major land acquisition waiver request. In accordance with federal law and Army regulations, these documents were forwarded to higher headquarters, Headquarters of the Army (HQDA), and eventually the USD (AT&L) for “review and concurrence” that land acquisition is an action worthy of consideration. Between 2004 and 2006, the Army conducted several outreach meetings with landowners and other interested parties in the vicinity of the PCMS to discuss the Army’s desire to expand the military training facility. Although the Army did not (and does not) have a specific plan for land acquisition, Fort Carson made its intentions (and the circumstances required for internal approval to initiate consideration of the action) clear.

In February 2007, more than 4 years after the first internal publication assessing potential expansion, a waiver to the land acquisition moratorium was granted allowing the Army to move forward with an EIS (and other studies). This waiver occurred 15 months after the NOI for the transformation action was published in the *Federal Register* and 4 months after the public release of the *PCMS Transformation DEIS*. The Army recognizes that many people and agencies in southeastern Colorado and elsewhere are concerned about the Army’s activities at the PCMS, including the issue of the potential for future expansion of the PCMS. The Army is sensitive to the large number of local landowners and residents who expressed this concern, including many long-time residents who live and work on ranches, many of which have been in their families for generations. The Army understands the pride of heritage of many residents, including ranchers and family members who value their way of life and are worried about changes that might occur if expansion of the PCMS proceeds subsequent to evaluation in a separate EIS. The potential expansion of the PCMS will be addressed in a separate EIS that will have a full opportunity for public involvement and participation.

Based on comments received on the DEIS and on recent Army decisions relevant to expanding the PCMS, the Army has revised the *PCMS Transformation FEIS* to update the discussion of land acquisition and expansion of the PCMS. In particular, Section 1.4.4 discusses public comments received on expansion, Section 2.1.3 discusses the relationship

between expansion and transformation, and Sections 1.3.3, 2.4.2, 3.13.2 and the Executive Summary of the DEIS have been revised in the FEIS to clarify in more detail the issue of land expansion at the PCMS and its relationship to the Proposed Action evaluated in this FEIS. None of the additions, modifications, or clarifications to the *PCMS Transformation DEIS* changes the findings of environmental impacts or mitigations of the DEIS.

1.3.4 Stryker Brigade Combat Team

Fort Carson is being considered as one of five possible alternative locations for the future stationing of the Stryker Brigade Combat Team (SBCT). These various locations are being assessed in the *Draft Supplemental Environmental Impact Statement for the Permanent Stationing of the 5th Stryker Brigade Combat Team (SBCT)*. If the Army makes the decision in the Record of Decision (ROD) for that Supplemental EIS (SEIS) to station the SBCT at Fort Carson, the SBCT would train at the PCMS. It is unknown at this stage in the analysis whether Fort Carson is a likely or unlikely candidate for that SBCT or, if the SBCT did come to Fort Carson, that it would be an additional stationing action or if an existing BCT stationed at Fort Carson would be sent elsewhere. Because of the lack of available information on such a possible future action, the SBCT stationing at Fort Carson is not considered a reasonably foreseeable action, and the cumulative impacts of the unknown Stryker location and PCMS transformation are not considered in the *PCMS Transformation FEIS*. If a decision were made to station the SBCT at Fort Carson, a site-specific analysis of the impacts of that stationing decision would be conducted at a future date, including an analysis of the training at the PCMS. The site-specific NEPA analysis for the SBCT stationing action(s) would consider the cumulative effects of the PCMS transformation action (as part of the baseline) in combination with the SBCT action(s).

1.4 Public Involvement

The Army invited public participation in the NEPA process. Consideration of the comments of all interested persons promoted open communication and enabled better decision making. All agencies, organizations, and members of the public with a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, were provided the opportunity to participate in the decision-making process.

1.4.1 Overview of the Public Involvement Process

Public participation opportunities for this EIS and decision making on the Proposed Action are guided by 32 CFR 651. The EIS process begins with involving the public, agencies, and other interested parties in the scoping process to identify the issues to be addressed. A DEIS is then prepared and filed with the U.S. Environmental Protection Agency (EPA), and the Army publishes a Notice of Availability (NOA) in the *Federal Register* and in newspapers in the vicinity of the Proposed Action. A 45-day comment period begins on the date EPA announces the availability of the DEIS in the *Federal Register*. During the 45-day comment period, but after at least 15 days following publication of the NOA, a public meeting is held to provide an opportunity for public, organizations, and regulatory agencies to present comments and information. A FEIS is then prepared that addresses all comments received on the DEIS. The FEIS is filed with EPA and made available to the public through a NOA publication in the *Federal Register*. A final decision on the Proposed Action, which is documented in a ROD, may be made after a 30-day waiting period. A ROD is a public

document that states the decision, the alternatives and factors considered, the preferred alternative, and any mitigation measures outlined in the FEIS. The NOA of the ROD also is published in the *Federal Register*.

Throughout this process, the public was able to obtain information on the scope, status, and progress of the Proposed Action and the EIS process through the PCMS NEPA Coordinator (phone: 719-526-0912, fax: 719-526-1705, or e-mail: carsdecampcmsnepa@conus.army.mil).

1.4.2 Scoping and Public Notice

On November 23, 2005, the Department of the Army issued the "Notice of Intent (NOI) to Prepare Environmental Impact Statements for Realignment Actions Resulting from the 2005 Base Closure and Realignment Commission's Recommendations" (70 FR 70793). In addition, individual letters were sent to invite agencies to a scoping meeting, and notice of two public scoping meetings was announced in local papers and through a public service announcement.

1.4.2.1 Agency Scoping

Agencies with permitting review responsibilities and other interested parties were invited to an agency scoping meeting held at the Pueblo Convention Center in Pueblo, Colorado, on April 24, 2006, from 1:00 to 2:00 p.m. Of the 39 invited agencies, representatives from the following seven agencies attended the agency scoping meeting:

- USACE, Southern Colorado Regulatory Office;
- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS);
- Colorado Division of Wildlife (CDOW);
- Pikes Peak Area Council of Governments;
- U.S. Department of the Interior;
- U.S. Geological Survey (USGS);
- USDI, U.S. Fish and Wildlife Service (USFWS); and
- Colorado Division of Water Resources.

The agency scoping meeting was conducted in a presentation format. The Director of DECAM presented information about the proposed actions at both the PCMS and Fort Carson. The presentation was supported by the NEPA Coordinator for the PCMS, the NEPA Coordinator for Fort Carson, and other resource area experts from the PCMS and Fort Carson. The meeting lasted approximately 45 minutes.

Agency representatives in attendance raised general questions or issues for consideration in the EIS during a question and answer period following the presentation. CDOW requested clarification on whether any training restriction times would be imposed. The PCMS staff indicated that the training schedule was presently undetermined and acknowledged that the training calendar could be 365 days per year. The PCMS staff also indicated, however, that not all training would be mechanized, which would allow land rest, and that any

necessary mitigation for habitat and training restrictions would be addressed in the EIS. USGS voiced concern regarding soil erosion and sedimentation in streams with increased training activities. NRCS expressed concern regarding the spread of noxious weeds caused by increased training activities (the PCMS intends to continue its existing noxious weeds program). No written agency comments were received.

1.4.2.2 Public Scoping

Public scoping meetings were held at Otero Junior College in La Junta, Colorado, on April 26, 2006, from 6:30 to 8:00 p.m., and at Trinidad State Junior College in Trinidad, Colorado, on April 27, 2006, from 6:30 to 8:00 p.m. Approximately 2 weeks before the public scoping meetings, notice of the public meetings was published in the following 10 general-circulation papers:

- *The Gazette;*
- *Fountain Valley News;*
- *Pueblo Chieftain;*
- *La Junta Tribune-Democrat;*
- *Bent County Democrat;*
- *Fowler Tribune;*
- *Trinidad Chronicle;*
- *Rocky Ford Daily Gazette;*
- *Ordway New Era;*
- *The Ag Journal; and*
- *Hispania News.*

These public notices provided information on the background and purpose of the Proposed Action, requested public comment on this DEIS, and provided information on the public scoping meetings held as part of the EIS process. In addition, a public service announcement regarding the public scoping meetings was released by Fort Carson on April 12, 2006 initiating the public scoping period. Notice of the public scoping meetings also ran on television and radio.

At both meetings, the Army was represented by its staff from the PCMS and Fort Carson DECAM, Operations, Planning and Training (G-3), Aviation, and the DPW and supported by its consultants. The public scoping meetings were conducted in a combined presentation and workshop format. Attendees were greeted on arrival and asked to sign an attendance record form, listing their name, address, affiliation (if any), and whether they would like to be added to a project mailing list. Each guest was also given a comment form to submit written comments or concerns they would like addressed in the EIS. The Army requested that comment forms be completed and returned at the meeting or provided to the Army via mail, e-mail, or phone before the end the scoping period on May 11, 2006.

Poster displays at stations introduced the public to resource issues. The stations were staffed by DECAM and DPW resource experts who were available to explain the project and its implications on resources. DECAM staff gave a presentation and answered questions from the audience. The meetings each lasted approximately 2 hours.

Written and verbal comments on the scope of the EIS were received from individuals and organizations during the public comment period on the following topics:

- Biological resources;
- Cultural resources;
- Noise;
- Traffic and transportation;
- Water resources; and
- General comments.

1.4.3 Review of the DEIS

During the preparation and review of the DEIS, the Army coordinated closely with local, state, and federal entities to ensure that issues of concern and relevance to the transformation Proposed Action were considered. Results of agency consultation are referenced in the respective resource areas included in Section 3.0.

In accordance with CEQ and Army regulations for implementing NEPA, a period of public comment on the DEIS was provided prior to completion of this FEIS. This section provides an overview of the review period and public review meetings, and summarizes the types and numbers of comments received on the DEIS. Comments that were received have been considered in preparing the FEIS. Appendix H contains a complete record of the comments submitted to the Army on the *PCMS Transformation DEIS* and presents the Army's responses to those comments

The public review period for the DEIS was from October 13, 2006, to February 16, 2007. The NOA of the DEIS, as well as announcement of public review meetings, was published in the *Federal Register* on October 13, 2007 (71 FR 60509). In addition, display ads were placed in the same 10 local newspapers as the scoping announcements, and federal, state, and local agencies as well as members of the public that participated in scoping were sent letters announcing the availability of the DEIS and providing details regarding the public review meeting. Members of Congress received an informational packet, including Questions and Answers, describing the DEIS. Copies of the DEIS were available online <http://www.hqda.army.mil/acsim/brac/nepa_eis_docs.htm>, placed in local libraries, and mailed to anyone that requested a copy. Section 5.0 of this FEIS presents a distribution list for the DEIS.

The NOA provided for a 45-day public comment period, which is in accordance with NEPA regulations (40 CFR 1506.10[c]). The initial comment period ended on November 27, 2006. The Army extended the public review period by an additional 45 days in response to requests by the public and elected officials. The extension was publicized in the *Federal Register* (71 FR 69652) and local newspapers. On February 2, 2007, the Army announced another extension of the comment period (72 FR 5049) for the *PCMS Transformation DEIS* in response to elected officials' requests because of severe weather in southeastern Colorado that could have prevented citizens of the region from getting comments to the Army before the close of the second comment period. The comment period for the DEIS ended on February 16, 2007.

The Army held three public meetings to receive comments on the DEIS. Meetings were held in Fountain (near Colorado Springs), Trinidad, and La Junta, Colorado, on November 1, 2, and 3, 2006, respectively. The meetings were announced in local newspapers and through a public service announcement released by Fort Carson. The meeting notices also provided

details about the meeting format and agenda, which included a self-guided review of background materials and display boards between 5:30 and 6:00 p.m., and oral comments from 6:00 to 7:30 p.m. Approximately 900 people attended these meetings, and 82 chose to provide oral comments.

The public was greeted on arrival and asked to sign an attendance record form listing their name, address, and affiliation (if any). An informational packet including the following documents was provided at the sign-in:

- Copy of the Executive Summary of the *PCMS Transformation DEIS*
- NEPA Fact Sheet
- Questions and Answers about the *PCMS Transformation DEIS*
- Public Comment Forms

Display boards about the DEIS also were available outside of the meeting rooms for review before the Army presentation and oral comment period began at approximately 6:00 p.m.

At the welcome table, each person was asked if he/she wished to provide oral comments at the meeting. Anyone desiring to make oral comments was asked to sign in at a separate speakers' table, where he/she was given information about providing oral comments at the meeting. Speakers were signed up to speak in the order in which they arrived, except that elected officials were given an opportunity to speak first if they chose to.

At approximately 6:00 p.m., Mr. Tom Warren, Director of DECAM at Fort Carson, conducted a short slideshow presentation about the Proposed Action evaluated in the DEIS, the EIS process and progress, and the process for public comment on the DEIS. An Army consultant facilitated the oral comment period beginning with an overview of the meeting logistics - emergency exits, restrooms, informational packets, speaker sign-in sheets, and meeting sign-in sheets. The facilitator explained how the oral comment period was organized. Each speaker was limited to 3 minutes and needed to be ready to speak when his/her name was called. Speakers and the audience were asked to respect the time limits, use common courtesy and appropriate language, and not to interrupt or talk when others are speaking. The facilitator also noted that all comments on the DEIS would be addressed in the FEIS regardless of the manner in which they were received, and speaking at the public meeting was one of many options available to citizens wishing to provide input to the DEIS.

Approximately 200 people attended the meeting in Fountain, Colorado, and 22 chose to provide oral comments by speaking during the meeting. Approximately 300 people attended the meeting in Trinidad, Colorado, and 27 chose to provide oral comments by speaking during the meeting. Approximately 400 people attended the meeting in La Junta, Colorado, and 33 chose to provide oral comments by speaking during the meeting. Media coverage of the meetings included television and newspaper outlets. The meeting on November 1, 2006, was held jointly with the *Fort Carson Transformation DEIS* meeting, and most of the comments received were related to the PCMS action or to the potential future expansion of the PCMS. Note that comments related to the Fort Carson transformation action are addressed in the *Fort Carson Transformation FEIS*.

During the public comment period, approximately 5,000 individual comments were received on the *PCMS Transformation DEIS*. Appendix H contains the comments received,

including the transcripts of the public review meetings, and presents the Army's responses to those comments. In some cases, comments prompted clarification from the DEIS that are reflected in the FEIS. Those instances are noted in the applicable portions of this FEIS. None of the clarifications changes the findings or conclusions of the DEIS.

1.4.4 Comments Received on the Expansion of the PCMS

The Army received many comments on the potential future land acquisition in the vicinity of the PCMS. All comments and responses to those comments are provided in Appendix H of the FEIS. As noted in Section 1.3.3, during the DEIS public comment period, the DoD has made decisions relevant to the waiver on land acquisition around the PCMS, and these decisions and their relationship to the PCMS transformation Proposed Action have been included in the FEIS.

The Army stated throughout the process for this *PCMS Transformation FEIS* that expansion was a potential future action that is not ripe for NEPA analysis and would not affect the decision making for the transformation Proposed Action. All public announcements in newspaper notices and in public presentations clearly stated that this EIS would not address the potential future PCMS expansion; rather, it would address only the mission changes and associated impacts to the existing PCMS footprint.

The Army understands the public's concern about expanding the PCMS. All expansion-related comments received on this EIS provide a solid foundation for the scoping process for the expansion EIS and are helpful to the Army in determining the scope of the significant issues that will need to be addressed in an upcoming proposed PCMS expansion EIS. All the oral and written comments made at the meetings have merit, and the Army will consider them as it moves forward with the PCMS expansion EIS. The Army also will provide notice to interested persons of future meetings and opportunities for input on the EIS evaluating potential acquisition.

1.4.5 Ongoing Public Involvement at the PCMS

Through preparation and review of this EIS, several members of the public expressed the need to contact the Army about routine operations at the PCMS. For environmental matters, the public should contact the PCMS DECAAM point of contact at (719) 524-0123. For all other matters, the public should contact the Commanding General's hotline at (719) 526-2677 or by Internet at <http://www.carson.army.mil/hotline/index.html>.

1.4.6 Availability of the FEIS

The NOA of the FEIS was published in the *Federal Register* on June 22, 2007. Newspaper and individual letter notifications also were provided in the same manner as the DEIS notices. No public meetings will be held for the FEIS. As with the DEIS, the FEIS is available online <http://www.hqda.army.mil/acsim/brac/nepa_eis_docs.htm>, at local libraries, and by request of the PCMS NEPA Coordinator.

PCMS NEPA Coordinator
Directorate of Environmental Compliance and Management
1638 Elwell Street, Building 6236
Fort Carson, Colorado 80913-4000
Telephone: 719-526-0912
Fax: 719-526-1705
E-mail: carsdecampcmsnepa@conus.army.mil

After a 30-day review period, the Army plans to issue a ROD. The NOA for the ROD will be published in the *Federal Register*. The ROD completes the EIS process.

1.5 Legal Framework

The scope of this EIS is to evaluate how the transformation activities of the Proposed Action would be implemented at the PCMS (see Section 1.3). The timing for implementing the Proposed Action is contingent upon numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations at the PCMS, the Army is mandated by AR 200-1 to comply with all applicable federal, state, and local environmental regulations and the requirements of environmental permits. Many of these guiding statutes and regulations are discussed throughout Section 3.0, where applicable, for the resources evaluated in this EIS.

2.0 Alternatives

2.1 Introduction

This section describes the No Action alternative and the Proposed Action. Section 2.2 presents the No Action alternative, as required by NEPA (40 CFR 1508.25[b]). Section 2.3 presents the Proposed Action, which is the Army's preferred alternative. Section 2.4 presents the alternatives considered but eliminated from detailed consideration because they do not meet the purpose and need. This EIS evaluates environmental effects of implementing the No Action alternative and Proposed Action (preferred alternative) at the PCMS.

As discussed in Section 1.1, the transformation activities at Fort Carson are evaluated in the *Fort Carson Transformation FEIS*. Fort Carson is discussed in this EIS because the PCMS is considered as part of Fort Carson for command and administrative responsibilities. Fort Carson is also the home station for all of the AC units that train at the PCMS, and it supports training for smaller units on its ranges.

2.1.1 Location

The PCMS is located in southeastern Colorado in Las Animas County, approximately 150 mi southeast of Fort Carson (see Figure 2-1). The PCMS is bounded by U.S. Highway 350 (U.S. 350) to the west, Purgatoire River Canyon to the east, Las Animas County Road 54 to the south, and Otero County to the north. Nearby cities include Trinidad to the southwest and La Junta to the northeast.

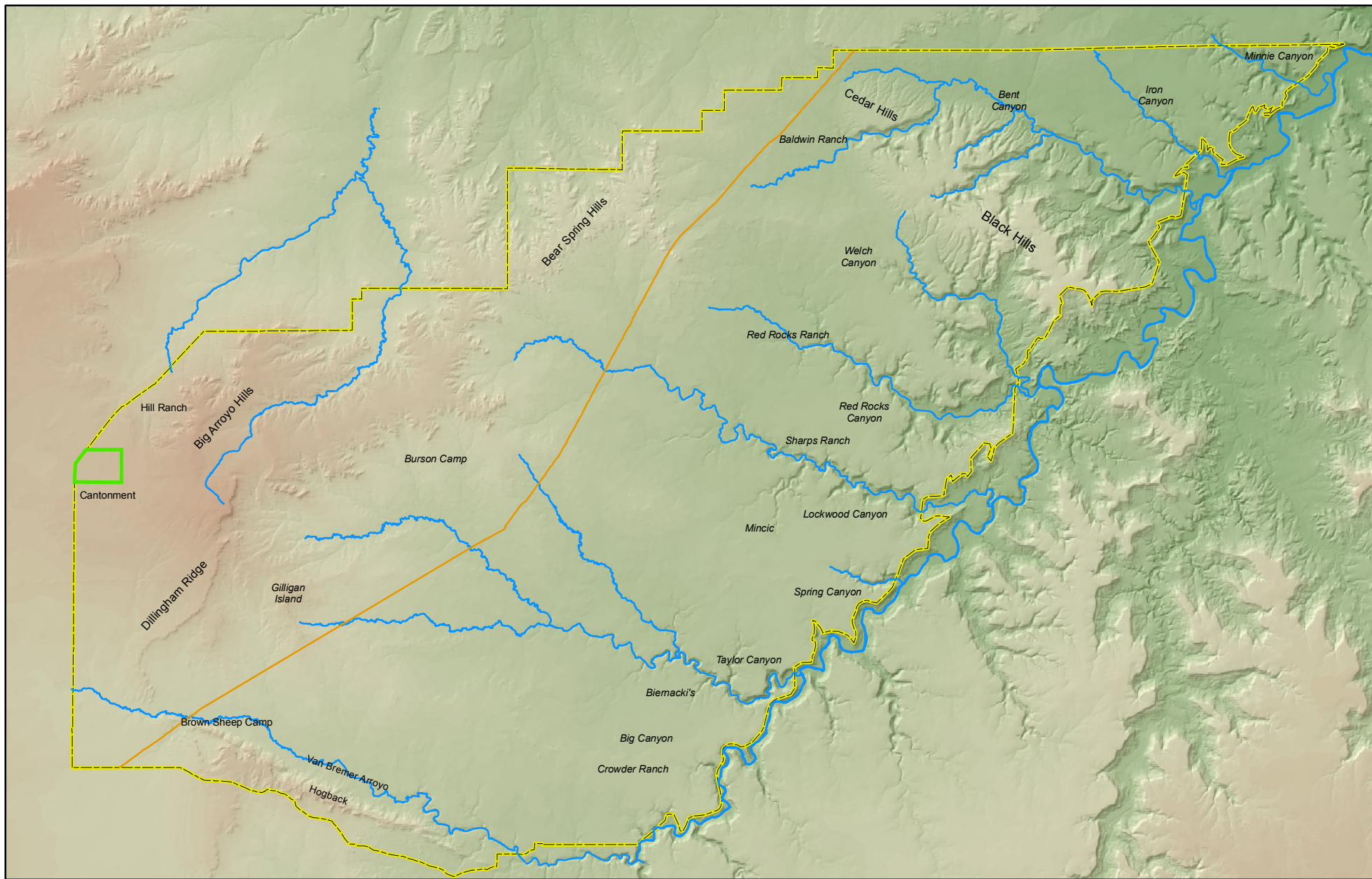
2.1.2 Study Area

As a result of BRAC 2005, IGPBS, and AMF, nearly all available land within the boundaries of the PCMS would be affected by project alternatives. The majority of construction would be within the Cantonment, although several small-scale range projects are also planned. All areas outside of the Cantonment comprise the PCMS training areas. The training areas within the PCMS boundary would be subject to increased troop training. Figure 2-2 shows the Cantonment and training areas. (Areas outside the Cantonment are used for training.)

The primary study area includes land within the PCMS boundary. Effects to areas in the vicinity of the PCMS are described and considered, as appropriate, in Section 3.0 on the basis of the region of influence (ROI) for specific environmental resource areas. For example, biological resources are primarily affected within the boundary of the PCMS, but socioeconomic resources could be affected at the county level, including Las Animas, Otero, and Huerfano counties.



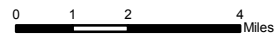
FIGURE 2-1
Regional Location Map



Legend

- Installation Boundary
- Cantonment Area
- Surface Water
- Existing High-Pressure Gas Line

FIGURE 2-2
Locations of Cantonment and Training Areas at the PCMS



2.1.3 Relationship between Transformation and the Potential Future Expansion of the PCMS

As discussed in Section 1.3.3, the potential future expansion of the PCMS is not evaluated in this EIS but will be evaluated in a subsequent EIS, in accordance with federal law and Army regulations. The following discussion provides additional details about the preliminary planning that the Army has conducted to support its major land acquisition waiver request, and why the future expansion of the PCMS is not part of the Proposed Action for this FEIS, is not an alternative to the Proposed Action for this FEIS, and is not a reasonably foreseeable future action that can be evaluated as part of the cumulative impact analysis for this FEIS. Appendix H (particularly Section H.1.1) expands on these discussions in response to specific public and agency comments on expansion.

2.1.3.1 Army Planning for Major Land Acquisitions

As noted in Section 1.3.3, the Army is bound by a moratorium prohibiting public proposals for land acquisition without explicit approval from the OSD. Without a waiver from that land acquisition moratorium, the Army cannot issue a NOI to initiate an EIS. Now that the waiver has been approved (see Section 1.3.3, above), the Army has committed to initiating an EIS process for this new action. This commitment has been consistently stated throughout the pre-planning studies to support the waiver request, in the *PCMS Transformation DEIS*, and in all public forums for the DEIS, including the scoping meetings and the meetings conducted during the extended public review period for the DEIS (see Section H.1.1, subheading “PCMS Transformation EIS Public Scoping Meetings and Expansion,” in Appendix H). Although the decision has now been made to initiate an expansion EIS, neither a proposed action nor a set of reasonable and feasible alternatives has been developed. Approval has been given only to begin real estate planning and initiate an EIS and environmental baseline study. The Army is developing its proposed action and initial set of alternatives to support its NOI for the expansion EIS, and will initiate a public scoping process with the issuance of the NOI (in accordance with 32 CFR 651.45).

2.1.3.2 Expansion is Not Part of the PCMS Transformation Proposed Action or a Reasonable Alternative to the Proposed Action

Land acquisition for expansion is a future action that could occur, but the determination of if, how, when, and where it could occur is contingent on numerous studies, processes, and public discussion that may require several years of consideration. Because of the immediate need for implementing the transformation actions, expansion is neither a reasonable component of the Proposed Action of the *PCMS Transformation FEIS* nor a reasonable and feasible alternative to it.

Expansion of the PCMS is not part of the Proposed Action for this FEIS. The transformation Proposed Action incorporates modifications to training requirements in ways that best meet training needs (see Section 2.2.4.2) and can be implemented as a stand-alone action (i.e., troop realignment, training, and construction) that does not require expanding the PCMS boundaries. That is, land acquisition is not necessary or proposed to implement the Proposed Action in the *PCMS Transformation FEIS*.

Expansion is not a reasonable alternative to the Proposed Action for PCMS transformation because the lack of information on a defined proposed action for expansion (and the time

necessary to develop a proposed action for expansion) would delay the *PCMS Transformation EIS* beyond the timeframe for the Army to implement transformation at the PCMS. The need for transformation, as discussed in this FEIS, is immediate. Transformation activities are mandated by BRAC and other Army initiatives and will occur independent of future expansion (see Section 1.2 of the DEIS). The potential expansion of the PCMS will be addressed in a separate EIS that will provide a full opportunity of public involvement and participation.

The discussion of potential expansion in this FEIS under Section 2.4.2, *Alternatives Considered but Dismissed*, has been supplemented to update the discussion on the basis of the waiver decision that was made subsequent to the issuance of the NOI and the release of the DEIS for the Proposed Action. In addition, that section is also modified to clarify the rationale for not evaluating expansion as an alternative to the *PCMS Transformation FEIS*. Appendix H (specifically Sections H.1.1 and H.1.4) also addresses the consideration of expansion as an alternative to the transformation action.

2.1.3.3 Cumulative Analysis of the Transformation and Expansion Actions

In accordance with the CEQ's NEPA regulations, the *PCMS Transformation FEIS* includes an adequate assessment of the potential cumulative impacts of implementing the Proposed Action in combination with the potential future expansion of the PCMS. The expansion action is at such a preliminary stage (i.e., no proposed action has been developed, no NOI to prepare an EIS has been published in the *Federal Register*, no EIS has been initiated) that effective cumulative analysis of such a future action is not reasonable or feasible.

Additionally, although an EIS will be initiated for expansion, approval for expansion requires many steps, including congressional approval, and is not imminent. Substantive public discussion will accompany the review of an expansion proposed action. As noted in EPA (1999) guidance for review of cumulative impact analysis, the best indicator of whether a project is reasonably foreseeable is whether final approval has been obtained or if the project (not the planning of the project) is imminent. As noted in Section 3.13 of the FEIS, when the Army defines the proposed action for expansion, it will consider the cumulative effects of this action in combination with expansion in the future EIS when sufficient data are available to make that analysis meaningful.

2.2 No Action Alternative

Under the No Action alternative, the changes required by BRAC 2005, IGPBS, and AMF actions at Fort Carson (as discussed in detail in Section 2.3) would not be implemented at the PCMS. Force structure, assigned personnel, and equipment would be as they existed prior to the development of these programs. Facility construction and training activities would occur as needed to support the pre-BRAC 2005, pre-IGPBS, and pre-AMF conditions and would undergo separate NEPA review prior to implementation in accordance with regulations and current practice. Therefore, the No Action alternative does not include construction of new facilities.

This alternative is not feasible because troops would be moving to Fort Carson and would need to be trained at the PCMS (as discussed in Section 1.0). Nevertheless, this alternative is included as required by CEQ and Army NEPA-implementing regulations. The No Action

alternative provides a benchmark to compare the magnitude of the environmental effects of the Proposed Action.

2.2.1 Force Structure

The No Action alternative considers the force structure that was in place in fall 2005 when the BRAC 2005 recommendations were finalized. This baseline establishes a measure to compare the No Action alternative with the Proposed Action. The baseline is realistic in terms of overall troop levels and training needs. The stationing of units, however, is dynamic, and the description of the force structure described here might not depict the on-the-ground conditions at Fort Carson and related training schedules at the PCMS. Additionally, deployments in Iraq and Afghanistan mean that many of the troops assigned to Fort Carson are not physically located on the post or training at the PCMS.

Under the No Action alternative, the PCMS would provide temporary Soldier and support facilities to meet the training requirements of the following major units stationed at Fort Carson:

- 3 BCT, 4th Infantry Division (3-4 ID);
- 3rd ACR;
- 43rd Area Support Group (43 ASG); and
- 10th Special Forces Group (10 SFG).

The 3rd ACR consists of three cavalry squadrons (battalion-sized units comprised of 45 ground-maneuver platoons), an aviation squadron, and a support squadron. With nearly 5,000 Soldiers assigned, the 3rd ACR is the largest unit to train at the PCMS.

The 3-4 ID consists of three maneuver battalions (two infantry battalions and one tank battalion), 10 maneuver companies, and 33 maneuver platoons. The 3-4 ID has 3,800 Soldiers and is the second largest unit to train at the PCMS. The 43 ASG consists of approximately 2,800 Soldiers. The 10 SFG consists of approximately 1,200 personnel in three battalions. Other support and smaller units comprise the remainder of Fort Carson's 14,500 assigned Soldiers.

In the fall of 2005 when the BRAC 2005 recommendations were finalized, approximately 3,300 Soldiers associated with the 2 BCT, 2nd Infantry Division (2-2 ID) were temporarily stationed at Fort Carson. These Soldiers were not included in the No Action alternative baseline numbers because they were not permanently assigned to Fort Carson, and they did not increase the actual population at Fort Carson because of the deployment of the 3-4 ID. The permanent stationing of the 2-2 ID is included as part of the Proposed Action.

2.2.2 Equipment

Under the No Action alternative, Fort Carson supports approximately 650 tracked vehicles, 1,800 wheeled vehicles, 85 helicopters, eight Tactical Unmanned Aerial Systems (TUASs), 48 Small Unmanned Aerial Systems (SUASs), and other non-combat vehicles. Tracked vehicles, such as tanks, use rotating tracks for mobilization, whereas wheeled vehicles use rubberized tires on wheels for travel. Helicopters and Unmanned Aerial Systems (UASs), which includes TUASs and SUASs, generally support ground maneuvers, but helicopters are sometimes used independently of other maneuvers. Note that all permanently assigned helicopters are currently associated with the 3rd ACR and are, therefore, only applicable to

the No Action alternative because the 3rd ACR has relocated to Fort Hood and is not part of the force structure under the Proposed Action.

The type, use, and training area requirements of the equipment assigned to the PCMS and/or Fort Carson are described in Table 2-1. Photographs of the equipment are presented on Figure 2-3. Maneuver scenarios at the PCMS could use 81-millimeter (mm), non-dud producing (non-explosive practice rounds) mortar rounds. The 81-mm mortar practice rounds are either filled with concrete or are hollow.

TABLE 2-1

Equipment Assigned to the PCMS and/or Fort Carson
PCMS Transformation EIS, PCMS, Colorado

Category	Equipment	Mission	Training Area Requirements
Tracked Vehicles	M1 Abrams Main Combat Tank	Provides heavy armor superiority on the battlefield (simulated ammunition)	Maneuver areas and firing ranges
	M2/M3 Bradley Fighting Vehicles	Provide protected transport of an infantry squad and overwatches fires to support the dismounted infantry (simulated ammunition)	
	M-109 Paladin Self-Propelled Howitzer	Provides the primary artillery support for armored and mechanized units (155-mm artillery training round)	
	M113 Armored Personnel (mortar) Carrier	Provides a highly mobile, survivable, and reliable tracked-vehicle platform that is able to keep pace with Abrams and Bradleys	
Wheeled Vehicles	Family of Medium Tactical Vehicles (FMTV)	Fills the Army's medium tactical-vehicle requirements for mobility and resupply, and transportation of equipment and personnel	Maneuver areas
	Heavy Expanded Mobility Tactical Truck (HEMTT)	Provides heavy transport capabilities for re-supply of combat vehicles and weapons systems	
	High-Mobility Multipurpose Wheeled Vehicle (HMMWV)	Provides a common light tactical vehicle capability	
	Palletized Load System (PLS)	Performs line haul and unit resupply; rapid movement of combat-configured loads of ammunition and all classes of supply, shelters and containers	
Engineer Equipment	Dozers, scrapers, loaders, excavators, dump trucks	Performs horizontal construction to ensure mobility and post support for strike, sustainment, and logistics forces	Maneuver areas and dig locations; excavation training might require clearing and grubbing

TABLE 2-1
 Equipment Assigned to the PCMS and/or Fort Carson
PCMS Transformation EIS, PCMS, Colorado

Category	Equipment	Mission	Training Area Requirements
Aerial	Unmanned Aerial Systems (UAS)	Provides commanders the ability to see beyond the horizon, conduct reconnaissance, and strike targets	Adequate launch surface, facilities for Ground Control Station (with line of sight requirements); airspace coordination
Indirect Fire	Towed Howitzer	Provides long-range destructive, suppressive, and protective indirect and direct field artillery fires (training ammunition – Litre rounds)	Maneuver areas and firing ranges
	Mortars	Provides medium-range indirect fire support (training ammunition – Litre rounds)	
Anti-armor	Javelin Anti-Tank Missile	Provides a man-portable, highly survivable medium anti-tank weapon system (simulator)	Maneuver areas and firing ranges
	Tube-Launched, Optically-Sited, Wire-Guided (TOW) Missile System	Defeats threat armored vehicles and urban enclosed threats at extended ranges in all expected battlefield conditions (simulator)	
Individual and Crew-Served Weapons	M2 .50-Caliber Machine Gun	Engages targets with accurate automatic direct fire (.50 caliber)	Firing ranges
	MK-19 Automatic Grenade Launcher	Engages targets with accurate automatic indirect fire (40 mm training grenades)	
	M240B Machine Gun	Engages targets with accurate direct automatic fire (7.62 mm)	
	M249 Squad Automatic Weapon	Engages targets with accurate direct automatic fire (5.56 mm)	
	M-4 Carbine	Engages targets with accurate direct fire (5.56 mm)	
	M9 Pistol	Engages targets with accurate direct fire (9 mm)	
	M-16 Rifle	Engages targets with accurate direct fire (5.56 mm)	
M203 Grenade Launcher	Engages targets with accurate indirect short-range fire 40 mm training grenades)		



AH-64 Apache *



CH-47 Chinook *



OH-58D Kiowa Warrior *



UH-60 Blackhawk *



Raven SUAS



Shadow TUAS



Javelin Anti-Tank Missile



M1 Abrams Main Combat Tank



M2 .50 Cal Machine Gun



M2/M3 Bradley Fighting Vehicle



M113 Armored Personnel
(Mortar Carrier)



Mortars



M203 Grenade Launcher



M-16 Rifle



M249 Squad Automatic Weapon



M-4 Carbine



M9 Pistol



M-109 Paladin
Self-Propelled Howitzer



MK-19 Automatic Grenade
Launcher



M240B Machine Gun



Family of Medium Tactical Vehicles



Palletized Loading System



Towed Howitzer



Tube-Launched, Optically-Tracked,
Wire-Guided Missile System



Heavy Expanded Mobility
Tactical Truck



Dozers, Scrapers, Loaders,
Excavators, Dump Trucks



High-Mobility Multipurpose
Wheeled Vehicle

FIGURE 2-3

Equipment Used at or Assigned to the PCMS and Fort Carson

*After implementation of transformation activities no helicopters will be permanently assigned to the PCMS or Fort Carson

2.2.3 Construction and Operation

Under the No Action alternative, no major capital improvements would be implemented. Any facility construction on the PCMS under the No Action alternative would be subject to separate environmental review under NEPA. No major capital improvements would occur because none is anticipated other than those associated with BRAC 2005, IGPBS, and AMF.

2.2.4 Training Requirements Under the No Action Alternative

This section provides an overview of the factors that influence how training is implemented and describes the typical training activities that have the potential to result in impacts to the environment.

2.2.4.1 Training Needs

Under the No Action alternative, the PCMS would continue to support training for AC units and some RC units assigned to, or otherwise under the responsibility of, Fort Carson. In non-wartime conditions, the PCMS would support the rotations of the 3-4 ID, 3rd ACR, 43 ASG, and 10 SFG.

The 3-4 ID, 3rd ACR, and 10 SFG each has three ground maneuver battalions (referred to as squadrons in the case of the 3rd ACR), and each of these battalion-sized units is required to conduct two 3-week maneuver training rotations per year for a total of 54 weeks of training per year (9 battalions x 6 weeks = 54 weeks). A battalion-size unit rotation requires half of the land area at the PCMS. Therefore, under the No Action alternative, the PCMS would be fully used for battalion-size maneuver training for 27 weeks. Additional training would be needed to support the 43 ASG, other smaller units, and RC units.

The 3-4 ID and 3rd ACR conduct large mechanized training at the PCMS. As described by DECAM (1997), a 3-4 ID rotation typically consists of 2,000 to 3,000 vehicles of all types and 3,000 to 5,500 personnel. A rotation of the 3rd ACR consists of more vehicles and personnel. Rotations last 4 to 5 weeks total time. Full-strength maneuver is usually 3 weeks, and rotations last 4 to 5 weeks, including additional time for travel, staging, and downtime for wet weather.

Mechanized training rotations at the PCMS have been scheduled, on average, approximately 12 to 16 weeks per year since the PCMS was established. For approximately 8 months of the year, the land is able to rest and recover. This level of use equates to two to three large mechanized rotations, with smaller operations interspersed (DECAM, 1997). Large mechanized rotations have primarily occurred from January to March, from July to August, and from September to November.

The training requirement under the No Action alternative is more than twice the amount of training that has historically occurred at the PCMS. There are two primary explanations for the difference between projected use under the No Action alternative and documented historical use. First, operational deployments abroad have precluded units at Fort Carson from using the PCMS to meet training requirements. Second, up to half of the 3-4 ID and 3rd ACR maneuver training rotations have been supported by the National Training Center (NTC) at Fort Irwin, California. However, NTC is projected to be heavily scheduled in coming years because of the activation of an additional 10 brigades across the Army and the return of forces from overseas to the United States. In comparison with past conditions, it is

forecast that the NTC area would have limited availability to support units assigned to Fort Carson. Units assigned to Fort Carson would continue to use the NTC for force-on-force exercises, which might occur once every 2 years if scheduling permits.

2.2.4.2 Description of Training Activities

Under the No Action alternative, the types and areas of training activities would continue as now. The training areas at the PCMS provide areas for different types of training, as listed below. Numbered training areas are available for maneuver, and lettered training areas are available for dismounted training only. Small-arms live-fire ranges, when in use, preclude other training activities. There are also small restricted areas at the PCMS. Use of these areas is summarized here and further described in Section 3.2.1.3.

- Maneuver (or mechanized) training areas, which comprise the majority of land at the PCMS, support equipment (tracked vehicles, wheeled vehicles, and engineer equipment) moving throughout the area in accordance with the requirements of the training exercise. No live fire weapons or explosive ammunitions are used by tanks at the PCMS. Only small arms weapons (pistols, machine guns, etc.) employ live firing on their designated ranges). The MILES is used to simulate a realistic battlefield environment for tank training (see Section 2.3.4.1). Maneuvers can occur both on-road and off-road. Mechanized training can result in heavy soil disturbances because equipment movements are not limited.
- Small-arms live-fire ranges at the PCMS include locations where small arms (up to .50 caliber) are fired. Small-arms live-fire ranges at the PCMS are used as maneuver training areas when not active.
- Dismounted training areas are areas where Soldiers can move on foot but no vehicular traffic is permitted. Dismounted training areas at the PCMS primarily include canyons that are unsuitable for mechanized training. Dismounted training results in environmental impacts that are similar to recreational uses, such as hiking or camping.
- Restricted areas protect, to varying degrees, cultural resources, fragile soils, facilities, or environmental values and are restricted from certain types of training activities, depending on the resource to be protected. Therefore, activities in these areas do not normally result in any adverse environmental impacts.

Existing regulations and land management practices as described below would continue to be implemented.

2.2.4.3 Coordination of Training Development

The process for implementing the training mission includes extensive coordination with ITAM, DECAM, Directorate of Plans, Training, and Mobilization (DPTM) Range Division, Unit Commanders, Troop Commanders, and other entities. These other entities include, but are not limited to, Military Police, the Range Facility Management Support System, Fort Carson Safety Officer, RC units National Guard units, the U.S. Air Force Air Liaison officer, Air Route Traffic Control, and the Director of Public Works. DECAM coordinates changes in training operations or land use that could have adverse impacts to the environment and provides information and recommendations regarding environmental resources and environmental requirements. ITAM integrates mission requirements and land maintenance

to optimize training. Other parties external to the PCMS also are contacted regularly to ensure that safety concerns are factored into training exercises. For example, the Army could also contact the Denver Air Traffic Control Center regarding a specific training exercise being planned.

Under the No Action alternative, existing land and environmental management programs would continue to be implemented. The ITAM program would continue to monitor training activities, institute projects to minimize training damage, and educate units to limit damage to training lands. ITAM is a dynamic program for collection and review of maneuver data and land conditions. Because the condition of training lands is highly variable, depending on the amount and type of training and the climatic conditions during training, the ITAM program does not set specific ratios for land rest to sustain training lands. Instead, the ITAM program provides a process by which the post directorates (primarily the G-3, Directorate of Plans, Training, and Mobilization [DPTM], DPW, and DECAM) work together to provide input regarding the training needs and the environmental condition of the training lands.

Environmental plans developed by DECAM staff, in coordination with relevant regulatory agencies and approved by the Garrison Commander, would continue to be followed to manage environmental resources in a manner that complies with environmental laws and regulations and avoids unnecessary environmental damage. Units training at the PCMS would continue to be briefed by resource specialists regarding the protection of resources and mitigation measures (such as avoidance of areas with known cultural resources) that have been included in specific training exercises. Decisions on training activities would continue to balance current training needs and protection measures to maximize the training mission.

2.2.4.4 Environmental Considerations and Safety Measures

The Army considers several factors when implementing its training mission. Some of the factors considered include natural, climatic, biological, and cultural resource conditions in the training areas and troop safety. It is in the Army's interest to sustain the land at the PCMS for future training activities as described in Section 1.2.5. In addition, measures to ensure the safety of troops during training also include conditions that protect natural and cultural resources. On the basis of this process, the Army effectively incorporates mitigation for environmental impacts into implementation of its training mission. The extensive coordination regarding use of the training areas includes maintaining the training areas in a way that meets the training mission and manages the training areas to avoid environmental impacts that would compromise the training mission. This coordination is documented in several ways, including preparation of a risk management assessment and live-fire certification. The entities noted above (see Section 2.2.4.3) are involved in developing pre- and post-training planning and assessment.

The measures listed below illustrate the comprehensive consideration of the future condition of the environment in developing training exercises. Examples of the measures incorporated in the development of all training include the following:

- No animal may be captured, killed, taken, wounded, injured, harassed for any reason (with the exception of authorized, permitted hunting).
- Cutting or damaging live or standing dead trees or bushes is prohibited.

- Established roads should be used in areas that are reforested or reseeded.
- Removing, defacing, vandalizing artifacts or other cultural remains is prohibited.
- Burning or burying refuse is prohibited.
- Vehicle use should be avoided in wet or dry drainages.
- Unnecessary disturbance of wildlife species or their habitats is prohibited.
- The potential for wind and other factors to spread fires is evaluated.
- The weather is monitored to avoid training in severe weather conditions.

Prior to use for training, DPTM Range Division inspects training areas and evaluates them in accordance with Fort Carson Regulations 350-10 (MDC Program [Fort Carson, 2004]) and 385-63 (Firing Ammunition for Training, Target Practice, Administration and Control of Ranges and Training Areas [Fort Carson, 1997]). During each rotation, DPTM Range Division Inspectors might observe the daily training and interact with military training personnel and unit leaders. During these interactions, or at other times as necessary, resource and environmental management professionals make recommendations to unit leaders about maneuver damage, soil moisture conditions, wildlife locations, locations of cultural resources, and other locations where sensitive environmental resources could be adversely affected by training. Units then make necessary adjustments to training exercises, at the commander's discretion.

After each rotation, DPTM Range Division inspects the areas according to Fort Carson Regulations 350-10 and 385-63. DPTM Range Division may compile a detailed "After Action Report" pertaining to all environmental elements affected by the exercise in conjunction with the support from ITAM Program with DECAM resource management professionals as appropriate.

Several long-term monitoring programs are in place at the PCMS to monitor land conditions. The Range and Training Land Assessment program (USDA, 2001a) is a statistically based program that primarily monitors vegetation but also monitors habitat composition. Other resources monitored at the PCMS include stream flow (quantity and quality), noise, and cultural resources. These data provide additional inputs to the suitability of lands for specific training exercises and are factored when training plans are developed.

2.2.5 Land Sustainability

Under the No Action alternative, periods of ground maneuver training would continue to be interspersed with periods of rest and recovery as determined necessary and appropriate under the procedures described above. These procedures have proven effective in maintaining the sustainability of the training areas.

2.3 Proposed Action

As discussed in Section 1.0, the mission of the PCMS is to prepare Soldiers for operational deployments and missions by providing training areas for units stationed at, or otherwise under the control of, Fort Carson. The PCMS accommodates large contiguous maneuver and

training areas that cannot be accommodated at Fort Carson because of size limitations. The PCMS also provides small-arms live-fire ranges and facilities needed to certify Soldiers for deployments abroad.

Under the Proposed Action, the Army's preferred alternative, the Army would: 1) increase use of the PCMS training areas to provide training for realigned AC units and additional RC units assigned to, or otherwise under the control of, Fort Carson; 2) construct facilities in the Cantonment to support longer-duration training rotations, and 3) construct training facilities in the training areas. The development of the training component of the Proposed Action is based on unit training resource requirements as prescribed by TC 25-1 (Army, 2004a) and TC 25-8 (Army, 2004b). Training and maneuver activities under the Proposed Action would be similar to those described under the No Action alternative (see Section 2.2.4.2). The increased training requirements of additional AC and RC units, however, would result in increased frequency of use of the training areas.

The Proposed Action is designed to ensure that the overall purpose and need is met, as defined in Section 1.2. The Proposed Action incorporates the need to balance maneuver training, live firing, and environmental management to meet the Army's integrated goals of maintaining military training readiness and sustaining lands for continued use. In addition to the specific construction projects required to accommodate the increase in troops, the increase in training activities is accomplished through a process-driven approach. The introduction to Section 3.0 discusses the analysis of impacts based on this process-driven approach.

Several factors specific to the Proposed Action influence its implementation and, therefore, how the Proposed Action is described and how implementing it affects the analysis in Section 3.0. These factors include the following:

- **Combat Readiness.** Military commanders and land managers need to maintain flexibility in managing training needs to ensure combat readiness. Training at the PCMS would occur at various frequencies and for varying periods. To maximize the ability of commanders and managers to vary the training and the landscape conditions to meet the overall purpose and need of this action (that is, combat readiness) as described in Section 1.2, the description of the Proposed Action assumes that training could occur throughout the PCMS in accordance with the appropriate land use classifications (for example, maneuver training areas). For the analysis of environmental consequences, impacts are assessed in a way that discloses conservative (that is, worst case) impacts, even though that intensive level of training over broad geographies might not occur frequently, or at all. The "worst case" condition is bounded by the Army's requirements to sustain training lands for continued use and its need to balance training requirements and land sustainability as described in Section 1.0.
- **Staged Restationing and Transformation of Units.** The restationing of units at Fort Carson is expected to occur in stages. Temporary actions occurred in 2005, and implementation of the full restationing and transformation actions is expected to be complete by 2011, with most actions being completed by 2009. As the Army proceeds with transformation planning, the total unit strength might vary throughout the implementation period (although these variations generally relate to smaller units below the BCT level). Further, overseas deployment of Fort Carson Soldiers continues, and the

Army does not have a firm timetable for when units will return and train at the PCMS. The Proposed Action assumes that all units are training at their home station; however, this situation might not materialize for several years, depending on the frequency of operational deployments. When this situation does occur, the PCMS would not be able to support the training load required, and the Army would have to make trade-offs to maximize training and support combat readiness. Therefore, the Proposed Action describes training activity as a process by which the Army would monitor and respond to changing conditions to sustain the land for training and provide maximum troop readiness.

- **Timing of Construction Projects.** The timing of construction projects is contingent upon funding availability and priorities. Projects are likely to be constructed in phases throughout the implementation period. The schedule of troop arrivals at Fort Carson from restationing or from duty overseas would affect the timing of implementation of new training requirements.

The Proposed Action is discussed in detail in the following sections:

- Changes in Force Structure (Section 2.3.1);
- Equipment (Section 2.3.2);
- Construction of Support Facilities (Section 2.3.3); and
- Training Requirements Under the Proposed Action (Section 2.3.4).

2.3.1 Changes in Force Structure

Under the Proposed Action, the PCMS would provide for training of troops stationed at, or otherwise under the responsibility of, Fort Carson as a result of BRAC 2005, IGPBS, and AMF. The stationing of additional units and the transformation of existing units would result in a total force structure that includes two command headquarters, three HBCTs, one IBCT, Special Forces battalions, and other support units. At the completion of transformation programs, approximately 23,000 military troops would be permanently stationed at Fort Carson and would train at the PCMS at certain times. In addition, the PCMS might be responsible for providing training for thousands of National Guard and RC troops from throughout the western United States. No units would be permanently assigned to the PCMS; therefore, the PCMS does not support long-term Soldier care and has no role in providing permanent support for dependents, civilian contractors, or personnel other than a small custodial staff.

2.3.2 Equipment

As discussed in Section 2.3.1, at the completion of the BRAC 2005, IGPBS, and AMF actions, the PCMS would be required to provide large-area training for three HBCTs, one IBCT, and other units. Equipment assigned to these units would be used during training activities. No permanent equipment storage exists or is proposed at the PCMS at this time. However, in the future the Army might decide to preposition equipment at the PCMS, which would require additional storage and maintenance facilities. This decision would be subject to separate NEPA review.

Under the Proposed Action, there would be one additional HBCT and one additional IBCT assigned to train at the PCMS. The type of equipment used by each BCT is described below.

Because of the space required to train BCTs, one BCT requires all of the training areas at the PCMS to conduct training exercises. The maximum amount of equipment used would be that associated with one BCT (either IBCT or HBCT). Each HBCT would have approximately 900 wheeled vehicles, 360 tracked vehicles, and 380 trailers. The IBCT would have approximately 930 wheeled vehicles, two tracked vehicles, and 430 trailers.

None of the BCTs is currently projected to have aviation battalions. The only aerial equipment assigned to the BCTs is UASs. These UASs cannot be used at the PCMS under current conditions because the PCMS lacks restricted airspace (that is, an area that is restricted from entry, usually up to a certain elevation, by other aircraft). UASs can only operate in areas without restricted airspace if they are accompanied by manned aircraft. Because no manned aircraft are assigned to Fort Carson, none is available to accompany UASs.

2.3.3 Construction of Support Facilities

To support transformation activities, the Army would construct several support facilities at the PCMS under the Proposed Action (see Appendix B). These facilities include a brigade support complex, medical facilities, storage facilities, minimum Soldier support functions, a vehicle maintenance facility, motor pools, and upgraded roads and utilities within the Cantonment (see Figure 2-4). The Cantonment facilities would be austere, as are the current facilities. The new facilities would support long-duration training rotations that are dictated by FORSCOM (2006).

Outside the Cantonment, the Army would construct and operate a live hand grenade range, ammunition holding area, protective equipment training facility, upgrades to an existing small-arms range, and communication facilities (see Figure 2-5). Upgrade of the modified-record firing range would require demolition of a small facility of approximately 1,600 square feet. These projects are necessary to allow the PCMS to certify Soldiers for operational deployments, as required by TC 25-8 (Army, 2004b). The projects proposed for construction in the training areas involve little ground disturbance either during construction or operation.

2.3.4 Training Requirements Under the Proposed Action

This section presents an overview of the factors that influence how training would be implemented under the Proposed Action. It also describes the types of training activities that could occur and the process for implementing the training mission at the PCMS.



Legend

Existing

- Cantonment Area
- Sidewalks
- Roads
- Installation Boundary

Proposed

- Communication Line
- Electrical Utilities
- Natural Gas Utilities
- Construction Fence

- After Action Review Facility
- Brigade Support Complex
- Clamshell Buildings
- Vehicle Maintenance Shop

- MILES Warehouse
- Medical and Dental Clinic
- Pad Site for Brigade Vehicles

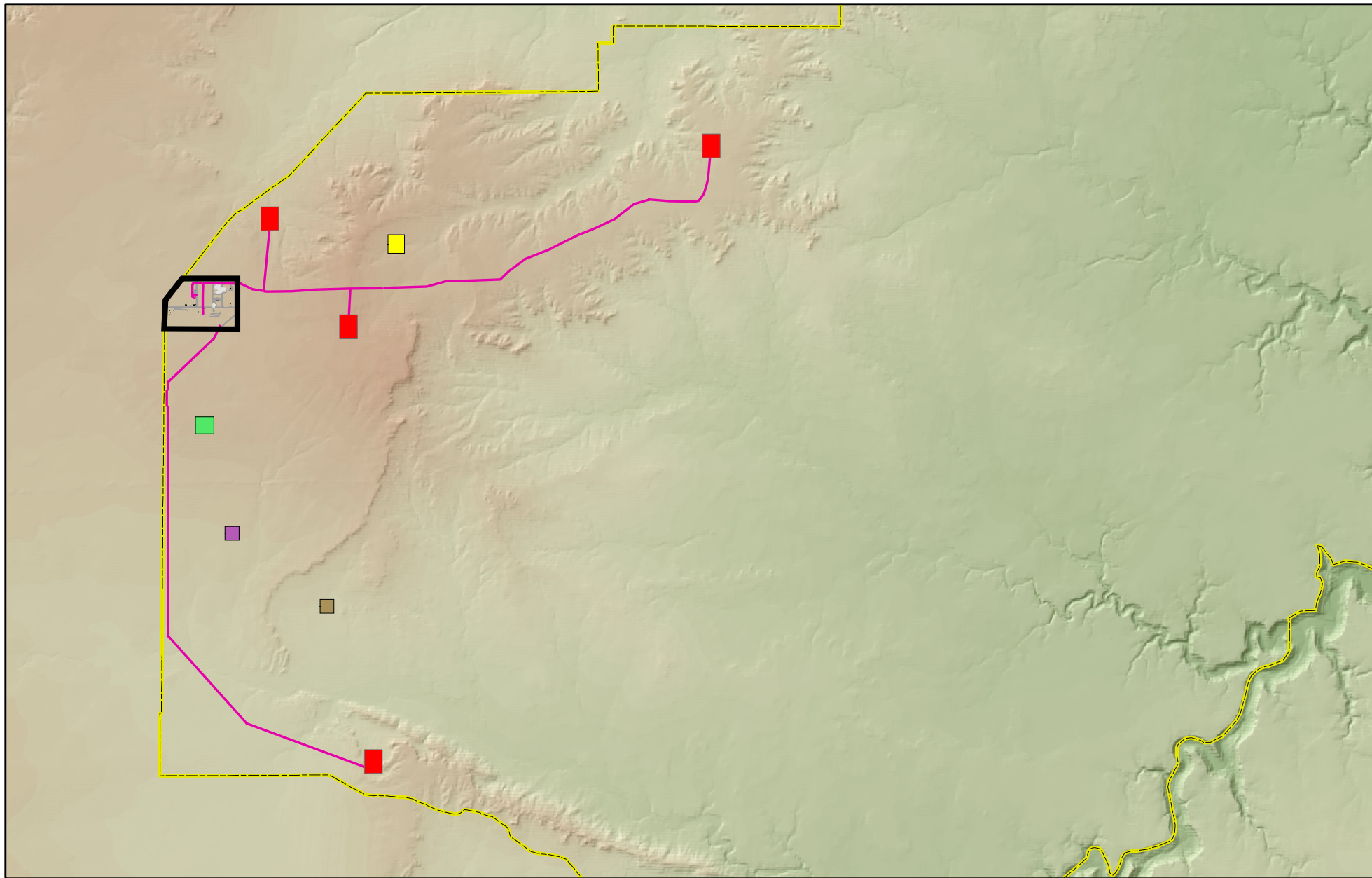
- Transportation Warehouse
- Unit Motor Pool
- Vehicle Washrack

Note: Expansion of existing Logistics Storage Facility is not shown above but is included in Appendix B



FIGURE 2-4
Proposed Construction Projects
at the PCMS Cantonment

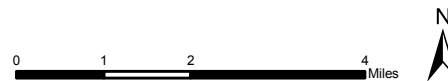
Figure not to Scale



Legend

- Proposed Communication Line
- Directorate of Information Management Communication Huts
- Ammunition Holding Area
- Live Hand-grenade Range
- Modified Record Fire Range
- Personal Protective Equipment Testing Facility
- Sidewalks
- Roads
- Cantonment Area
- Installation Boundary

FIGURE 2-5
Proposed Construction Projects at the PCMS Training Areas



2.3.4.1 Training Needs

Under the Proposed Action, the PCMS would support the training requirements of four BCTs, the 43 ASG, 10 SFG, and RC units. The training requirements for these types of units are described in the No Action alternative (see Section 2.2.4.1). Training requirements under the Proposed Action would increase over the No Action alternative because two additional AC BCTs would require use of the PCMS for large-area mechanized training, and additional RC units would train at the PCMS. As with the No Action alternative, changes in Army training resource requirements of TC-25-1 (Army, 2004a) and TC 25-8 (Army, 2004b) increase the demand for training land at the PCMS because of the need to train more frequently, for longer-durations, and over larger geographic areas. Increased use of the PCMS would include a greater number of training rotations and a larger geographic scope of training activities. The PCMS is projected to support a vast majority of maneuver training requirements above platoon-level operations, including all BCT-level and battalion-level training.

Small-Arms Live-Fire Ranges and Live Hand Grenade Range

In addition to large-area ranges, the PCMS provides RC and other units stationed at Fort Carson with the capability to conduct individual weapons qualifications, as needed. Under the Proposed Action, frequency of small-arms live-fire training at the PCMS would increase. Additionally, under the Proposed Action, a new live hand grenade range would be sited at the PCMS to support individual weapons qualifications. Operation of the live hand grenade range would involve individual Soldiers testing and practicing throwing grenades. Live grenades would be thrown and exploded one at a time. Duds would be collected or detonated, and no unexploded ordnance would remain. A surface danger zone (SDZ) would be associated with the live hand grenade range. The ranges would be supported by a basic load ammunition holding area that would be used to store small arms, grenades, and pyrotechnical devices while units are training at the PCMS. The chambers of the ammunition holding area would be enveloped by earthen berms and the holding area would be surrounded by a safety buffer.

As combat systems of the future are fielded, many of these systems would likely have space requirements that are not compatible with the populated area surrounding Fort Carson and Colorado Springs. Firing ranges and training infrastructure to allow Soldiers to become proficient with these systems would likely be sited at the PCMS because of safety considerations and community incompatibility at Fort Carson. However, at this time, neither additional large-area ranges nor live-fire activities are planned at the PCMS. Rather, the Proposed Action involves a greater use of the existing training facilities. Any new live-fire training activities at the PCMS would undergo separate environmental review under NEPA.

Maneuver Training at the PCMS

Army transformation and restationing decisions associated with BRAC 2005 and IGPBS have implications for the maneuver support mission of the PCMS. In the past, armored units stationed at Fort Carson have used the NTC in Fort Irwin, California, to accomplish their capstone maneuver (that is, battalion and BCT) training rotations and mission training plan certifications following the PCMS train-ups. In 2004, the Army made a decision, as part of the AMF, to expand its force from 28 to 43 ground maneuver brigades. This presents new training requirements for the PCMS. The NTC, while otherwise large enough to support

maneuver training, is heavily scheduled and might not be readily available to support the training cycles of Fort Carson's units in the future. This lack of availability would become more severe as the Army forces in central Asia return. The NTC can support 10 to 12 BCT training rotations per year. With 43 total BCTs in the Army, the PCMS must serve as the main training area and pre-combat training center venue to meet training requirements for units up to the BCT level that are stationed at Fort Carson.

At present, the PCMS can accommodate training for battalion and BCT high-intensity conflict operations (for example, attack, defend, and movement-to-contact) against an opposing force. These operations entail the tactical movement of units toward a defined objective (enemy force) or defense of a defined area against an enemy force. Tactical movement involves the use of terrain, cover and concealment, obstacles, and key avenues of vehicular movement through the terrain (also called trafficability) to target, engage, and destroy the enemy.

Live tank fire has never been conducted at the PCMS and is not proposed as part of the Proposed Action. MILES, which uses laser tracking systems to register the destruction of friendly and enemy vehicles, would continue to be used at the PCMS. MILES is a training system that provides a realistic battlefield environment for Soldiers involved in training exercises. MILES provides tactical engagement simulation for direct fire, force-on-force training using eye-safe laser "bullets." Laser transmitters are attached to each individual and vehicle weapon system and accurately replicate actual ranges and lethality of specific weapon systems, such as the M1 Abrams Tank, Bradley Infantry Fighting Vehicle, M113 Armored Personnel Carrier, wheeled vehicles, and other non-shooting targets. Additionally, MILES simulations can include anti-armor weapons, machine guns, rifles, and other ancillary items, such as a controller gun.

Maneuver projections have demonstrated that the PCMS would only be able to meet a portion of the total maneuver training requirements of BCTs to be stationed at Fort Carson as part of BRAC 2005, IGPBS, and AMF (FORSCOM, 2006). There is not enough time in the annual training schedule to provide all units with the required training. Under the Proposed Action, the PCMS would be required to support the large-area training requirements for companies, battalions, and BCTs associated with the three HBCTs, one IBCT, Special Forces, and RC units that would be assigned to Fort Carson. Each HBCT has 16 company-size units organized into three maneuver battalions and three other battalions. The IBCT has eight companies, three battalions, and one BCT. The Special Forces have three battalions with requirements equivalent to an IBCT. RC units are assumed to train an equivalent of three BCTs per year. Table 2-2 illustrates the number of weeks of training required for the various units assigned to train at the PCMS.

TABLE 2-2

Summary of Training Rotations for Units Assigned to Train at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Unit	Minimum Number of Units Assigned to Train at the PCMS	Maximum Number of Rotations per Year	Duration (weeks)	Training Weeks
Company	49	5	1	245
Battalion	15	1	3	45
BCT	8	1	3	24

One BCT requires the entire PCMS for doctrinal training. One battalion requires half of the PCMS land area for training. Companies require approximately one-eighth of the PCMS land area to conduct maneuvers. Therefore, company training would require 31 weeks of the PCMS training calendar, battalions would require 22.5 weeks, and BCTs would require 24 weeks, for a total training load of 77.5 weeks to support the doctrinal training of the assigned units. This training load is not possible and becomes more unrealistic when factoring in conflicts attributable to the live-fire operations and necessary land rest to sustain the training lands.

The Proposed Action maximizes training and the need to sustain the training areas for continued use. Under the Proposed Action, the Garrison Commander, with input from the G-3, DPW, DPTM Range Division, and DECAM, would approve the use of the PCMS for training events set and approved by the senior mission commander on Fort Carson. It is recognized that trade-offs would be necessary under the Proposed Action because of land constraints. TC 25-1 (Army, 2004a) notes some of the options commanders have to modify training requirements to best meet training resource objectives:

... [a] maneuver area may be limited as a result of its configuration or restrictions on use. There are several ways to adjust the battlefield space requirement. The commander can reduce unit frontages, decrease the distance between maneuver brigades and their support units, or position support units in an area not contiguous to the maneuver brigades. As an example, the brigade commander could disperse his units across an installation, a good distance apart. This example does not reduce the requirement for maneuver/training areas, but represents one option for training to standard within constrained resources.

Examples of decisions that could be made to address land constraints include reducing the size of the areas used for training (that is, maneuver boxes), reducing the duration of training exercises, alternating unit readiness by training less than all of the four BCTs, or a combination of these. To maintain operational flexibility on the part of military commanders and land managers, this EIS assumes that training could occur at any location at the PCMS in accordance with the appropriate training land uses (for example, maneuver training areas). Specific training scenarios would only be known after training needs are evaluated in the real-world context of identified needs (based on when troops are realigned to Fort

Carson during the implementation period) and the assessment of land conditions and sustainability.

2.3.4.2 Description of Training Activities

Training activities under the Proposed Action would be similar to those described under the No Action alternative (see Section 2.2.4.2). Under the Proposed Action, the four types of training areas (maneuver training areas, dismounted training areas, small-arms live-fire training ranges, and restricted areas) would be the same as described under the No Action alternative. The frequency of training would likely increase to meet the increased training demand described in Section 2.3.4.1. It is assumed under the Proposed Action that training could affect a greater area on the PCMS and the land condition could worsen.

2.3.4.3 Process for Implementing the Training Mission

The process for implementing training under the Proposed Action would be the same as described under the No Action alternative in Section 2.2.4.3. Decisions made by the Garrison Commander are made in compliance with all relevant environmental laws and regulations and in consultation with DPTM Range Division, DECAM, and other staff.

2.3.4.4 Coordination of Training Development

Coordination in developing training activities would be the same as described under the No Action alternative (see Section 2.2.4.3). The Army would continue to use its ITAM program to monitor training activities, institute projects to minimize training damage, and educate units to limit damage to training lands. Environmental plans developed by DECAM staff in coordination with relevant regulatory agencies and approved by the Garrison Commander would continue to be followed to manage environmental resources in a manner that complies with environmental laws and regulations and avoids unnecessary environmental damage. Coordination with internal and external entities would continue, and input from others would be considered in developing specific training exercises.

2.3.4.5 Environmental Considerations and Safety Measures

Under the Proposed Action, environmental and safety considerations would influence the development of training exercises, as described under the No Action alternative (see Section 2.2.4.4). Other factors or new environmental mitigation measures that might be considered to mitigate impacts of the more frequent and longer-duration training under the Proposed Action are assessed in the environmental impact analysis (see Section 3.0). Any new mitigation determined to be reasonable and necessary to offset environmental impacts of the Proposed Action will be incorporated into the ROD for this EIS, and management plans and regulations will be modified as appropriate.

2.4 Alternatives Considered but Dismissed

In developing the Proposed Action, the Army considered several alternatives to balance training requirements and land availability. However, it was determined, that these alternatives would unreasonably restrict the Army's ability to react to changing conditions (see Section 1.3 for a discussion of the scope of the EIS analysis and how NEPA actions are addressed under BRAC). In addition, as discussed in Section 1.3, alternatives that consider whether troops should be realigned to Fort Carson are eliminated from consideration by

BRAC and, therefore, are not considered reasonable or feasible for analysis in this EIS. Other alternatives considered but dismissed are discussed in the following section.

2.4.1 Train Troops at Other Locales

It is the intent of the BRAC Commission decisions that receiving installations accommodate increases in personnel within existing available facilities (IMCOM, 2005). The focus of the development of alternatives in this EIS, therefore, was to use the capacity of the PCMS for increased training rather than seek training at other locales.

In addition to meeting the BRAC Commission intentions, supplementing training at the PCMS at locations other than the PCMS was determined to be infeasible. First, there are no locations within the continental United States that have excess training capacity to support overflow from Fort Carson. Many other Army posts, such as Camp Guernsey (Wyoming), Yakima Training Center (Washington), and Gowen Field (Idaho), have severe space limitations or restrictions on the type of maneuver training permitted. Generally, the Army has a nationwide shortage of training areas, particularly for large maneuver training. There are no existing Army training facilities that are not fully used by other units. Home-station training schedules are developed to maximize the training needs for the units assigned to individual bases, and no facilities other than the NTC support visiting forces assigned to other bases. For instance, Fort Carson and the PCMS support Fort Carson Soldiers, Fort Lewis and Yakima support Fort Lewis Soldiers, and Fort Bliss supports Fort Bliss Soldiers. Army sites that have areas large enough to accommodate training, such as the NTC at Fort Irwin, California, are projected to be heavily scheduled and do not have capacity to support Fort Carson's excess needs. The Army sometimes enters into agreements with other federal agencies or private land owners to allow training on non-Army lands. However, the Army determined that BCT-level maneuver and live-fire training would not be compatible with land uses on non-Army property near the PCMS. This type of training would require acquisition of land and was dismissed because the Army does not have approval to acquire large tracts of land (see Section 2.4.2). A secondary factor is that the cost of training Fort Carson Soldiers on other Army properties would be approximately three times that of home station training, and this cost would be incurred repeatedly throughout the year, making this option cost-prohibitive. Regardless of cost or time constraints, all Army units must train at their home stations, supplemented by training at the NTC when available and appropriate.

2.4.2 Land Acquisition and Expansion

Acquiring land is an alternative that would meet the need for training to doctrinal standards. The Army has committed to prepare an EIS to assess the affects of expansion as a proposed action as discussed in Sections 1.3.3 and 2.1.3. However, expansion is not a reasonable alternative to the Proposed Action for this transformation EIS. The information for necessary analysis of expansion under NEPA cannot be gathered, categorized, and analyzed to support implementation in time to meet the PCMS training needs of the additional Soldiers arriving at Fort Carson under the transformation activities. The need for transformation is immediate. Inclusion of expansion in this FEIS would not allow the Army to meet the BRAC and other transformation activity requirements

2.4.3 Training Scenarios Based on Deployment Conditions

A set of alternatives was considered to be in line with Department of the Army HQ's training requirement land-use projections, which are based on the most frequently occurring deployment scenarios. These scenarios included low-intensity, medium-intensity, and high-intensity land uses. The low-intensity use assumes that a maximum number of units (two BCTs) would be deployed and, therefore, not conducting home station training. The medium-intensity scenario assumes that one BCT is deployed and three BCTs are conducting home station training. The medium-intensity scenario is considered the most frequent deployment scenario. The high-intensity scenario assumes no deployments and that all BCTs are conducting home station training. These alternatives provide a baseline for comparison and public disclosure of the range of impacts that could occur as a result of the action alternatives. However, they did not represent reasonable alternatives regarding NEPA because they were based on conditions that were beyond the Army's control and could not be reasonably selected as a Proposed Action.

3.0 Affected Environment and Environmental Consequences

3.1 Introduction

This section introduces the resource areas and the approach to the EIS analysis. It also describes the affected environment and the environmental consequences of implementing the Proposed Action and No Action alternative. Based on existing available information obtained from the Army, personal communications with knowledgeable sources, and readily available published literature, this EIS qualitatively and quantitatively evaluates the potential environmental impacts of proposed training activities at the PCMS.

3.1.1 Resources Analyzed

This EIS analyzes and discloses the direct, indirect, and cumulative impacts of implementing the BRAC 2005, IGPBS, and AMF at the PCMS for the following resource areas:

- Land Use (Section 3.2);
- Air Quality (Section 3.3);
- Noise (Section 3.4);
- Geology and Soils (Section 3.5);
- Water Resources (Section 3.6);
- Biological Resources (Section 3.7);
- Cultural Resources (Section 3.8);
- Socioeconomics (Section 3.9);
- Transportation (Section 3.10);
- Utilities (Section 3.11); and
- Hazardous and Toxic Substances (Section 3.12).

Potential effects to the visual and aesthetic resources on and around the PCMS were considered but not included for detailed analysis. Construction of new facilities and implementation of increased training could introduce new elements to the visual landscape, but these changes either would not be visible off post or are consistent with the character of a military post. Therefore, there would be no adverse visual or aesthetic impacts resulting from increased density of buildings or frequency and duration of training activities, and visual and aesthetic impacts are not discussed further. The potential for decreased visibility or increased fugitive dust emissions (which has potential for visual and aesthetic impacts) is addressed under the air quality analysis (see Section 3.3).

3.1.2 Framework for Assessing Impacts

In compliance with NEPA, CEQ guidelines, and 32 CFR Part 989, et seq., the description of the affected environment focuses on those resources and conditions potentially subject to impacts. Subsequent to the description of the components of the affected environment, this

section presents the analysis of the direct, indirect, and cumulative environmental and socioeconomic effects that would likely occur under the Proposed Action or No Action alternative and identifies adverse environmental effects that cannot be avoided through project design.

The terms “effect” and “impact” are synonymous as used in the EIS. Effects can be beneficial or adverse and can apply to natural, aesthetic, historical, cultural, and economic resources within the project area and within the surrounding area. Effects are also expressed in terms of duration. The duration of short-term impacts is considered to be 1 year or less, and long-term impacts are described as lasting beyond 1 year. Long-term impacts can potentially continue in perpetuity. The magnitude of effects of an action must be considered regardless of whether the effects are adverse or beneficial. In instances where potentially adverse impacts are identified, measures that could be used to mitigate those impacts are discussed. In addition to direct and indirect impacts, cumulative impacts are discussed in Section 3.13.

3.2 Land Use

This section discusses land use in and around the PCMS and management plans that provide guidance on operations at the PCMS. The section identifies the environmental consequences to changes in land use and compliance with management plans resulting from the No Action alternative and Proposed Action.

3.2.1 Affected Environment

3.2.1.1 Geographic Setting and Location

The PCMS is an approximately 235,000-acre Army site dedicated to training units stationed at, or otherwise under the responsibility, of Fort Carson. The PCMS is located in southeastern Colorado in Las Animas County, approximately 150 mi southeast of Fort Carson. The PCMS is bounded by U.S. 350 to the west, Purgatoire River Canyon to the east, Las Animas County Road 54 to the south, and Otero County to the north. Nearby cities include Trinidad to the southwest and La Junta to the northeast.

3.2.1.2 Climate

The PCMS has a moderate, dry climate. Average monthly maximum temperatures range from 46.9 degrees Fahrenheit (°F) in January to 88.9°F in July. Average monthly minimum temperatures range from 16.7°F in January to 58.6°F in July. Average annual precipitation is about 13 inches, with the majority falling as rain in the summer months (May through August). Snowfall can occur in any month except June, July, and August and is generally highest in November, December, and March.

From 2001 to 2005 (with the exception of 2004), the PCMS experienced severe to extreme drought conditions and received less than average precipitation (Koblinsky, 2006 and Drought Monitor, 2006). Table 3-1 summarizes monthly climatic data measured at the Trinidad Airport.

TABLE 3-1

Summary of Climatic Data for the PCMS Area Recorded at the Trinidad Airport, 1948-2005
PCMS Transformation EIS, PCMS, Colorado

Month	Average Temperature (°F)		Average Precipitation ^a (inches)	Average Snowfall (inches)
	Maximum	Minimum		
January	46.9	16.7	0.38	4.7
February	50.5	19.9	0.44	5.4
March	56.6	25.4	0.80	7.2
April	65.2	34.2	1.09	4.9
May	74.4	43.8	1.73	1.3
June	84.5	53.0	1.40	0.0
July	88.9	58.6	2.05	0.0
August	86.6	56.9	1.96	0.0
September	79.9	49.2	1.07	0.4
October	69.4	37.4	0.81	3.3
November	55.8	25.4	0.68	6.5
December	48.0	17.9	0.49	6.3
Annual Average	67.2	36.5	—	—
Total Annual Average	—	—	12.91	40.2

Source: Western Regional Climate Center, 2006.

^aPrecipitation includes precipitation from snowfall.

— = Does not apply.

3.2.1.3 Existing Land Use

Military Use

Las Animas County recognizes the land use at the PCMS as a military training facility. Land use on the PCMS has been divided into two primary categories, the Cantonment and the training areas. The Cantonment consists of developed land; the training areas consist of open land.

Cantonment

The cantonment area comprises approximately 1,660 acres of the PCMS. The Cantonment provides limited, austere Soldier and support facilities. Military training is restricted in this area.

Training Areas

The training areas consist of unimproved or open lands that are used for military training maneuvers and small-arms live-fire activities. The terrain at the PCMS varies widely from open, rolling prairies to semi-arid, basaltic hills. To a large degree, the terrain defines the suitability of training activities that occur within the training areas. The four main training

land use types within the training areas include maneuver training, dismounted training, small-arms live-fire ranges, and restricted areas.

Maneuver training areas comprise the majority of training land available at the PCMS. Maneuver training areas are appropriate (based on topography and other environmental conditions) for equipment and personnel tactically maneuvering against an opposing force throughout the area. Equipment and personnel move through the area according to the requirements of training exercises, resulting in disturbance to soils and vegetation. Land rest and rehabilitation are required in maneuver training areas, so these areas are not available at all times to support training activities. Use of maneuver training areas can also be limited in the area of small-arms live-fire ranges if the ranges are actively being used for training activities.

Small-arms live-fire ranges include SDZs identified to protect personnel during weapons training. The SDZs are available for maneuver training when no live-fire activities are occurring. The acreage of the SDZs, therefore, is not additive to the maneuver training areas.

Dismounted training areas have no vehicular traffic, except for emergency vehicles. These areas of the PCMS primarily include canyons that are unsuitable for mechanized training. Soldiers can move in these areas on foot only. Activities occurring in dismounted training areas include surveying, placing communication equipment, bivouacking, and rappelling. Land impacts are generally similar to recreational camping (Trame, 1997).

Restricted areas protect lands that support wildlife, ecosystems, soils, facilities, and cultural resources. Varying degrees of training use are allowed in restricted areas. For example, in areas with known occurrences of buried cultural resources, digging is not permitted.

Recreational Use

Some areas within the PCMS are accessible to the public for recreational use when training activities do not occur. Currently, the recreational uses on the PCMS include hunting and camping (hunters only). Recreational uses are allowed in the training areas and occur at a dedicated campground near the intersection of Military Supply Routes (MSRs) 1 and 3 (DECAM, 2002a).

The PCMS offers the single largest contiguous parcel of public lands available for hunting in the region. The abundance of game, the timing of hunting seasons (close to the rut), and the hunt success rate make the PCMS a highly desirable hunting area. Licenses are granted to hunt on the PCMS annually. On average, 300 to 500 licenses are issued each year. Licenses to hunt buck deer with a rifle on the PCMS are difficult to obtain; only 19 licenses were granted for 384 applicants in 2006 (CDOW, 2006). The waitlist for these licenses is more than 13 years.

3.2.1.4 Land Use Planning

Land use planning at the PCMS is the responsibility of Fort Carson's DPW Master Planning Division. Master planning at the PCMS is tied to Fort Carson because facility and training requirements at the PCMS are dependent on the troops stationed at Fort Carson. The Master Planning Division continuously assesses the need for new facilities and how new facilities can be incorporated to best complement existing land uses at the PCMS through its master planning process.

3.2.1.5 Surrounding Off-Site Land Use

The PCMS is surrounded on three sides by land that is zoned for agricultural uses and used for dryland cattle grazing. The Comanche National Grassland, which is managed by the U.S. Forest Service (USFS), lies immediately north of the PCMS; it consists of undeveloped open land and several recreation sites. Several small communities are located near the PCMS along U.S. 350, including Model, Timpas, Thatcher, Houghton, and Delhi, all of which have populations of less than 50. Trinidad, which has a population of less than 10,000, is located 40 mi southwest of the PCMS, and La Junta, with a population of approximately 7,000, is located approximately 42 mi to the northeast.

Comprehensive planning and land uses in Las Animas County are governed by the *Las Animas County Development Guide* (Las Animas County Planning Commission, 1994). The *Draft Cimarron and Comanche National Grasslands Land Management Plan* (USFS, 2005) is currently being updated. The plan describes existing conditions, identifies desired conditions, and articulates the management goals. These plans recognize the PCMS as a military training installation.

3.2.1.6 Prime Farmland

The Farmland Protection Policy Act of 1981 requires federal agencies to consider the impact of any activity that would convert prime or unique farmlands to non-agricultural uses. The NRCS regulates compliance with the law (7 CFR 658). According to the NRCS (USDA, 1979), prime farmlands occur north of the PCMS in Otero County. Prime farmland in Las Animas County is generally associated with the Purgatoire River and land that is irrigated. In the vicinity of the PCMS, irrigated prime farmland is located near the towns of Model (water is delivered by pipeline) and Hoehne, located to the southwest (Mendez, 2006).

The Purgatoire River, bordering the eastern boundary of the PCMS, is associated with canyonland formations characterized by steep topography that would not support prime farmland. Land is not irrigated on the PCMS, and prime farmland does not occur on the installation (Mendez, 2006). Because no prime farmland exists within the PCMS, prime farmland is not carried forward in this EIS for further analysis.

3.2.2 Consequences

3.2.2.1 No Action Alternative

Training

Under the No Action alternative, training activities would increase over historical levels on the PCMS as described in Section 2.2.4. The increased activity could degrade training lands and affect the long-term availability of the lands for military use.

As described in Section 2.2.4.3, existing land and environmental management programs would continue under the No Action alternative. The ITAM program would continue to monitor training activities, institute projects to minimize training damage, and educate Soldiers to limit damage on training lands. Decisions regarding training activities would continue to consider both training needs and necessary sustainment measures to establish the balance between the two that maintains lands suitable for training while also maximizing the achievement of the training mission.

Under the No Action alternative, recreational uses would still be allowed on the training areas when they would not interfere with the military mission. The increased training activities on the PCMS would likely reduce the availability of the training areas for hunting compared to historical conditions. The PCMS provides the single largest contiguous parcel (approximately 233,000 acres) of public land available for hunting in the region and is delineated as a single game management unit. The Comanche National Grassland, an approximately 186,000-acre parcel of public land, is located adjacent to the PCMS and is available for various types of outdoor recreation, such as bird watching, camping, and hunting. Hunters may also use nearby public lands such as the Apishipa State Wildlife Area (approximately 7,900 acres). Hunting licenses for private land surrounding the PCMS are also granted, but access to those lands requires permission from individual landowners. The reduction in opportunities for hunting on the PCMS as a result of the No Action alternative would adversely affect recreation uses. However, hunters could obtain permits for other hunting areas nearby.

The noise increases in areas outside the PCMS boundaries, as described in Section 3.4.2, might discourage residential development or settling of other sensitive receptors in these areas in the future. To prevent adverse noise impacts in the future, the PCMS would follow AR 200-1 (Army, 1997) and the *Installation Environmental Noise Management Plan, Fort Carson, Colorado* (USACE, 2006a) to monitor noise. No other impacts to existing or future land uses surrounding the PCMS would occur as a result of the No Action alternative. The PCMS would remain a military training facility, which is the current land use designated by Las Animas County and recognized by surrounding property owners.

Construction and Operation

Facility construction would not be conducted under the No Action alternative. No changes in land uses would occur; therefore, there would be no impacts under the No Action alternative.

3.2.2.2 Proposed Action

Training

Increased training could degrade training lands and affect the long-term availability of training lands for military use, resulting in an adverse effect. In addition, the potential exists for indirect impacts to air quality (see Section 3.3), noise (see Section 3.4), soils (see Section 3.5), water resources (see Section 3.6), and biological resources (see Section 3.7). These indirect impacts are discussed in the respective sections of this document. To mitigate potential degradation of training lands, implementation of land management and environmental programs would continue to balance training requirements and the need to maintain quality training lands for sustained military use.

Increased training activities on the PCMS under the Proposed Action would likely reduce the availability of the training areas for hunting. The potential limitations on hunting would affect recreation uses by further limiting or removing the single largest contiguous area of public hunting grounds in southeast Colorado. However, because other available hunting areas exist nearby (as discussed under the No Action alternative), it is expected that adequate opportunities for hunting exist on nearby public lands; therefore, the potential limits on hunting at the PCMS would not result in an adverse impact to opportunities for hunting in the area.

The noise increases in areas outside the PCMS boundaries, described in Section 3.4.2, might discourage residential development or settling of other sensitive receptors in these areas in the future. To prevent adverse noise impacts in the future, the PCMS would follow AR 200-1 (Army, 1997) and the *Installation Environmental Noise Management Plan* (USACE, 2006a) to monitor noise. No other impacts to existing or future land uses surrounding the PCMS would occur from implementing the Proposed Action. The PCMS would remain a military training facility, which is the current land use designated by Las Animas County and recognized by surrounding property owners.

Construction and Operation

Construction activities and future operation of the PCMS as a result of implementing the Proposed Action would have only minimal adverse impacts to land use on the installation. The Cantonment is the designated developed area of the PCMS and construction of facilities is consistent with that land use designation. The projects proposed to be constructed in the training areas involve little ground disturbance either during construction or operation and would result in conversion of a very small amount of open land to developed land.

Construction of new support facilities and future operation of the PCMS would be required to comply with the Fort Carson regulations and management plans (see Appendix A). In some cases, regulations and plans may need to be updated to reflect new mission activities. Construction of facilities and their future operation would be contained within the PCMS; therefore, there would be no change in land use at or in the vicinity of the PCMS as a result of construction or operation of new facilities. Associated transportation impacts are discussed in Section 3.10.

3.3 Air Quality

This section presents the affected environment and the impacts for air quality at the PCMS as a result of implementing the Proposed Action and No Action alternative. Appendix C of this EIS contains supporting documents that provide detail on the approach to the air quality analysis in this EIS. Subsequent to the public scoping period conducted for this EIS, interim communication occurred between DECAM, the Colorado Department of Public Health and Environment (CDPHE) and EPA, Region 8. The meetings and correspondence focused on the modeling approach and methodology to be used to evaluate the potential impacts to air quality. A modeling protocol was submitted to and reviewed by CDPHE and EPA; comments from both were incorporated. The air modeling analysis was conducted in accordance with the methods requested by CDPHE and EPA.

3.3.1 Affected Environment

This section presents the affected environment for air quality at the PCMS. Applicable air quality laws and regulations designed to protect and improve air quality are discussed first, followed by a description of ambient air quality conditions at the PCMS. The PCMS is located in Las Animas County, Colorado, which was established in the modeling protocol as the near-field radius of impact. As requested by the CDPHE, Air Pollution Control Division (APCD), far-field impacts to the air quality related values (AQRVs) were evaluated at the Great Sand Dunes National Park and Preserve, the Florissant Fossil Beds National Monument in Colorado, and the Wheeler Peak Wilderness in New Mexico, all of which are within approximately 124 mi (200 km) of the PCMS. The Federal Land Managers (FLMs) for

the USFS, the National Park Service, and the USFWS are responsible for protecting the nation's parks and monuments and establishing the AQRVs. National parks and monuments are designated as Class I and Class II areas, depending on the required level of protection. Under the Prevention of Significant Deterioration (PSD) program, three air quality classes (Classes I, II, III) were established for areas that are in attainment of the National Ambient Air Quality Standards (NAAQS). Class I areas have the highest level of protection from air pollutants and very little deterioration of air quality is allowed in these areas. Class I areas are national parks and national wildlife areas that have been designated as special to the public. Well-managed growth is allowed in Class II areas, which leads to moderate deterioration of air quality in these areas. Currently, all areas not designated Class I areas are classified as Class II areas.

3.3.1.1 Laws and Regulations

The Clean Air Act (CAA), adopted in 1970, and its amendments in 1977 and 1990 established programs and permitting process designed to protect and improve air quality. Air quality regulations are published in 40 CFR Sections 50 through 97 and Sections 1048 through 1068. As mandated by the CAA, EPA has established maximum threshold standards for the following criteria pollutants:

- Carbon monoxide (CO);
- Particulate matter (PM₁₀ and PM_{2.5});
- Ozone;
- Nitrogen dioxide (NO₂);
- Sulfur dioxide (SO₂); and
- Lead.

Federal clean air laws require areas that do not meet the NAAQS for ozone, CO, NO₂, SO₂, and inhalable particulate matter (PM) (that is, nonattainment areas), to develop state implementation plans that describe how states would attain the NAAQS.

Laws and regulations also exist to protect air quality in areas that are meeting the national standards. Any significant net increase of criteria pollutants for which the area is designated as "attainment" would subject the PCMS to the PSD review requirements (40 CFR 52.21). The Colorado Air Quality Control Commission (AQCC), which is within the CDPHE, administers the State of Colorado's EPA-approved PSD program (59 *Federal Register* [FR] 42500) by implementing Regulation 3, Part D, which regulates criteria pollutants from new combustion sources.

The AQCC also regulates the emissions of PM, smoke, CO, and sulfur oxides (SO_x) by implementing opacity and emission limits in AQCC Regulation No. 1. Opacity limits are set to ensure that visibility is not impacted in the long term. Obscurants include smoke and other products used for military training. The PCMS would meet these requirements in the following ways:

- Adhering to DoD training manuals and guidance regarding DoD-approved obscurants;
- Ensuring no off-property transport of visible emissions from obscurants (or if any visible emissions have a reasonable probability of crossing the installation property boundary, ensuring that obscurant generation ceases immediately);

- Implementing precautionary measures; and
- Implementing the necessary response measures to minimize the impacts and informing the state as soon as possible, if visible emissions from obscurant use drift across the installation property boundary (AQCC Regulation No. 1, Subpart II.D, effective September 30, 2005).

The PCMS is also subject to Construction Permit No. 96LA1082, which limits the generation of DoD-approved obscurants for training exercises. The PCMS will not exceed the following permit-limited emission rates (APCD, 2000):

- 1,540 gallons per day for fog oil; or
- 115,591 pounds per year of smoke munitions; of this, hexachloroethane is not to exceed 2,024 pounds per year.

Controlled burns are used to minimize the risk of large fires by reducing fuel loads and breaking up the continuity of fuels. Prescribed burning targets areas with heavy fuel buildups that are the most likely to ignite as a result of range operations. A Prescribed Burn Planning Document is submitted to meet the requirements of AQCC Regulation No. 9, *Open Burning, Prescribed Fire and Permitting*, and procedures within the INRMP (DECAM, 2002a) are followed for each prescribed burn event. Some of the planning requirements include the following:

- Constant monitoring during the prescribed fire to ensure that air quality impacts and safety are not compromised;
- Obtaining the required state permit; and
- Coordinating with the National Wildfire Coordination Group, federal and state agencies, the Department of Public Works, local fire departments, and landowners.

To reduce the air quality impacts, the PCMS follows AR 200-1 to provide environmental protection and enhancement. Under AR 200-1, steps are identified that enable the Army to meet federal and state regulations and to minimize the use of ozone-depleting chemicals (Army, 1997).

Although not required, the *Fugitive Dust Control Plan* (DECAM, 2004a) and Fort Carson Regulation 200-1 (Fort Carson, 1999b) established for Fort Carson are followed as part of the best management practices (BMPs) at the PCMS to minimize dust impacts to air quality. Additionally, state land disturbance permits and dust suppression regulations and procedures are applicable and implemented at the PCMS. Disturbed areas larger than 25 acres or areas that have been disturbed 6 months or longer are subject to site-specific state permits, which implement BMPs.

3.3.1.2 Ambient Air Quality Conditions

This section presents the ambient air quality conditions at the PCMS. Specifically, it discusses compliance with ambient air quality standards in Las Animas County, air pollutant emissions generated at the PCMS, and the regional air pollutant emission summary for Las Animas County.

Ambient Air Quality Standards

This section presents the ambient air quality conditions in Las Animas County for various pollutants. Table 3-2 lists the NAAQS Class II significant impact level (SIL) and the attainment status for Las Animas County. As noted in Table 3-2, Las Animas County is in attainment for all the monitored criteria pollutants.

The NAAQS were established to protect human health and welfare. To evaluate impacts of the Proposed Action, the modeled net increase in concentration is summed with the ambient background concentration for each pollutant, and compared to the relevant NAAQS. The EPA SILs were developed to determine whether air quality impacts to PSD Class II lands would be significant. The SILs for each attainment pollutant are compared to the modeled net increase in concentration for that pollutant.

TABLE 3-2
National Ambient Air Quality Standards
PCMS Transformation EIS, PCMS, Colorado

Pollutant	Averaging Period	Las Animas County Attainment Status	NAAQS	Class II SIL ($\mu\text{g}/\text{m}^3$)
CO	8-hour	Attainment	35 ppm	500
	1-hour	Attainment	9.0 ppm	2,000
NO ₂	Annual	Attainment	0.053 ppm	1.0
PM ₁₀	Annual	Attainment	50 $\mu\text{g}/\text{m}^3$	1.0
	24-hour	Attainment	150 $\mu\text{g}/\text{m}^3$	5.0
SO ₂	Annual	Attainment	0.03 ppm	1.0
	24-hour	Attainment	0.14 ppm	5.0
	3-hour	NA	0.5 ppm	25
O ₂	8-hour	Attainment	0.08 ppm	NA
PM _{2.5}	Annual	Unclassified	15 $\mu\text{g}/\text{m}^3$	NA
	24-hour	Unclassified	65 $\mu\text{g}/\text{m}^3$	NA

Notes:

NA = not applicable

ppm = parts per million

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

Air Pollutant Emissions

The major sources of PM emissions generated at the PCMS are from prescribed burning, the use of smoke grenades, and fog-oil used during training exercises. Additional PM emissions result from vehicle travel on unpaved roads. The *Transformation Air Emission Inventory for the Pinon Canyon Maneuver Site* (DECAM, 2006a) contains a breakdown of air pollutants by source type. These emissions contribute to inhalable PM emissions that also have the potential to limit visibility. The combustion of fossil fuels in equipment such as boilers, generators, and motorized vehicles does not substantially contribute to the emissions generated at the PCMS. The existing emissions generated at the PCMS are listed in Table 3-3.

TABLE 3-3
Existing Emissions at the PCMS^a
PCMS Transformation EIS, PCMS, Colorado

Emission Source	Pollutant (tpy)				
	PM ₁₀	VOC	NO _x	CO	SO _x
Prescribed Burning ^b	110	NA	22	825	NA
Fog Oil and Graphite	15	15	NA	NA	NA
Smoke	2	NA	NA	NA	NA
Vehicle Travel ^b	138	NA	NA	NA	NA
Stationary Combustion Equipment	NA	NA	0.2	NA	NA
Storage Tanks	NA	1	NA	NA	NA

^aExisting emissions, except for fog oil, are from 2005. Fog oil emissions are calculated using the average from 2001/2002 usage because it is considered to be a representative use for the PCMS. Fog oil was last used at the PCMS in 2002.

^bSources are not included in the PSD evaluation in accordance with 40 CFR 52.21.

Notes:

NO_x = nitrogen oxide

tpy = tons per year

VOC = volatile organic compound

Regional Air Pollutant Emissions Summary

As a part of the CAA, EPA is required to set the NAAQS and designate areas as being attainment or nonattainment for those standards. To support the determination of the area designation, a National Emission Trend Inventory was developed for states and counties throughout the United States by EPA. The most recent data available for Las Animas County is provided by the EPA (2006). The EPA 2001 regional air pollutant emission summary for Las Animas County includes emissions from industrial-source fuel combustion, petroleum-related industries, other industrial processes, use of solvents, storage and transport services, waste disposal, recycling, highway vehicles, off-highway vehicles, agricultural activities, and miscellaneous fugitive dust sources.

Vehicle exhaust is the major source for VOCs, NO_x, and SO₂. Combustion from wildfires is the major source for CO, and fugitive dust from unpaved roads is the major source for PM₁₀. The air pollutant emissions for all of Las Animas County as of 2001 are as follows:

- 2,067 tpy of VOC;
- 2,859 tpy of NO_x;
- 19,938 tpy of CO;
- 133 tpy of SO₂; and
- 3,975 tpy of PM₁₀.

Given the relatively low emissions of the criteria pollutants throughout the county, the area is designated as being in attainment for all the NAAQS.

3.3.2 Consequences

The air quality analysis for the PCMS addresses the impacts to ambient air quality as a result of implementing the Proposed Action. The No Action alternative is assessed as a baseline for comparing the changes in air quality attributable to the incremental changes of the Proposed Action. For the Proposed Action, air quality impacts could occur during construction and operations. Short-term, construction-related impacts could result from fugitive dust and construction equipment exhaust. Long-term operational impacts could result from personnel increases and emission sources related to general population increases during training within the PCMS boundaries (such as the use of heating units and additional mobile sources) and increased land use and training requirements.

Air emissions that could result from implementing the Proposed Action were evaluated in accordance with federal and state regulations. The air quality analysis evaluates whether the Proposed Action would result in any of the following:

- Potentially cause or contribute to a violation of the NAAQS;
- Be considered a major source under PSD applicability; or
- Create an adverse visibility impact.

3.3.2.1 No Action Alternative

Training

Under the No Action alternative, training activities at the PCMS would increase from the training levels described in Section 2.2.4. The increase in training would be much less under the No Action alternative than under the Proposed Action. As noted in Section 3.3.2.2, under the discussion of the Proposed Action, potential impacts associated with the increase in training levels under the Proposed Action are below threshold levels. Because the increase in training associated with the No Action alternative is less than the increases of the Proposed Action, impacts from training increases under the No Action alternative would be below threshold levels and, therefore, would not result in impacts requiring mitigation.

Construction and Operation

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.3.2.2 Proposed Action

Training

Long-term adverse impacts have the potential to result from mobile sources and increased training exercises that are part of the Proposed Action. Mobile sources have the potential to result in impacts to air quality from increased emissions of fugitive dust (that is, PM) and vehicle exhaust. Increases in training exercises have the potential to result in impacts to air quality because of additional troop movements that result in fugitive dust emissions. Increases in criteria pollutants have the potential to decrease visibility and violate the NAAQS.

The increase in training exercises that would occur for the Proposed Action would not require an increase in the annual use of smoke or obscurants for training exercises in excess of existing permitted levels (Walker, 2006). Therefore, the only potential impact to air

quality from additional training activities under the Proposed Action would result from increased traffic on dirt roads and trails.

Convoy travel between Fort Carson and the PCMS was estimated. The increase in convoy traffic between Fort Carson and the PCMS would be on approximately 150 mi of paved public roads where emissions from personally owned vehicles already occur. The emissions resulting from the increase in convoys would be low, temporary, and dispersed over a great distance. The increases represent no more than 1 percent of total traffic and 10 percent of heavy vehicle traffic on the portions of road near the PM₁₀ air monitors. PM₁₀ is monitored in the Colorado Springs area and is representative of the ambient air conditions along the public road where convoy traffic is expected to occur. Currently, emissions from the average daily traffic (ADT) do not cause exceedences of the 24-hour standard. Therefore, any temporary incremental emission activity from the increased convoy transits is not expected to affect the current monitored compliance levels and would not result in impacts to air quality.

Construction and Operation

The analysis in this EIS addresses construction and operations emissions for the PCMS. For operations, the EIS assesses the impacts on an installation-wide basis and for stationary sources. In addition, the Proposed Action is assessed for impacts relative to ambient air quality standards and for visibility.

For construction, the Proposed Action could result in impacts to air quality because of wind-blown dust caused by construction equipment, exhaust emissions from construction equipment, and the increased number of vehicle trips by construction workers. Wind-blown dust contributes to PM emissions; pollutants associated with construction equipment exhaust include NO_x, PM, CO, and VOCs. To determine the effect construction would have on air quality, this evaluation relied on a comparable study that was conducted at Fort Carson. Approximately 1 million square feet of new or additional building space would be constructed under the Proposed Action at the PCMS (see Appendix B). At Fort Carson, more than 9 million square feet of similar construction activities were analyzed in the *Fort Carson Transformation DEIS* (DECAM, 2006b) to assess the potential impact to air quality. The analysis for Fort Carson showed that construction at Fort Carson would not result in impacts to air quality that exceed the *de minimis* regulatory threshold for General Conformity. It is anticipated that the reduced construction effort at the PCMS would result in fewer emissions than those proposed for Fort Carson; therefore, air quality emissions at the PCMS also would not exceed the *de minimis* threshold. While *de minimis* thresholds do not apply to the PCMS because it is in attainment for all criteria pollutants considered pursuant to 40 CFR 93, Subpart B, the comparison to the analysis conducted for Fort Carson indicates that the PCMS would continue to comply with the NAAQS under the Proposed Action.

For operations, emissions under the Proposed Action would be generated by both stationary and mobile sources, including fugitive dust from training exercises, vehicle emissions, and additional combustion equipment. The Proposed Action would result in emissions from prescribed burning. Prescribed burning, however, would occur regardless of whether the Proposed Action is implemented. As previously discussed in Section 3.3.1.1, the requirements of AQCC Regulation No. 9 are followed to ensure that conditions are acceptable for prescribed fires and that air quality is not compromised. Consequently, the

emissions estimated for the Proposed Action are overstated and constitute a conservative assessment of impacts.

Existing emissions data for facility and stationary sources are used to evaluate the potential impacts to air quality from implementing the Proposed Action. Table 3-4 lists the potential to emit (PTE) under the Proposed Action and the existing PTE for all facility sources at the PCMS. The net change in PTE associated with the Proposed Action is also provided.

TABLE 3-4
Existing Source PTE at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Potential to Emit	Pollutant (tpy)				
	PM ₁₀	NO _x	CO	SO _x	VOC
Proposed Action Emissions	937	75	866	16	65
Current Emissions	306	28	826	16	62
Proposed Action Net Change in PTE	631	48	40	0.26	3

In addition to facility wide emissions, this EIS assesses the potential for impacts from proposed stationary sources as a result of implementing the Proposed Action. Table 3-5 presents the proposed stationary sources under the Proposed Action. As noted Section 3.3.1, the combined emissions from all stationary sources at the PCMS are less than the facility PSD major-source threshold of 250 tpy for all pollutants; therefore, the PCMS would remain a true minor source (40 CFR 52.21(b)(1)(i)(b)). The operation of new stationary sources is not expected to exceed regulatory thresholds; therefore, the operation of the proposed facilities would not require permitting pursuant to PSD regulations. For additional information on the PSD applicability at the PCMS, see Appendix C, Attachment C.1.

TABLE 3-5
Proposed Stationary Sources
PCMS Transformation EIS, PCMS, Colorado

Emissions Type	Annual Emissions (tpy)				
	PM ₁₀	NO _x	CO	SO _x	VOC
Proposed Stationary Sources	62	53	41	16	65
Current Stationary Sources	58	6	1.27	16	62
Major Source Applicability Threshold	250	250	250	250	250

Installation-wide emissions and stationary source emissions listed in Tables 3-3 through 3-5 were evaluated in this EIS with the following models to assess emissions impacts. Stationary sources were evaluated under PSD applicability requirements (40 CFR 52.21) and using EPA's Industrial Source Complex Short Term (ISCST3) model for the near-field ambient air quality impacts. Emissions from off-road vehicles and stationary sources were evaluated using ISCST3, CALPUFF, and VISCREEN.

An air quality modeling analysis at a screening-level was performed to evaluate the potential impact to air quality in Las Animas County and the surrounding area under the Proposed Action for both stationary and mobile sources (see Appendix C, Attachment C.2). A modeling protocol was developed and submitted to CDPHE and EPA for comment prior to modeling. The document provided in Attachment C.2 is noted as Draft Final. No changes have been necessary to Attachment C.2, therefore, it is considered final.

The ISCST3 model was used to analyze the potential air quality impacts resulting from stationary source emissions and off-road emissions from the increased training maneuvers in comparison to the EPA Class II SILs and the NAAQS. The Class II SILs evaluate impacts based on facility emission rates and do not include background pollutant concentrations. As shown in Table 3-6 the modeling results indicate that all impacts are below the established Class II SILs for all criteria pollutants, with the exception of the values estimated for the annual NO₂ and the 24-hour PM₁₀ impacts. To evaluate these impacts, the modeled concentration was added to the background concentration for comparison to the NAAQS. The background concentration of pollutants represents the impacts from the current sources in the area. When the background concentrations are combined with the modeled impact from the proposed project, it represents the cumulative impact. When the modeled annual NO₂ concentration is combined with the ambient background concentration of NO₂, the total value is less than the NAAQS of 100 µg/m³. Additionally, when the modeled 24-hour PM₁₀ concentration is combined with the ambient PM₁₀ background concentration, the total value is less than the NAAQS of 150 µg/m³. Therefore, as shown in Table 3-6, the impact to air quality does not exceed the NAAQS.

TABLE 3-6

ISCST3 Modeling Results at the PCMS – Near-Field Impacts for Stationary Sources and Off-Road Emissions
PCMS Transformation EIS, PCMS, Colorado

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m ³)	EPA SIL (µg/m ³)	Background Concentration (µg/m ³)	Maximum Modeled and Background Concentration (µg/m ³)	NAAQS (µg/m ³)
CO	1-hour	200.28	500	—	NA	10,000
	8-hour	61.40	2,000	—	NA	40,000
NO ₂	Annual	2.0982	1	51.82	53.92	100
PM ₁₀	Annual	2.5888	1	9	11.25	50
	24-hour	66.82	5	55	121.82	150
SO ₂	Annual	0.0170	1	—	NA	80
	3-hour	0.7208	5	—	NA	365
	24-hour	0.2571	25	—	NA	1300

Notes:

Two modeling analysis were performed. One analysis used EPA-approved meteorological data from the Colorado Springs Airport. As requested by the CDPHE, a second modeling analysis used 1 year of data from the Rio Grande Portland Cement Tower. The results represent the higher value from the two analyses.

— = data not available

The CALPUFF model was used to analyze the AQRVs for Class I and Class II areas within approximately 124 mi (200 km) of the PCMS that result from stationary source emissions and off-road emissions from training maneuvers. Visibility (one of the AQRVs) is measured by determining the change in light extinction. As light extinction becomes greater, visibility

decreases. If a project contributes a greater than 5 percent change in light extinction, it would result in impacts to air quality. As shown by the modeling results in Table 3-7, the PCMS does not contribute to light extinctions greater than 5 percent for any Class I area; therefore, visibility impacts from implementing the Proposed Action would not exceed established standards.

TABLE 3-7

PCMS CALPUFF Modeling Results – Impacts to Class I Areas Within 200 km of the PCMS

PCMS Transformation EIS, PCMS, Colorado

Class I and Class II Area	Number of Occurrences Greater Than 5% Extinction	Deposition of Nitrogen (kg/ha/yr)	Deposition of Sulfur (kg/ha/yr)	Deposition SIL (kg/ha/yr)
Great Sand Dunes	0	0.000221	0.00000432	0.005
Wheeler Park	0	0.000265	0.00000329	0.005
Florissant Fossil Beds	0	0.0000785	0.00000149	0.005

Notes:

Visibility occurrences are per year for the maximum of 5 years.

Deposition of nitrogen and sulfur are per year for the maximum of 5 years. Deposition thresholds are the same for nitrogen and sulfur.

kg/ha/yr = kilogram per hectare per year

Deposition, which estimates the total amount of acid deposited on an area, is another AQRV. For the State of Colorado, the FLMS have established threshold levels of deposition. If a project does not exceed these levels, the impacts to air quality are deemed acceptable. As shown in Table 3-7, the deposition rates estimated for nitrogen and sulfur are much lower than the established thresholds, and air quality impacts to the nearby Class I areas from deposition would not exceed established standards.

At the request of EPA, the Class II Area Scenic Views were evaluated to determine visibility impacts. The CALPUFF model was used to determine potential impacts to the scenic views that were more than approximately 31 mi (50 km) from the PCMS and the VISCREEN model was used for areas within approximately 31 mi of the PCMS. As shown by the CALPUFF modeling results in Table 3-8, the PCMS does not contribute to the degradation of visibility at the scenic views that are more than approximately 31 mi from the PCMS. The VISCREEN modeling results indicate that the visible plumes of dust will be visible during active training exercises. However, given the limited number of actual training days per year, it is not expected to result in impacts to the Class II Area Scenic Views along the border of PCMS. Therefore, the PCMS does not contribute to the degradation of visibility at the Class II Area Scenic Views. Consequently, the Proposed Action would not result in impacts to visibility.

TABLE 3-8
 PCMS CALPUFF Modeling Results – Impacts to Class II Areas Scenic Views
PCMS Transformation EIS, PCMS, Colorado

Class II Area	Number of Occurrences Having Greater Than 5% Extinction
View Number 19, Picketwire Canyonlands-Dinosaur Tracks	0
View Number 32, Spanish Peaks	7
View Number 98, Picture Canyon Historic District	0

3.4 Noise

This section describes the affected environment and the environmental consequences for noise, including potential impacts to noise-sensitive areas, such as those occupied by residences, schools, hospitals, or nursing homes.

3.4.1 Affected Environment

Noise-sensitive locations adjacent to the PCMS consist of a limited number of residences around the periphery of the installation. No other noise-sensitive areas are located adjacent to the PCMS.

The primary sources of noise at the PCMS originate from short-term military training exercises at the small-caliber weapons ranges and from military aircraft operations at the combat assault landing strip (CAL) by C-130 aircraft. Large-caliber weapons are currently not used at the PCMS (Renn, 2006). The current noise contours are discussed in Section 3.4.2 in the context of the environmental analysis for noise.

3.4.2 Consequences

To evaluate noise impacts associated with military training activities at the PCMS, the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) prepared an Environmental Noise Management Program noise study. USACHPPM is responsible for conducting noise studies for military operations at installations throughout the United States. The study used computer modeling to develop noise contours to identify noise-impacted areas. Airfield noise contours were developed using the NOISEMAP computer model; noise from large-caliber weapons was modeled using the BNOISE2 program; and SARNAM was used to model noise from small-caliber weapons. Existing records on flight and range operations, along with reasonable assumptions of use, were used to create inputs for the noise models. Noise contours, which are presented in Appendix D, were generated for both the No Action alternative (the baseline condition) and the Proposed Action (USACHPPM, 2006).

3.4.2.1 Small-Caliber Weapons Ranges

Only the ranges along the western boundary of the PCMS were used to determine existing noise contours resulting from small-caliber weapons because those ranges are located nearest the installation boundary. As shown in Appendix D, Figure D-1, existing noise

contours for the small-caliber weapons ranges located near the western boundary of the PCMS indicate that the Noise Zone (NZ) II (PK15(met) 87-decibel [dB]) contour extends beyond the western installation boundary by approximately 2,130 feet (650 meters). The Zone III (PK15(met) 104-dB) contour does not extend beyond the installation boundary. PK15 describes the peak noise level expected to be exceeded by only 15 percent of the events and is an indication of the maximum noise that can be heard during a single event.

3.4.2.2 Combat Assault Landing Strip

Compatible-use-zone noise contours generated for the PCMS are shown in Appendix D, Figure D-2. The NZ II (65 A-weighted day-night noise level [ADNL]) and NZ III (greater than 75 ADNL) contours for C-130 aircraft operations at the CAL currently do not extend beyond the installation boundary. The Land Use Planning Zone (LUPZ) (60 to 65 ADNL) contour extends beyond the western installation boundary by approximately 525 feet (160 meters). Although the NZ II and NZ III contours are contained within the installation boundary, there is the potential for aircraft to cause annoyance while entering or exiting the airspace.

In addition, a supplemental annoyance buffer was also generated for the nap of the earth (NOE) flight corridor. A 0.25-mi-wide buffer on either side of the NOE flight corridor was determined to be sufficient to account for possible annoyance outside the actual NOE flight corridor. As a result, the supplemental annoyance buffer extends past the installation boundary for a maximum of 0.25 mi. It should be noted that the 0.25-mi buffer does not surround the entire installation because the NOE flight corridor does not follow the full length of the installation boundary, but rather it is located at varying distances from the boundary.

3.4.2.3 No Action Alternative

Training

Under the No Action alternative, training activities would increase over historical levels on the PCMS, as described in Section 2.2.4. The increased training activity would result in a negligible increase in noise from increased convoy traffic and from increased training activities. The increase in noise levels was analyzed for the Proposed Action (which is greater than the No Action alternative) and determined not to result in a perceptible increase in noise for any noise receptors located off post (see Section 3.4.2). The noise increase associated with the No Action alternative is anticipated to be less than that expected under the Proposed Action. However, the noise increases in areas outside the installation boundaries anticipated under the No Action alternative might discourage residential development or settling of other sensitive receptors in these areas in the future. To prevent adverse noise impacts in the future, the PCMS would follow AR 200-1 (Army, 1997) and the *Installation Environmental Noise Management Plan* (USACE, 2006a) to monitor noise.

Construction and Operation

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.4.2.4 Proposed Action

Training

Increased convoy movements would result in increased traffic noise levels. Daily traffic volumes along Interstate 25 (I-25) would be expected to increase by less than 3 percent during convoy movements. Convoys would be timed to avoid peak traffic periods along I-25 through Pueblo, and they would not contribute to the peak hour noise levels in that area. Daily traffic volumes along U.S. Highway 160 (U.S. 160) and U.S. 350 would temporarily increase by up to 11 and 23 percent, respectively. The increases in daily traffic volumes would be expected to occur intermittently for approximately 30 days per year under maximum training conditions. Based on the expected traffic increases, hourly average traffic noise levels at locations along area roadways where convoy movements would occur are estimated to increase between 0 and 2 decibels (acoustic) (dBA), which would not be a perceptible change to area residents. Therefore, mitigation is not required.

There would be no change to the small-caliber weapons noise contours under the Proposed Action because of the distance between the proposed range facilities and the installation boundary. As a result, a discussion of noise resulting from small-caliber weapons is not included in the following analysis. In addition, the NOE flight corridor would not change under the No Action alternative or the Proposed Action; therefore, discussion of noise resulting from the NOE flight corridor is not included in the following analysis.

Large-caliber weapons contours were generated for the proposed hand grenade range, located along the western boundary of the installation as shown in Appendix D, Figure D-3. The LUPZ and NZ II contours would extend beyond the western boundary for 0.78 mi and 0.43 mi, respectively. The modeled NZ III boundary does not extend beyond the installation boundary. PK15(met) contours were also generated for the proposed hand grenade range as shown in Appendix D, Figure D-4. The PK15(met) 115 dB contour extends beyond the western installation boundary approximately 0.78 mi; the PK15(met) 130 dB contour does not extend beyond the installation boundary. If grazing occurs near the western installation boundary when the hand grenade range is in use, cattle could be disturbed by the intermittent noise from grenade explosions. No known noise-sensitive receptors are located in the areas outside the installation boundaries where noise increases are anticipated. Therefore, no adverse noise impacts to sensitive receptors under current land uses would be expected as a result of the Proposed Action.

The noise increases in areas outside the installation boundaries might discourage residential development or settling of other sensitive receptors in these areas in the future. To limit adverse noise impacts in the future, the PCMS would follow AR 200-1 (Army, 1997) and the *Installation Environmental Noise Management Plan* (USACE, 2006a) to monitor noise.

Construction and Operation

Noise from building construction and road maintenance would not be expected to extend outside the installation boundary. Noise resulting from construction activities would be infrequent and short term in duration. Therefore, mitigation is not required.

3.5 Geology and Soils

This section identifies the affected environment and the environmental consequences for geology, topographic conditions, and soils.

3.5.1 Affected Environment

3.5.1.1 Geologic and Topographic Conditions

Regional Setting

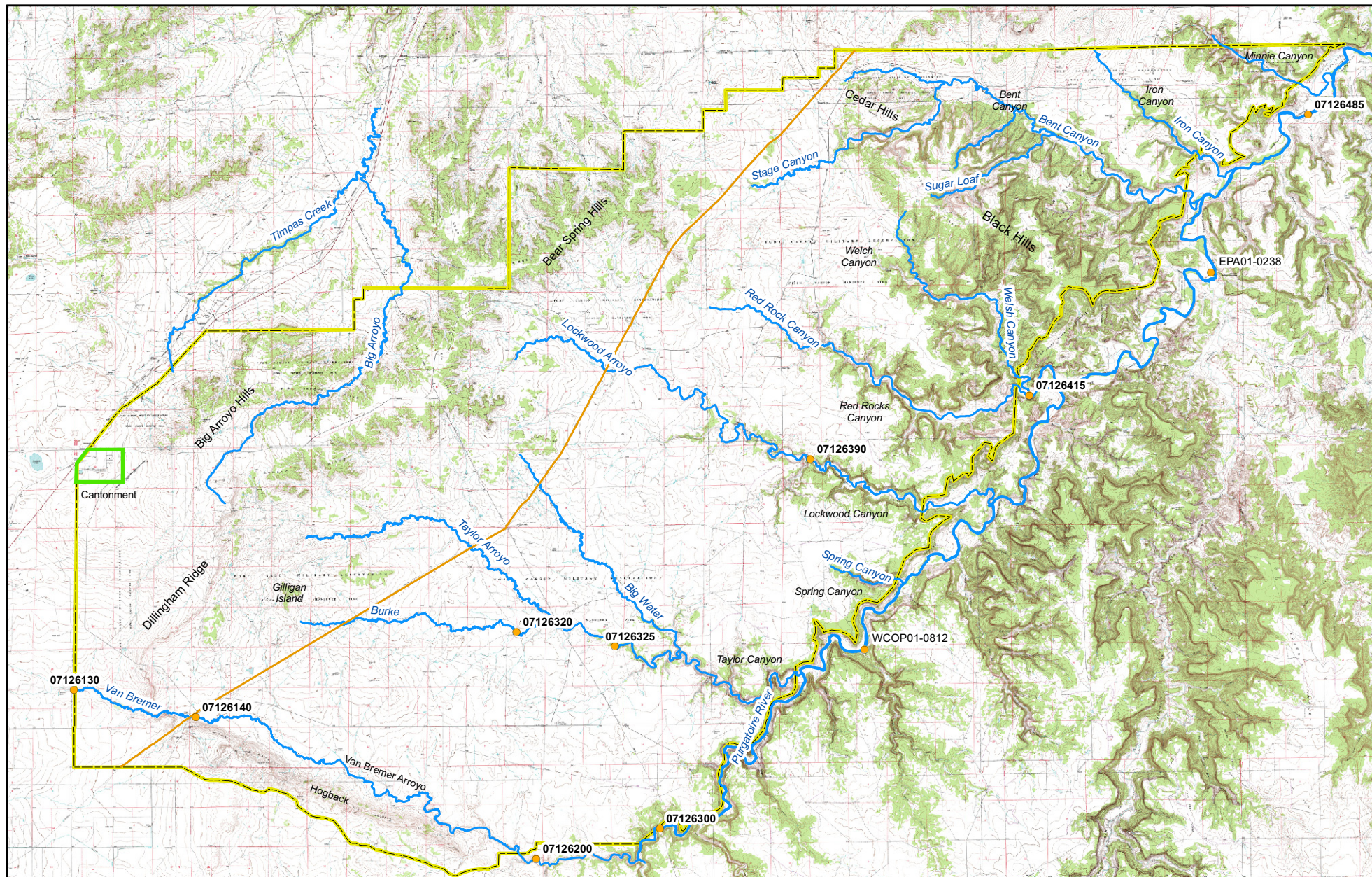
The PCMS is positioned within the Raton basin along the western margin of the Great Plains Physiographic Province. The landscape within this section is distinguished by topographic features such as mesas, cuestas, dissected plateaus, deep canyons, and volcanic formations. The basin gradually slopes downward, to the east, with elevations ranging from 5,500 feet above mean sea level (msl) in the west to 2,500 feet msl in the east (USACE, 2002a). The topography of the PCMS is shown on Figure 3-1.

The Raton basin is one of a series of intermontane basins that developed during the late Cretaceous and early Tertiary (the Cretaceous period ended 66.4 million years ago and was followed by the Tertiary period) along the eastern margin of the Rocky Mountain foreland. It was the result of compression associated with the Laramide Orogeny. The Raton basin was intruded by numerous volcanoes, forming lone mountain peaks; the geology of the section is characterized by volcanic vents, cinder cones, and lava fields.

The Great Plains Physiographic Province may be seismically active. According to the Colorado Geological Survey (CGS), the state has approximately 90 potentially active faults, some of which may be located in the vicinity of the Raton basin (CGS, 1999). A review of USGS and CGS databases indicates that faults in the area could have a low-to-moderate potential to cause damaging earthquakes (USGS, 2005 and CGS, 1999). It is estimated that several thousand faults within the state have not been extensively mapped or studied; therefore, predicting the timing or location of potentially dangerous earthquakes is not possible (CGS, 1999).

Project Setting

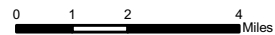
Four general topographic areas are located on the PCMS landscape. Wooded hills are located in the north northwest, east, and southeast. The Hogback, which consists of a basalt dike of volcanic origin, runs east to west along the southern boundary of the PCMS; grassy plains cover the area between the Purgatoire River and the woodlands; and canyons that drain to the Purgatoire River are located along the eastern boundary of the PCMS. Elevations on the PCMS range from 4,262 feet msl to more than 5,576 feet msl (DECAM, 2002a).



Legend

- Installation Boundary
- Surface Water
- Approximate Surface Water Quality Monitoring Stations
- Cantonment Area
- Existing High-Pressure Gas Line

FIGURE 3-1
Locations of Monitoring Stations at the PCMS



Geologic structures at the PCMS are generally associated with the Apishapa Uplift, which is oriented southeast to northeast across the southern portion of the PCMS. Sedimentary rocks associated with the uplift typically dip northeast from 1 to 3 degrees, up to 36 degrees (DECAM, 2002a). Small geologic structures within the PCMS include the Black Hills (5,365 feet msl), Sheep Canyon, and Muddy Creek Monoclines (strata inclined in the same direction). These monoclines have associated smaller synclines (a downward-curving fold with layers that dip toward the center of the structure) and anticlines (a fold that is convex up or to the youngest beds), including the Model Anticline, located in the western portion of the installation (DECAM, 2002a).

The PCMS is located within Seismic Zone 1 (DECAM, 2002a), which is an area of low seismic risk. Several seismic faults are located within the vicinity of the PCMS, although none crosses through the installation (USGS, 2005 and Widmann et al., 2002). Small faults might be associated with the Apishapa Uplift in the northern portion of the PCMS. Small earthquakes are known to occur in the region with generally undetectable effects (DECAM, 2002a). Since 1973, most earthquakes within 60 mi of the PCMS registered a magnitude of less than 4.0. The largest earthquake in the area recorded a magnitude of 5.0 approximately 50 mi from the center of the PCMS (CGS, 1997). There is low potential for significant seismic activity in the vicinity of the PCMS.

3.5.1.2 Soils

Regional Setting

Soil types commonly occurring in the Raton section are aridisol and entisol soils. These soil types are characterized by moderate to severe soil erodability, landslides, and unstable clay formation movement attributable to variations in moisture content and temperature (USACE, 2002a).

Project Setting

Thirty-one soil categories and associations have been recognized on the PCMS (DECAM, 2002a). Soils range from shallow to deep and are well drained. The soils are derived mainly from shale, sandstone, and limestone. Soil types for the PCMS are shown on Figure 3-2.

A brief description of soil coverage on the PCMS is provided below. Additional information on the PCMS soil types can be found in the INRMP (DECAM, 2002a), and specific information can be obtained from the NRCS soil survey for Las Animas County.

Flat-to-sloping plains are found in the western portion of the PCMS, and they contain soils that are generally silty, weakly developed, and calcareous throughout. Soils found in this landscape include loamy plains on upland flats, saline overflow in the depressions and along intermittent drainages, and sandy plains in sand dunes. This landscape is characterized by medium stability, with moderate soil losses from water erosion and high soil losses from wind erosion if soils are disturbed.

Limestone ridges are found in the northwestern corner of the PCMS. Major soils found in this landscape are limestone breaks on steep sideslopes and saline overflow along intermittent drainages. This landscape type is characterized by low stability, high soil loss by water erosion, and medium soil loss by wind erosion.

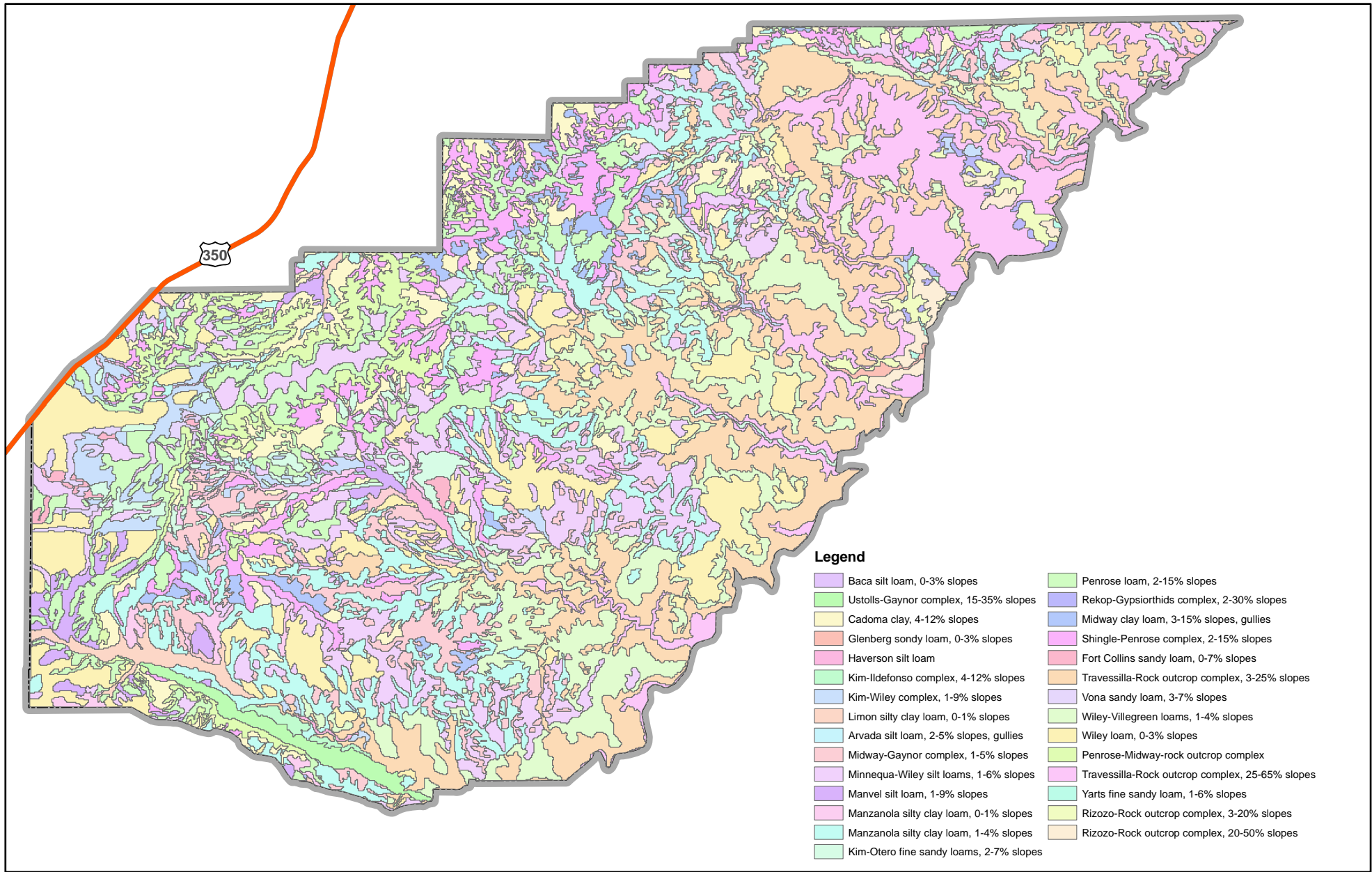


FIGURE 3-2
Distribution of Soil Types at the PCMS



0 2 4 8 Miles

The upland valley that crosses the installation from southwest to northeast, between limestone ridges and the Purgatoire River is characterized by loamy plains, alkaline plains, and saline overflow. Soils in this landscape are characterized by moderate water erosion and high wind erosion.

The landscape where the Purgatoire River and the associated side canyons form a series of rock-strewn cliffs and rolling mesa tops is characterized by rock and predominantly loamy plains-sandstone breaks, with some areas of loamy plains, saline overflow, and salt meadow soil types. This landscape is characterized by medium and low stability, moderate to high water erosion, and low wind erosion.

A major landslide occurs every 20 to 40 years at the PCMS, affecting soils with slopes that are greater than 30 percent. Landslides tend to occur at the PCMS from approximately the middle of the western boundary, southwest to Dillingham Ridge (Goss, 2006a).

3.5.1.3 Erosion Management

The PCMS currently follows regulations and has several land management programs that implement management plans designed to sustain training resources and offset adverse effects associated with military training (DECAM, 2002a). The BMPs and engineering controls implemented to reduce effects on soils are included in these programs.

Approximately 70 erosion-control reservoirs on the PCMS are monitored by the USGS as funding is available (Kuzmiak, 2006). Information on sediment monitoring associated with these erosion-control reservoirs is provided in Section 3.6.

The major plans, permits, and regulations implemented to reduce the effects of erosion and sedimentation on the PCMS include the following:

- MDC Program, Deferment Program, Reclamation Planning (Fort Carson, 2004);
- INRMP (DECAM, 2002a);
- *Fugitive Dust Control Plan* (DECAM, 2004a); and
- Section 404 Regional Permit No. 2002-00707 (USACE, 2002b).

In addition, the *EIS for Training Land Acquisition* (USACE, 1981) identifies mitigation that would minimize erosion on the installation. Under the direction of these plans and regulations, which are briefly described in Appendix A, the PCMS implements various erosion-control BMPs and mitigation measures on the installation intended to reduce the adverse effects of erosion and associated sediment.

In addition to the programs previously listed, soils management at the PCMS includes erosion control projects that are carried out by Fort Carson's Watershed Team when erosion control needs are identified (Goss, 2006a). Prior to implementing erosion control projects, the work is subject to environmental review, which may include categorical exclusion, REC, environmental assessment, EIS, and permitting (Goss, 2006a). The types of erosion control projects implemented by DECAM and ITAM include the following:

- Grading of existing roads to ensure proper drainage;
- Installation and maintenance of erosion control structures such as erosion control dams, rock check dams, waterbars, and hardened (bed of rock) crossings in existing drainages at intersections with established dirt roads;

- Bank-sloping to reduce gully erosion and to increase military training opportunities;
- Revegetation of disturbed lands; and
- Installation and maintenance of water diversions.

The main dirt roads in the training areas are maintained by the DPW by contractors (Goss, 2006a).

Modeling Studies

Adding Modern Soil Erosion Prediction and Rangeland Health Assessment to the Land Condition Trend Analysis Program at Fort Carson and Pinon Canyon (USDA, 2001a) evaluates soil erosion on training areas and the influences of land use and management practices on training areas at the PCMS. The study applied a hillslope erosion model to 19 study sites, one control site, and two bank slope sites on the PCMS to assess soil erosion rates and sediment yield along hillslopes. In the study, the USDA recommended using the model in soil protection planning and the design evaluation on the PCMS to evaluate revegetation design on sloped sites, training areas, and rest rotations (USDA, 2001a). The model has not been used on the PCMS since the initial studies were conducted by the USDA in 1999 because of the intensive field effort that would be required to collect data (Goss, 2006b).

Evaluation of Erosion and Sedimentation for TMDL Compliance at Fort Carson and Pinon Canyon (USDA, 2001b) discusses sedimentation in streams resulting from non-point source pollution on the PCMS. The study evaluates simulation modeling methods and data collected from hydrologic modeling, and it presents interpretations of these data for establishment of total maximum daily load (TMDL) levels at the PCMS. TMDLs for sediment (or other pollutants) have not been established for the Purgatoire River or its tributaries on the PCMS. Further information on existing sediment transport issues on the PCMS is presented in Section 3.6.

3.5.2 Consequences

3.5.2.1 No Action Alternative

Training

Geologic and Topographic Conditions

Under the No Action alternative, although training activities would increase in frequency, training would not significantly alter geologic and topographic conditions on the PCMS. Under the No Action alternative, no adverse effect on geologic and topographic conditions is anticipated to occur as a result of training activities.

Soils

Under the No Action alternative, training activities would increase in frequency and, therefore, would increase the effects on soils compared with historical conditions. Potential effects on soils are described below according to the type of training area (see Section 2.2.4.2 for descriptions of the training areas).

Maneuver Training Areas

Maneuver training areas consist of open, relatively flat areas suitable for maneuvering mechanized vehicles, including tracked and wheeled vehicles. Movement in these areas by vehicles or troops is unrestricted.

Direct impacts to soils that could occur within maneuver training areas under the No Action alternative include increased rutting from tank pivot turns (turns from a stopped position) and turns caused by tracked vehicles; and compaction caused by frequent repeated vehicle passes and the use of land for bivouac sites. These impacts result in soils that are susceptible to erosion by water and wind. Soil compaction reduces water infiltration through the soil profile, resulting in increased runoff that can exacerbate erosion. Construction of hull and turret defilades (large ramped holes dug to conceal equipment from ground forces) and tank traps can seriously alter or destroy the soil profile, which can make reclamation more difficult.

Soil and vegetation at the PCMS are particularly susceptible to maneuver damage when the soils are wet (DECAM, 2002a). The primary impact from training activities on wet soils is rutting. During dry conditions, vegetation is ground down, but roots usually remain intact. When roots are intact, vegetation may recover. When training occurs on wet soils, there is greater potential for root systems to be destroyed from rutting (potentially up to 24 inches deep in some places). Therefore, with the increased training frequency under the No Action alternative, revegetation would be much less likely to occur without surface soil preparation and reseeding compared to historical conditions. More compaction would occur when training is conducted on wet soils, but rutting would be the primary adverse effect. Training on dry soils would result in soil loss from wind erosion, but adverse effects would not be as severe as when training on wet soils (Goss, 2006b).

Direct adverse impacts attributable to the loss of vegetative cover are discussed in Section 3.7. An indirect adverse impact to soils from the loss of vegetative cover would be increased erosion by water and wind.

The PCMS would continue to implement existing erosion management programs as described in Section 3.5.1.3 to mitigate the effects on soils from increased training under the No Action alternative.

Small-Arms Live-Fire Ranges

Firing of small-caliber weapons can result in soil disturbance from ordnance impact (DECAM, 2001). When small-arms live-fire ranges are not in use, maneuver training would occur, which would result in similar adverse direct and indirect impacts to soils as previously described for maneuver training areas.

Dismounted Training Areas

Dismounted training areas are restricted to foot traffic and emergency vehicles. Therefore, direct impacts from increased training activities under the No Action alternative would include increased compaction of soils from foot traffic and bivouac activities, generally similar to impacts that result from recreational camping (Trame, 1997). Increased indirect impacts to soils could result from the loss of vegetative cover. Adverse effects on soils would be expected to be similar to, although less intense than, those that would be expected in the maneuver training areas. The PCMS would continue to implement existing erosion management programs as described in Section 3.5.1.3 to mitigate the effects on soils of increased training under the No Action alternative.

Restricted Areas

There could be minimal adverse effects to soils within the restricted areas under the No Action alternative because varying degrees of training would still be allowed.

Construction and Operation

Geologic and Topographic Conditions and Soils

Facility construction of the Proposed Action projects would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.5.2.2 Proposed Action

Training

Geologic and Topographic Conditions

As with the No Action alternative, training would not significantly alter geologic and topographic conditions on the installation. Therefore, no adverse effect would occur on geologic and topographic conditions as a result of training implemented under the Proposed Action.

Soils

Adverse impacts within the Cantonment could occur because training activities would include establishment of “tent cities” that would temporarily house troops training at the PCMS. The primary adverse effect to soils in these areas would be compaction, and an indirect impact would be loss of vegetation. The PCMS would continue to implement existing erosion management programs as described in Section 3.5.1.3 to mitigate the effects of staging activities on soils.

Additionally, impacts to soils from activities at the live hand grenade range could occur and would be limited to local disturbance of surface soils from training activities (for example, hand grenade explosions) and the cleanup of shrapnel and other debris. Impacts to soils during live hand grenade training activities would include the generation of small craters, fugitive dust, explosive emissions, and the distribution of shrapnel across the range. Impacts to surface soils would also occur during periodic site cleanup.

Erosion of soils within the area of the live hand grenade range is anticipated. The range is relatively flat and runoff from the range would be controlled by soil and erosion BMPs. Consequently, erosion would be limited to the immediate area inside the range, and it is unlikely that soil erosion and the discharge of sediment would occur beyond the boundaries of the range.

As previously noted, periodic site cleanup would occur at the range. These activities include cleanup of shrapnel and other debris and regrading of the site. These activities would also disturb surface soils and generate fugitive dust. However, cleanup activities would also restore the area to grade and fill small craters and areas of on-site erosion (for example, channels and rivulets), thus mitigating the potential for erosion and discharge of sediment from the site.

Direct and indirect impacts that occur as a result of use of the small-arms live-fire ranges would continue as described under the No Action alternative. More frequent use of the existing facilities would conflict with maneuver training and may result in a decreased use

of the maneuver training areas within the SDZs of small-arms live-fire ranges, thereby, reducing the impacts associated with mechanized training maneuvers.

As detailed in Section 2.0, activities in the training areas would entail an increased number of training rotations, personnel, and equipment to support military operations under the Proposed Action. The potential effects to soils under the Proposed Action would be similar to those described under the No Action alternative, but they could occur at a greater magnitude as a result of the increased level of training activity. As described under the No Action alternative, the PCMS would continue to implement existing erosion management programs (see Section 3.5.1.3) to reduce the effects of increased training on soils under the No Action alternative. These programs might not be sufficient to mitigate adverse impacts to soils from the increased frequency of training activities under the Proposed Action. Therefore, additional erosion control structures and other mitigation measures would likely need to be implemented to mitigate the adverse effects of increased training activities on soils.

Construction and Operation

Geologic and Topographic Conditions

No substantial adverse effects on the geology of the PCMS would result from implementation of the Proposed Action because construction and operations would not change the underlying geology of the installation. Minor changes in elevation would result from site grading and preparation during construction in the Cantonment and at select locations in the training areas. However, these alterations would not substantially change the topography of the PCMS, and impacts from grading and construction activities would be negligible relative to the overall size of the facility. No change in geologic and topographic conditions would occur during facility operation.

Soils

Construction activities on the PCMS and the location of construction projects on the installation that would be implemented under the Proposed Action are identified in Section 2.0 and on Figures 2-4 and 2-5. The majority of construction would be within the Cantonment, although several small-scale projects in the training areas are also planned.

Disturbance to soils would generally occur during construction. Heavy equipment would be used to clear and grade sites, move and compact soils, excavate foundations, and remove debris in construction and paving areas. In addition, minor grading and compaction could occur during maintenance activities. Ground-disturbing activities could result in erosion by water and wind and the potential off-site transport of sediment. To reduce water and wind erosion during construction activities, the area of disturbance would be minimized. Additionally, the PCMS would continue to implement existing programs and standard BMPs to reduce the effects of construction on soils. Sedimentation and erosion control measures would be implemented in accordance with stormwater regulations (see Section 3.6) to minimize erosion of on-site soils and soils in surrounding areas. Disturbed land in the Cantonment would be prepared and seeded in accordance with Fort Carson's installation design for landscape standards (Fort Carson, 2006a). In disturbed parts of the training areas, reseeding standards would follow the *General Downrange Seeding Specifications for Fort Carson* (DECAM, 2002c). No additional mitigation would be required.

3.6 Water Resources

This section identifies the water resources at the PCMS, including surface water, groundwater, and floodplains and the environmental consequences for water resources from the construction and operation of new facilities and increased training under the Proposed Action. Environmental consequences for potable water supply are described in Section 3.11.

3.6.1 Affected Environment

In addressing water resources at the PCMS, the Army is guided by relevant statutes (and their implementing regulations) that establish standards and provide guidance on water resource management and planning. The primary regulation directing operations at the PCMS is the Clean Water Act (CWA) and its National Pollutant Discharge Elimination System (NPDES) requirements, which are administered by EPA. USACE has the primary responsibility for administering Section 404 of the CWA as it pertains to dredge and fill activities for any waters of the United States (including wetlands) (DECAM, 2002a and USACE, 2002b). The use of surface water and groundwater is governed by Colorado water law, and all use or diversion of water must be coordinated with DECAM prior to use. Specific objectives for water resources on Army lands were established in accordance with AR 200-1 (Army, 1997); EO 11988 provides requirements for floodplain management (DECAM, 2002a).

DECAM's water resources management program includes control of non-point source pollution (DECAM, 2002a). Stormwater pollution prevention plans (SWPPP) are prepared when required, and BMPs for individual facilities are implemented as appropriate (DECAM, 2002a). Contractors must submit a NOI to obtain coverage under the "NPDES General Permit for Storm Water Discharges from Construction Activities" for each construction project that disturbs 1 acre of land or more (U.S. Army Environmental Center [USAEC], 2005). In addition, for each project, the contractor must develop and implement a SWPPP that outlines mitigation strategies to reduce impacts associated with stormwater runoff during construction (Fort Carson, 2006b). Erosion control activities in waters of the United States are permitted in the Section 404 regional permit (USACE, 2002b). The activities authorized under this permit are described in Section 3.6.1.1. The *Pollution Prevention (P2) Plan* (DECAM, 2004b) outlines techniques for protecting water resources during operations. This plan must be updated when new operations are added.

As described in the INRMP, water resources at the PCMS are managed in coordination with the USGS, NRCS, USFWS, U.S. Department of Justice, USACE, CDOW, and the Colorado State Division of Water Resources. The water resources management program implemented at the PCMS includes watershed and sedimentation monitoring, watershed and sedimentation management and enhancement, project reviews for erosion and sediment control, and compliance with federal and state laws and regulations (DECAM, 2002a). DECAM leads a cross-functional Watershed Team that provides an integrated approach to watershed compliance, management, and sustainability. The Watershed Team is responsible for implementing strategic watershed goals that would maintain the critical land resources that provide a realistic military training environment. Performance goals for the Watershed Team include maintaining stable or improving rangeland conditions by developing and implementing erosion control and vegetation management initiatives in accordance with

accepted scientific methods and engineering standards (Watershed Team, 2006). This is validated through the Range Training Land Assessment program (USDA, 2001a).

Management plans and programs applicable to water resources under which the PCMS operates are listed in Appendix A.

3.6.1.1 Surface Water

Regional Setting

The PCMS is located in the Arkansas River basin. The Purgatoire River is the primary drainage near the PCMS. As shown on Figure 3-1, there are several smaller creeks and drainages on or adjacent to the PCMS. Water from the PCMS ultimately drains into the Arkansas River via the Purgatoire River or the Big Arroyo drainage. The Purgatoire River and its tributaries within the PCMS have periodic high flows, including the potential for flash floods. Smaller creeks and drainages might be dry much of the year.

Project Setting

The majority of the drainages at the PCMS flow from the northwest to the southeast and drain into the Purgatoire River, which flows to the northeast along the southern and eastern boundaries of the PCMS. The Big Arroyo drainage is located in the northwest corner of the PCMS and flows northeast (DECAM, 2002a). No creeks or major drainages are present in the Cantonment. The drainages at the PCMS are intermittent; flow originates from precipitation events. Flow from the PCMS contributes approximately 4 percent of the total flow in the Purgatoire River at the Rock Crossing USGS Station 07126485 (USGS, 1993). The quality of surface water at the PCMS is generally high (DECAM, 2002a). However, the surface water at the PCMS is not a source of domestic water supply.

The potential for sediment loading in surface water is a concern (USACE, 1981). Fort Carson and the PCMS have been issued a Section 404 regional permit (Permit No. 2002-00707) by the USACE, Albuquerque District, which authorizes implementation of erosion control activities at the PCMS (USACE, 2002b).

The PCMS implements BMPs and the DECAM water resources management program. Erosion control activities and BMPs that are or could be implemented at the PCMS to control sediment loading in surface water are identified and described in detail in the Section 404 regional permit (USACE, 2002b), the storm sewer system capacity report (USAEC, 2005), and the *Programmatic Environmental Assessment for the Erosion and Sediment Control Program* (DECAM, 1998). The permit includes a range of erosion control methods, including the following:

- Erosion control impoundments;
- Banksloping of erosion courses;
- Check dams;
- Rock armor;
- Hardened crossings;
- Culverts and bridges;
- Erosion control terraces and water diversions; and
- Water turnouts.

To control and monitor sediment transport and loading, the USGS operates approximately 70 erosion-control reservoirs, a stream flow gauge on the Purgatoire River, and five stream flow-sediment gauges on Purgatoire River tributaries that drain more than 60 percent of the PCMS. The erosion-control reservoirs are used to assess sediment yields from small watersheds in the training areas, while the stream flow-sediment gauges quantify water and sediment quantities leaving the PCMS. The USGS uses information from the erosion-control reservoirs and stream flow-sediment gauges to support an erosion-production and sediment-production assessment of the PCMS (DECAM, 2002a).

The USGS has monitored water quality, including sediment yield, at the PCMS since 1983 in cooperation with the Army and Fort Carson (USGS, 1993). Water quality data from 1984 (before military training activities started at the PCMS) through 1987 (after training was initiated) were evaluated by statistical analysis. The finding of this report demonstrated that the military maneuvers conducted during this period did not have a statistically significant effect on water quality in the Purgatoire River (USGS, 1993). Another study sought to evaluate erosion and sedimentation for potential TMDL compliance (USDA, 2001b). The TMDL study did not result in a TMDL for sedimentation, but it outlined further steps for study.

3.6.1.2 Surface Water Quality

Water Quality Standards

The CDPHE Water Quality Control Commission (WQCC) is responsible for establishing acceptable water quality levels on all streams in Colorado. As such, WQCC has divided all water bodies in the state into various segments, each of which has been assigned water quality levels, known as “water quality standards,” that have been established to protect and preserve the beneficial uses of the water or to improve the water quality.

Classification and use designations have been established for the Purgatoire River, according to the water quality standards adopted by WQCC on February 12, 2007. The mainstem of the Purgatoire River and all tributaries within the PCMS are contained in stream Segment 7 of the Lower Arkansas River Basin, and have been designated for the following uses: Aquatic Life Warm 1, Recreation 1a, and Agriculture. As detailed in Regulation 31, “The Basic Standards and Methodologies for Surface Water,” these uses are defined as follows:

Warm Water Aquatic Life, Class 1: These are waters that (a) currently are capable of sustaining a wide variety of warm water aquatic life, including sensitive species, or (b) could sustain such aquatic life but for correctable water quality conditions. Waters are considered capable of sustaining aquatic life where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species. “Aquatic life” includes both fish and invertebrates species.

Recreation Class 1a: These are surface waters in which primary contact uses have been documented or are presumed to be present. These uses include recreational activities in or on the water when the ingestion of small quantities of water is likely to occur such as swimming, rafting, kayaking, tubing, windsurfing, and water-skiing.

Agricultural: These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado, and which are not hazardous as drinking water for livestock.

The established water quality standards for the mainstem of the Purgatoire River and all tributaries in the PCMS are listed in Table 3-9.

TABLE 3-9

Stream Classifications and Water Quality Standards for Segment 7 (Mainstem of the Purgatoire River from Interstate 25 to the Confluence with the Arkansas River)

PCMS Transformation EIS, PCMS, Colorado

Designation	Classification	Physical and Biological Standards	Inorganic (mg/L)	Metals (µg/L)	
None	Aq Life Warm 2	DO = 5.0 mg/L	NH ₃ (ac) = TVS S = 0.002	Fe(ch) = 1000 (Trec)	
	Recreation 2	pH = 6.5 to 9.0	NH ₃ (ch) = 0.10 B = 0.75	Pb(ac/ch) = TVS	
	Agriculture		F.Coli = 200/100 ml	Cl ₂ (ac) = 0.019 NO ₂ = 0.5	Mn(ac/ch) = TVS
			E. Coli = 126/100 ml	Cl ₂ (ch) = 0.011 NO ₃ = 10	Hg(ch) = 0.01 (Tot)
			CN = 0.00		Ni(ac/ch) = TVS
			As(ch) = 100 (Trec)		Se(ac/ch) = TVS*
			Cd(ac/ch) = TVS		Ag(ac/ch) = TVS
			CrIII(ac) = 50 (Trec)		Zn(ac/ch) = TVS
			CrVI(ac/ch) = TVS		
			Cu(ac/ch) = TVS		

µg/L = micrograms per liter	CrVI = hexavalent chromium	Ni = nickel
ac = acute	Cu = copper	NO ₂ = nitrogen dioxide
Ag = silver	DO = dissolved oxygen	NO ₃ = nitrate
As = arsenic	Fe = iron	Pb = lead
Cd = cadmium	Hg = mercury	Se = selenium
ch = chronic	mg/L = milligrams per liter	Tot = total
Cl1 = chlorine gas	ml = milliliters	Trec = total recoverable
CN = cyanide	Mn = manganese	TVS = table value standard
CrIII = trivalent chromium	NH ₃ = ammonia	Zn = zinc

303(d) Listed Waters

Section 303(d) of the CWA requires CDPHE's Water Quality Control Division (Division) to develop a list of water bodies within the state that are not meeting the water quality standards. The Division is then required to further evaluate the stream and develop a TMDL, which will generally specify the amount of pollutants that each source, point and nonpoint, can discharge into the stream. Segment 7 is presently on the Colorado 2006 303(d) list of impaired waters, which identifies water bodies and parameters in instances where the Division has determined that one or more assigned uses or standards are not currently attained. Segment 7 has been listed because the existing quality exceeds the underlying standard for dissolved selenium. In addition, Segment 7 is included on WQCC's 2006 Monitoring and Evaluation List for sediment because there is reason to suspect water quality problems in the stream segment, but uncertainty exists in one or more factors to make a determination.

It should be noted that high selenium levels have been observed in numerous locations throughout the state. The selenium sources are typically tied to fossil fuels, such as coal or oil, or are the result of the natural weathering or irrigation of cretaceous marine shales and shale-derived soils. The latter is especially true of areas where the soils contain high alkalinity and receive low amounts of precipitation. The USGS has determined that the PCMS drainage area contains slightly to moderate saline soils (USGS, 1993).

In-Stream Water Quality

Table 3-10 lists the surface water monitoring stations on streams that drain the PCMS. The USGS has nine stream monitoring gauge stations along the Purgatoire River and its tributaries within the PCMS, all of which have been evaluated to determine the extent of available water quality data. All but two USGS stream monitoring gauge stations stopped collecting data between 1987 and 1989. Two of the stations (07123600 and 07126485) continued to collect very limited data until 1990, and even less data after 1994. Several USGS stream monitoring gauge stations are present both upstream and downstream of the project area, but these stations are too remote from the project area to be representative of the PCMS stream flow data. However, limited water quality data were found on the EPA STORET (STOrage and RETrieval) water quality database for two stream monitoring gauge stations (WCOP01-0812 and EPA01-0238) on the Purgatoire River adjacent to the PCMS. Figure 3-1 shows all of the water quality monitoring stations relevant to PCMS.

TABLE 3-10

Water Quality Monitoring Stations Within or Near the PCMS
PCMS Transformation EIS, PCMS, Colorado

Organization Name	Station ID	Stream	Location
USGS	07126130	Van Bremer Arroyo, Purgatoire River	Van Bremer Arroyo near Thatcher, CO
USGS	07126140	Van Bremer Arroyo, Purgatoire River	Van Bremer Arroyo near Tyrone, CO
USGS	07126200	Van Bremer Arroyo, Purgatoire River	Van Bremer Arroyo near Model, CO
USGS	07126300	Purgatoire River	Purgatoire River near Thatcher, CO
USGS	07126320	Burke Arroyo, Purgatoire River	Burke Arroyo Tributary near Thatcher, CO
USGS	07126325	Taylor Arroyo, Purgatoire River	Taylor Arroyo below Rock Crossing near Thatcher, CO
EPA National Aquatic Resource Survey Data	WCOP01-0812	Purgatoire River	Purgatoire River midway between Taylor and Spring Canyon
USGS	07126390	Lockwood Arroyo, Purgatoire River	Lockwood Canyon Creek near Thatcher, CO
USGS	07126415	Red Rock Arroyo, Purgatoire River	Red Rock Canyon Creek at mouth near Thatcher, CO
EPA National Aquatic Resource Survey Data	EPA01-0238	Purgatoire River	Purgatoire River approximately 2 miles upstream of Bent Canyon
USGS	07126485	Purgatoire River	Purgatoire River at Rock Crossing near Timpas, CO

Available water quality data from 1999 to present are summarized in Table 3-11. Summary statistics of available stream flow data indicate large fluctuations in stream flow conditions. Near the southeast boundary of the PCMS (07126300), stream flow in the Purgatoire River ranged from 0.10 to 1,560 cubic feet per second (cfs), while at the northwest boundary of the

installation (07126485), stream flow in the river varied between 0.39 and 2,300 cfs. Stream flow fluctuations in the Purgatoire River can be attributed to precipitation, diversions, and irrigation–return flows. Suspended sediment concentrations at 07126485 ranged from 7 to 5,120 milligrams per liter (mg/L), with the fluctuations due in part to the additional flow from Chacuaco Creek, which is the main tributary to the Purgatoire River. Additionally, specific conductance has been shown to be correlated to dissolved-solids concentrations. Available specific conductance data also indicated large fluctuations in the available data at 07126300 and 07126485. The volume of available data from 1999 to present was insufficient to establish baseline water quality for the Purgatoire River near the PCMS.

Table 3-12 shows the available data from the 1993 USGS study at stations 07126300 and 07126485. Although the USGS evaluated 11 stations, including the USGS stations listed in Table 3-10, only stations 07126300 and 07126485 were evaluated for various water quality parameters in addition to stream flow, suspended solids, and sediment loads.

In 1993, the USGS completed a study entitled *Assessment of Effects of Military Maneuvers on the Stream flow, Water Quality, and Sediment Yields at the U.S. Army Pinon Canyon Maneuver Site, Las Animas County, Colorado* (USGS, 1993). This report analyzed instream water quality data during the pre- and post- military maneuver periods at the PCMS in 1982–1985 and 1985–1987, respectively. Effects of military maneuvers on stream flow quantity and quality were determined by statistical analysis. The USGS reported no statistically significant change in stream flow quantity or quality between the pre- and post-maneuver periods for the Purgatoire River and its tributaries within the PCMS. However, the USGS report indicated that the reliability of statistical data could have been improved with additional years of stream flow quantity and quality data. Because existing water quality data after 1999 are extremely limited, the 1993 report summarized the most recent extensive water quality data set for the Purgatoire River near the PCMS.

Summary statistics of available stream flow data from the USGS (1993) study indicate fluctuations in stream flow conditions at both USGS stations. However, the minimum stream flow recorded between 1982 and 1987 is 1,020 cfs, which is significantly higher as compared to the limited data after 1999. The USGS (1993) study also evaluated dissolved-solids and sediment loads in relation to specific conductance according to water years from 1984 to 1987. Table 3-13 summarizes the dissolved solids and suspended sediment loads for the water years evaluated by the USGS (1993) study. In general, suspended sediment concentrations from 1982 to 1987 varied from 20 to 70,000 mg/L at stations 07126300 and 07126485.

TABLE 3-11
Water Quality Summary for Monitoring Stations Near the PCMS
PCMS Transformation EIS, PCMS, Colorado

Station ID	Date Period	Statistics	pH (SU)	DO (mg/L)	Temp (°C)	Spec. Cond. (µs/cm)	Instantaneous Discharge (cfs)	Turbidity (NTU)	TSS (mg/L)	Sus. Sediment (mg/L)	Sulfur (mg/L)	Dissolved Ammonia as N (mg/L)	Dissolved Chloride (mg/L)	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	*Hardness as CaCO ₃ (mg/L)	Dissolved Selenium (µg/L)	Dissolved Zinc (µg/L)
07126300 (Purgatoire River near Thatcher, CO)	4/29/1999 to 10/6/2004	# samples	--	--	44	24	44	--	--	--	--	--	--	--	--	--	--	--
		Min	--	--	0.3	901	0.10	--	--	--	--	--	--	--	--	--	--	--
		Mean	--	--	15	2812	69	--	--	--	--	--	--	--	--	--	--	--
		Max	--	--	30	4730	1560	--	--	--	--	--	--	--	--	--	--	--
WCOP01-0812 (Purgatoire River midway between Taylor and Spring Canyon)	9/17/2002 to 8/13/2003	# samples	2	0	2	2	--	2	2	--	2	2	1	2	2	--	1	1
		Min	7.95	--	20.9	584	--	175	136	--	24	0.01	--	0.16	16.3	--	--	2.0
		Mean	7.98	--	24.6	618	--	212	156	--	25	0.02	7.24	0.18	17.5	72.3	7.9	17.9
		Max	8.01	--	28.3	651	--	248	177	--	27	0.03	--	0.20	18.6	--	--	33.7
EPA01-0238 (Purgatoire River approximately 2 miles upstream of Bent Canyon)	8/25/2004	# samples	1	1	1	1	--	1	1	--	1	1	1	1	1	1	1	1
		Min	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Mean	8.5	7.3	23.5	1357	--	84.1	173	--	63	0	58.8	0.03	63.6	263	1.1	0
		Max	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07126485 (Purgatoire River at Rock Crossing near Timpas, CO)	3/2/1999 to 9/16/2005	# samples	--	--	67	32	72	--	--	35	--	--	--	--	--	--	--	--
		Min	--	--	0	1240	0.39	--	--	7	--	--	--	--	--	--	--	--
		Mean	--	--	17	2656	148	--	--	819	--	--	--	--	--	--	--	--
		Max	--	--	28	4190	2300	--	--	5120	--	--	--	--	--	--	--	--

Notes:

*Calculated from calcium and magnesium concentrations.

°C = degrees Celsius

µg/L = micrograms per liter

µS/cm = microsiemens per centimeter

CaCO₃ = calcium carbonate

cfs = cubic feet per second

mg/L = milligrams per liter

NTU = nephelometric turbidity unit

SU = standard unit

TABLE 3-12
 1993 USGS Water Quality Data at Stations 07126300 and 07126485
 PCMS Transformation EIS, PCMS, Colorado

Station ID	Date	Statistics	Spec. Cond. (µS/cm)	Instantaneous Stream Flow (cfs)	Dissolved Oxygen (mg/L)	Dissolved Nitrite Plus Nitrate as Nitrogen (mg/L)	Total Recoverable Cadmium (µg/L)	Dissolved Chromium (mg/L)	Total Recoverable Copper (µg/L)	Total Recoverable Iron (µg/L)	Total Recoverable Lead (µg/L)	Total Recoverable Manganese (µg/L)	Total Recoverable Zinc (µg/L)	Total Cyanide (µg/L)
07126300 (Purgatoire River near Thatcher, CO)	Pre-maneuver (1982 – 1985)	# samples	15	22	16	20	15	15	15	15	15	15	15	12
		Min	1,320	14	7.0	<0.10	<0.1	<10	4.0	160	<1.0	20	10	<0.01
		Mean	2,440	52	8.5	0.18	<0.1	<10	12	1,200	4.0	60	40	<0.01
		Max	3,440	1,090	13.7	0.76	4.0	20	290	180,000	190	4,200	810	<0.01
07126300 (Purgatoire River near Thatcher, CO)	Post-maneuver (1985 – 1987)	# samples	25	22	11	22	10	10	10	9	10	10	9	10
		Min	1,030	17	7.2	<0.10	<0.1	<10	2.0	40	<1.0	30	30	<0.01
		Mean	2,900	275	10	0.38	<1.0	<10	20.5	1,700	9.0	275	110	<0.01
		Max	3,610	1,470	12.2	0.60	8.0	<10	930	290,000	600	11,000	1,500	<0.05
07126485 (Purgatoire River at Rock Crossing near Timpas, CO)	Pre-maneuver (1982 – 1985)	# samples	15	18	16	20	12	13	12	12	12	12	12	11
		Min	1,320	12	5.9	<0.01	<1.0	<10	2.0	160	<1.0	30	20	<0.01
		Mean	2,950	48	8.0	0.10	<1.0	<10	11	1,035	4.0	70	45	<0.01
		Max	3,430	861	13	0.70	3.0	20	430	240,000	270	6,400	1,100	<0.01
07126485 (Purgatoire River at Rock Crossing near Timpas, CO)	Post-maneuver (1985 – 1987)	# samples	25	25	9	26	15	15	15	15	15	15	15	15
		Min	1,020	9.3	5.6	<0.10	<1.0	<10	2.0	160	<1.0	40	20	<0.01
		Mean	2,780	211	8.6	0.33	<1.0	<10	130	100,000	6.0	2,800	580	<0.01
		Max	3,480	2,950	11.4	0.75	1.0	20	510	410,000	400	9,800	2,000	<0.05

µg/L = micrograms per liter
 µS/cm = microsiemens per centimeter
 cfs = cubic feet per second
 mg/L = milligrams per liter

TABLE 3-13
1993 USGS Summary of Dissolved Solids and Suspended Sediment Loads
PCMS Transformation EIS, PCMS, Colorado

Station ID	Parameters	Water Years			
		1984	1985	1986	1987
07126300 (Purgatoire River near Thatcher, CO)	Dissolved Solids Load (tons)	119,000	110,000	118,000	155,000
	Suspended Sediment Load (tons)	134,000	280,000	701,000	753,000
07126485 (Purgatoire River at Rock Crossing near Timpas, CO)	Dissolved Solids Load (tons)	113,000	106,000	116,000	150,000
	Suspended Sediment Load (tons)	158,000	244,000	820,000	669,000

The most recent physical, biological, inorganic, and metal parameters available were evaluated for each station near the PCMS to determine existing ambient water quality. The water quality pollutants of concern are those that WQCC has established numeric water quality criteria. Table 3-14 lists numeric water quality criteria for which standards are in place and for which data were available from either the USGS or EPA after 1999. Those parameters where the ambient water quality data exceeded the water quality standards for each stream segment are noted in Table 3-14. Additionally, the 1993 USGS study compares the water quality data collected during the study to instream water quality standards using time-series plots. Table 3-15 indicates the amount of times the water quality standards for stations 07126300 and 07126485 was exceeded during 1982 and 1987.

TABLE 3-14
Comparison of Instream Monitoring Water Quality Data After 1999 to Water Quality Standards
PCMS Transformation EIS, PCMS, Colorado

Parameter	Units	Stations ID	Existing Water Quality (Percentile)	Existing Water Quality (Concentration)	Water Quality Standard***	Exceeds Water Quality Standard?
pH	SU	WCOP01-0812	Range of 15th to 85th	7.9 to 8.0	6.5 to 9.0	No
		EPA01-0238	Range of 15th to 85th	8.5**	6.5 to 9.0	No
Dissolved Oxygen	mg/L	EPA01-0238	Minimum 15th	7.3**	5.0	No
Dissolved Selenium	µg/L	WCOP01-0812	85th	7.9**	Se (acute) = 18.4 Se (chronic) = 7.0*	Yes, exceeds temporary modification
		EPA01-0238	85th	1.1**	Se (acute) = 18.4 Se (chronic) = 7.0*	No
Dissolved Zinc	µg/L	WCOP01-0812	85th	29	Zn (acute) = 88 Zn (chronic) = 89	No
		EPA01-0238	85th	0**	Zn (acute) = 261 Zn (chronic) = 263	No

*Temporary modification of Se chronic water quality standard by CDPHE based on uncertainty. The Se temporary modification of 7.0 µg/L expires 12/31/2007.

**Only one water quality data point was available.

***Water quality standards for dissolved selenium and dissolved zinc were calculated from instream hardness concentrations.

µg/L = micrograms per liter

mg/L = milligrams per liter

Se = selenium

SU = standard unit

Zn = zinc

TABLE 3-15

Comparison of Instream Monitoring Water Quality Data from 1993 USGS Study to Water Quality Standards
PCMS Transformation EIS, PCMS, Colorado

	Station ID 07126300		Station ID 07126485	
	# Samples	# Samples Exceeded	# Samples	# Samples Exceeded
Dissolved Oxygen (mg/L)	27	0	24	0
Dissolved Nitrite Plus Nitrate as Nitrogen (mg/L)	42	10	46	11
Total Recoverable Cadmium ($\mu\text{g/L}$)	25	1	27	0
Dissolved Chromium (mg/L)	25	0	28	0
Total Recoverable Copper ($\mu\text{g/L}$)	25	14	27	19
Total Recoverable Iron ($\mu\text{g/L}$)	24	12	27	16
Total Recoverable Lead ($\mu\text{g/L}$)	25	8	27	6
Total Recoverable Manganese ($\mu\text{g/L}$)	25	8	27	10
Total Recoverable Zinc ($\mu\text{g/L}$)	24	7	26	11

$\mu\text{g/L}$ = micrograms per liter

mg/L = milligrams per liter

3.6.1.3 Hydrogeology and Groundwater

Regional Setting

The majority of regional groundwater at or near the PCMS occurs in the Dakota Sandstone and the Purgatoire Formation (DECAM, 2002a), which are part of the Arkansas River basin. Much of the Arkansas River basin has a hydraulic head difference in the deep bedrock aquifers that is lower than that in the shallow formations. This indicates that the deep bedrock aquifers are not in communication with the shallow formations.

Project Setting

Groundwater movement in the northeastern corner of the PCMS is toward the northeast, while groundwater movement throughout the remainder of the installation is toward the east and southeast. Groundwater is recharged primarily from precipitation and subsurface inflow from neighboring aquifers (DECAM, 1998).

Previous groundwater quality testing determined that the groundwater beneath the PCMS contains concentrations of dissolved solids, sulfate, iron, manganese, nitrate, chloride, fluoride, selenium, and radionuclide constituents that exceed domestic or public-use water quality standards. The water quality in the aquifer is adequate for wildlife and livestock, and for fire suppression (DECAM, 2002a and DECAM, 1998). There are approximately 95 wells on the PCMS, about 30 of which are functional. Some of the major wells are connected to distribution lines that fill stock tanks for wildlife management and fire suppression (DECAM, 2002a).

3.6.1.4 Floodplains

Floodplains have not been mapped on the PCMS (Federal Emergency Management Agency Map Service Center, 2006). However, flash floods occur intermittently during high rainfall events, typically from May through October (DECAM, 2002a). Flood-prone areas occur along the drainages in the training areas. The Cantonment is not subject to flooding.

3.6.2 Consequences

3.6.2.1 No Action Alternative

Training

Under the No Action alternative, training activities would increase over historical levels on the PCMS as described in Section 2.2.4. Units that formerly conducted training at the NTC would conduct training on the PCMS. Potential effects of training under the No Action alternative are described below.

Surface Water and Stormwater

The increased number of vehicles crossing dry drainages could modify drainage structures through erosion or compaction and could modify the drainages, resulting in increased erosion. Such erosion could result in indirect impacts to water quality, as previously discussed. The PCMS implements multiple plans to reduce the effects of erosion, including the MDC Program and the Deferment Program (see Appendix A). Stream crossings (for example, the installation of hardened crossings, culverts, and bridges) are permitted by the Section 404 regional permit.

Because of the increased training frequency, the PCMS could experience an increase in training during wet weather when soils are more susceptible to damage and increased erosion. Potential direct impacts to soils and the subsequent increase in erosion are described in Section 3.5. Increased sediment transport to receiving waters or increased dust carried by wind to adjacent or nearby water bodies, including the Purgatoire River, could result in decreased surface-water quality from increased turbidity or sedimentation. To mitigate potential adverse effects, the ITAM program and INRMP requirements would be used to address increased training requirements and maintain sustainability of the training areas. Continued implementation of these programs and efforts by the Watershed Team would repair training land damage and minimize the potential for wind and water erosion of soils and subsequent indirect impacts to water quality.

Increased training would increase the use of fuels, solvents, and other hazardous and toxic substances (see Section 3.12), which could result in indirect impacts to surface water if accidentally released into the environment. To address potential adverse effects, the PCMS would continue to implement AR 200-1 and best management practices. Vehicle and equipment fueling and maintenance would be restricted to approved areas unless emergency field maintenance is required. If field maintenance is required, appropriate control and containment measures would be implemented to prevent accidental contamination of surface water.

As described in Section 3.12.2.1, lead deposition at the small-arms live-fire ranges could increase as a result of increased use of lead-containing ammunition during training activities. The lead could result in indirect impacts to surface waters if it were carried by wind or water into nearby water bodies. However, generation of fugitive dust at the small-arms live-fire ranges is expected to be minor because of vegetative cover and lead dust remediation at the firing line and downrange (DECAM, 2005b). Munitions residue and lead would be relatively immobile in PCMS soil because of the minimal rainfall conditions and the erosion control measures that would be implemented (DECAM, 2005b).

Hydrogeology and Groundwater

Training activities would not pump or use any groundwater or release any water that could percolate into aquifers at the PCMS. Therefore, there would be no direct impact to groundwater at the PCMS.

Increased training would increase the use of fuels, solvents, and other hazardous and toxic substances (see Section 3.12), which could result in an indirect effect to groundwater if released in an area where infiltration to groundwater could occur. The PCMS would continue to implement the *SPCC Plan* (DECAM, 2004c). Vehicle and equipment fueling and maintenance would be restricted to approved areas unless emergency field maintenance is required. If field maintenance is required, appropriate control and containment measures would be implemented to prevent accidental contamination of groundwater. With these procedures in place, there is a low probability of the shallow aquifer being affected.

As described in Section 3.12.2.1, lead deposition at the small-arms live-fire ranges could increase as a result of increased use of lead-based ammunition during training activities. The lead could result in indirect impacts to groundwater quality if it were to leach into groundwater. Because lead binds tightly to soil particles, the potential for and extent of lead leaching into groundwater or being transported by groundwater are expected to be minor. In addition, minimal rainfall at PCMS would minimize the leaching of lead into groundwater (DECAM, 2005b).

Floodplains

Floodplains have not been mapped at the PCMS. However, personnel and equipment could be affected by floodwaters when training in flood-prone areas, especially during flash floods. The safety of troops and equipment is a priority during training, and training procedures direct that troops relocate away from flood-prone areas when conditions are favorable for sudden storms and flash flooding. These procedures would continue to be implemented under the No Action alternative.

Construction and Operation

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.6.2.2 Proposed Action

Training

Training impacts to surface water, stormwater, hydrogeology, groundwater, and floodplains would be of the same types described under the No Action alternative. However, the training load resulting from an increased number of units assigned to train at the PCMS would be greater under the Proposed Action than under the No Action alternative. Therefore, the magnitude of impacts from training under the Proposed Action would be greater than described under the No Action alternative. The PCMS would continue to implement all plans and policies. ITAM and the Watershed Team would identify areas where impacts to soils could result in indirect impacts to water resources. Plans would be modified and updated to provide control measures to minimize the potential for water resource impacts.

Construction and Operation

Surface Water and Stormwater

Ground disturbance from construction and demolition activities could result in erosion or sediment transport to surface waters. As described under Affected Environment and listed in Appendix A, the PCMS implements several plans and programs to protect water resources. The PCMS would continue to implement existing BMPs, follow permitting requirements, and adhere to DECAM's water resources management program during construction and operation of new facilities. For each project disturbing an area greater than 1 acre, a SWPPP would be prepared and implemented to avoid or minimize the potential for impacts from stormwater runoff during construction (Fort Carson, 2006b).

Because the area that would be converted from permeable to impermeable surfaces by the construction of new facilities represents approximately 0.008 percent of the PCMS area and 1.1 percent of the cantonment area, adverse effects from increased stormwater runoff are not expected.

Dewatering, while unlikely, might be needed during construction. Impacts to surface water would be minimal because dewatering would be implemented in accordance with the CWA Section 404 permitting requirements. Discharge would be to the land surface through a filtration and energy dissipation structure to minimize the potential for erosion and downstream sedimentation.

Construction and operation of new facilities would increase the use of fuels, solvents, and other hazardous and toxic substances (see Section 3.12), which could result in an indirect effect to surface water if accidentally released into the environment. The PCMS would require that all handling and storage of hazardous and toxic substances be done in accordance with established procedures and policies. The PCMS would continue to implement all applicable hazard management plans to address leaks or spills of hazardous materials, including the *SPCC Plan* (DECAM, 2004c), *Underground Storage Tanks (USTs) and Aboveground Storage Tanks (ASTs)* (DECAM, 2004d), AR 200-1, and FC 200-1.

Hydrogeology and Groundwater

Dewatering, while unlikely, might be needed during construction. Dewatering would not result in impacts to groundwater because it would be implemented in accordance with the Section 404 regional permit requirements, and the volume of groundwater affected would be minimal. Discharge would be to the land surface through a filtration and energy dissipation structure to minimize the potential for erosion and downstream sedimentation and would be done in areas where groundwater recharge would not occur. In addition, a dewatering permit would likely be necessary, which would require sedimentation treatment and sampling to monitor the effectiveness of the treatment.

Construction and operation of new facilities would increase the use of fuels, solvents, and other hazardous and toxic substances (see Section 3.12), which could result in an indirect effect to groundwater if accidentally released into the environment. The PCMS would require that all handling and storage of hazardous and toxic substances be done in accordance with established procedures and policies. The PCMS would continue to implement all applicable hazards management plans to address leaks or spills of hazardous materials, including AR 200-1, *USTs and ASTs* (DECAM, 2004d), and FC 200-1.

Floodplains

Construction of new facilities would take place almost exclusively in the Cantonment, which is located on higher ground away from drainages. However, some facilities would be constructed in the training areas. Although floodplains have not been mapped at the PCMS, flood-prone areas are expected to be located in and immediately adjacent to arroyos or other drainages. To avoid adverse impacts to any facilities that would be required in the training areas, new facilities would be located outside known flood-prone areas, including areas immediately adjacent to arroyos.

3.7 Biological Resources

This section describes the affected environment and environmental consequences of the Proposed Action and the No Action alternatives for biological resources at the PCMS, including vegetation, wildlife, sensitive species, and wetlands.

3.7.1 Affected Environment

The PCMS is located within the Central Shortgrass Prairie Ecoregion, which includes all the plains of Colorado east of the Rocky Mountains and an approximately equal area in adjacent Great Plains states and Texas. The Central Shortgrass Prairie is characterized by rolling to undulating plains and tablelands of low relief and occasional canyons, buttes, badlands, and isolated mountains. Shortgrass prairie, mixed-grass prairie, and sandsage prairie community types dominate the Central Shortgrass Prairie Ecoregion. Other community types, such as pinyon pine-juniper woodlands and deciduous riparian forests, occur less frequently (Burget et al., 1998).

3.7.1.1 Vegetation

The PCMS is characterized by flat to rolling, open terrain dominated by grasslands. Woodlands and a variety of shrub communities, most with a substantial grass understory, occupy higher ground and the steep canyons leading down to the Purgatoire River beyond the eastern boundary of the PCMS. Existing data on plant species and plant communities at the PCMS are available in detail in the "Plant Communities, Ecological Checklist," and "Species List for the U.S. Army Pinon Canyon Maneuver Site" (Shaw et al., 1989) and the INRMP (DECAM, 2002a). A plant species list for PCMS is provided in Appendix E, Attachment E.1. The spatial distribution of vegetation types on the PCMS is depicted on Figure 3-3 (DECAM, 2002a).

Several Colorado state-listed and county-listed (Las Animas County) noxious weeds have invaded both natural and developed landscapes on the PCMS. The PCMS has targeted noxious weeds for priority control by preventing them from populating disturbed areas, controlling infestations to levels compatible with other land management objectives, or eliminating the weed species from the area. Maintaining healthy native plant communities and revegetating disturbed areas, as necessary, are the most effective methods of preventing weed establishment and encroachment on the PCMS (DECAM, 2002a).

Woodlands

- Juniperus monosperma/Bouteloua eriopoda woodland
- Juniperus monosperma/Cercocarpus montanus woodland
- Juniperus monosperma/Oryzopsis micrantha woodland
- Pinus ponderosa/Sorghastrum nutans woodland
- Populus tremuloides/Muhlenbergia racemosa woodland

Grasslands

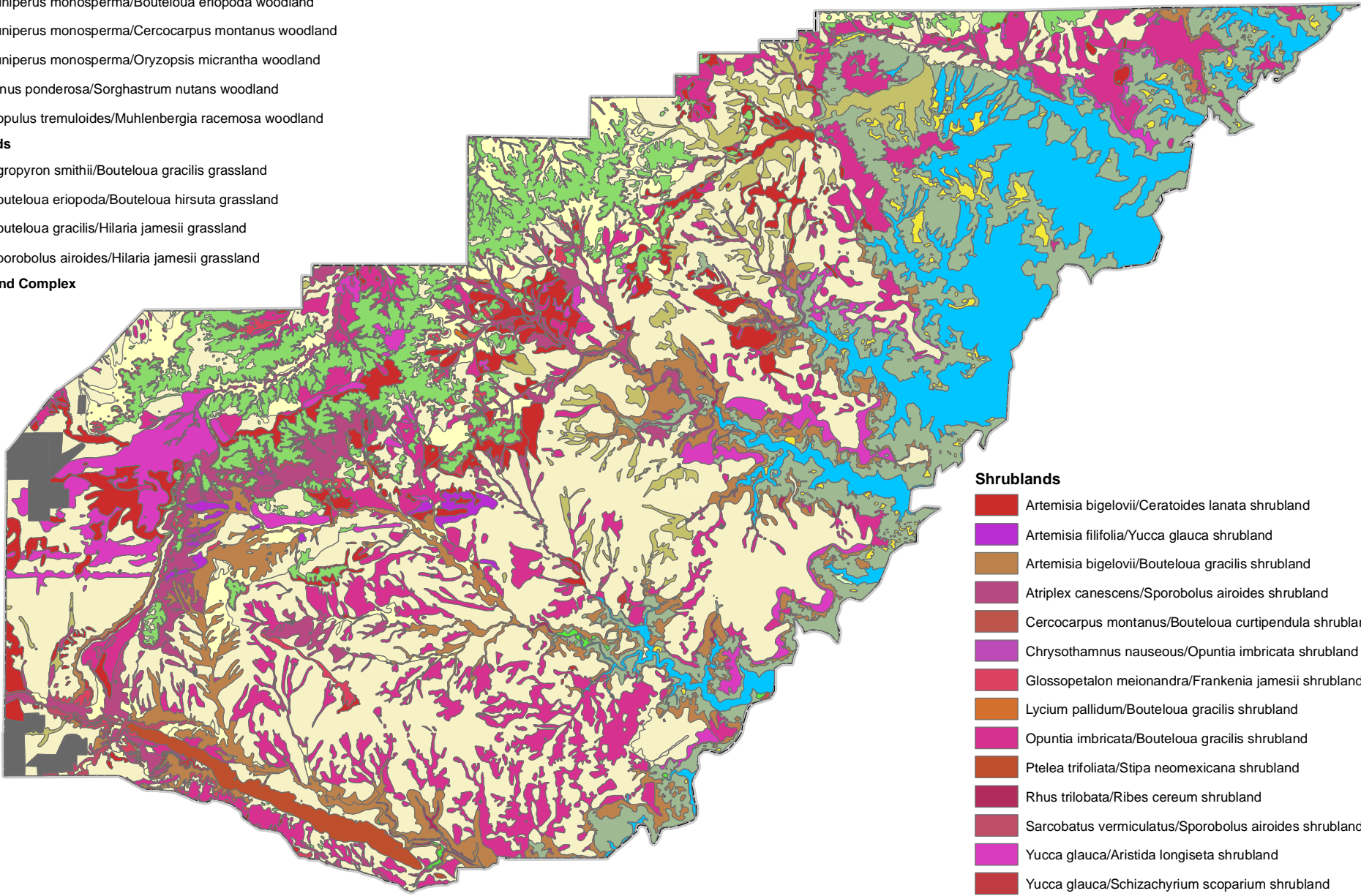
- Agropyron smithii/Bouteloua gracilis grassland
- Bouteloua eriopoda/Bouteloua hirsuta grassland
- Bouteloua gracilis/Hilaria jamesii grassland
- Sporobolus airoides/Hilaria jamesii grassland

Canyonland Complex

-

Shrublands

- Artemisia bigelovii/Ceratoides lanata shrubland
- Artemisia filifolia/Yucca glauca shrubland
- Artemisia bigelovii/Bouteloua gracilis shrubland
- Atriplex canescens/Sporobolus airoides shrubland
- Cercocarpus montanus/Bouteloua curtipendula shrubland
- Chrysothamnus nauseosus/Opuntia imbricata shrubland
- Glossopetalon meionandra/Frankenia jamesii shrubland
- Lycium pallidum/Bouteloua gracilis shrubland
- Opuntia imbricata/Bouteloua gracilis shrubland
- Ptelea trifoliata/Stipa neomexicana shrubland
- Rhus trilobata/Ribes cereum shrubland
- Sarcobatus vermiculatus/Sporobolus airoides shrubland
- Yucca glauca/Aristida longiseta shrubland
- Yucca glauca/Schizachyrium scoparium shrubland



Legend

- Installation Boundary
- Highly Disturbed Areas

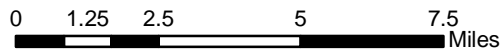


FIGURE 3-3
Distribution of Vegetation Types at the PCMS

Management of wildland fires protects and enhances natural resources on the PCMS. Prescribed fires accomplish predefined resource management objectives that include: reducing the fuel load contributed by excessive understory vegetation, thereby preventing larger and less easily controlled wildfires; creating buffer zones in and around small-arms live-fire ranges to reduce the risk of fire from training activities; manipulating the composition of existing plant communities; enhancing or creating specific wildlife habitats; and controlling noxious weeds (DECAM, 2002a). Prescribed burns are conducted on the PCMS during fall, winter, and early spring, (Klavetter, 2006a). Fire is suppressed or controlled where necessary for safety and to protect high-value resources. Wildfires are typically suppressed on the PCMS because they generally occur when existing conditions are favorable for large, uncontrollable fires (Klavetter, 2006).

3.7.1.2 Wildlife

Typical wildlife habitat types on the PCMS include shortgrass prairie, pinyon-juniper woodland, and aquatic and riparian communities. The dominant terrestrial habitat types on the PCMS are grasslands, shrublands, and woodlands. Aquatic habitats on the PCMS are very limited and consist of wetlands, riparian corridors, and open water (USFWS, 1991). Existing data on wildlife species and descriptions of wildlife habitats present on the PCMS are documented in the *Fish and Wildlife Management Recommendations: Pinon Canyon Maneuver Site Las Animas County, Colorado* (USFWS, 1991) and the INRMP (DECAM, 2002a).

Mammals

Several species of carnivores, ungulates, and small mammals are known to occur on the PCMS. Table 3-16 lists mammals commonly found on the PCMS and their habitat associations. A wildlife species list for PCMS is provided in Appendix E, Attachment E.2.

TABLE 3-16
Mammals and Habitat Associations at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Scientific Name	Common Name	Habitat Association at the PCMS
<i>Ursus americanus</i>	Black bear	Pinyon pine-juniper woodland
<i>Lepus californicus</i>	Black-tailed jackrabbit	Grassland
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	Grassland
<i>Lynx rufus</i>	Bobcat	Pinyon pine-juniper woodland
<i>Canis latrans</i>	Coyote	Grassland and pinyon pine-juniper woodland
<i>Sylvilagus audubonii</i>	Desert cottontail	Grassland
<i>Cervus canadensis</i>	Elk	Pinyon pine-juniper woodland
<i>Odocoileus hemionus</i>	Mule deer	Pinyon pine-juniper woodland
<i>Antilocapra americana</i>	Pronghorn	Grassland
<i>Vulpes velox</i>	Swift fox	Grassland

Birds

Table 3-17 lists birds known to occur on the PCMS and their habitat associations.

TABLE 3-17

Birds and Habitat Associations at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Scientific Name	Common Name	Habitat Association at the PCMS
<i>Haliaeetus leucocephalus</i>	Bald eagle	Grassland
<i>Thryomanes bewickii</i>	Bewick's wren	Pinyon pine-juniper woodland
<i>Athene cunicularia</i>	Burrowing owl	Grassland
<i>Catherpes mexicanus</i>	Canyon wren	Riparian
<i>Buteo regalis</i>	Ferruginous hawk	Grassland
<i>Aquila chrysaetos</i>	Golden eagle	Grassland
<i>Eremophila alpestris</i>	Horned lark	Grassland
<i>Melanerpes lewis</i>	Lewis' woodpecker	Riparian
<i>Sialia currucoides</i>	Mountain bluebird	Pinyon pine-juniper woodland
<i>Charadrius montanus</i>	Mountain plover	Grassland
<i>Falco mexicanus</i>	Prairie falcons	Grassland
<i>Callipepla squamata</i>	Scaled quail	Grassland and cholla
<i>Buteo swainsoni</i>	Swainson's hawk	Grassland
<i>Sturnella neglecta</i>	Western meadowlark	Grassland
<i>Coccyzus americanus</i>	Yellow-billed cuckoo	Riparian

Reptiles and Amphibians

The Texas horned lizard (*Phrynosoma cornutum*) and western rattlesnake (*Crotalus viridis*) are typical grassland reptiles found at the PCMS. The Texas blind snake (*Leptotyphlops dulcis*) is found in canyons with pinyon-juniper slopes and grasslands on the canyon floor (Hammerson, 1999). Wetlands support several herptofauna species found at the PCMS, including the plains leopard frog (*Rana blairi*) and snapping turtle (*Chelydra serpentina*).

Only eight amphibian species have been identified on the PCMS. (The complete list may be found in Appendix E.) Two of these species are spadefoot toads, which are well adapted to arid climates and spend 8 to 10 months a year subsurface (Hammerson, 1999). The other amphibian species found on the PCMS are associated with wetlands.

Invertebrate Species

There are limited data on the types and distribution of invertebrate species at the PCMS or in the surrounding area. No local, state, or federal agency has ever raised concerns that invertebrate species are being affected by military activities at the PCMS. The Army regularly coordinates with state and other federal agencies in identifying and managing biological resources at the PCMS and includes new information in its INRMP as

appropriate. Region 6 of the USFS has not conducted studies and does not have information specific to invertebrates of the nearby Comanche National Grassland. The few studies conducted at PCMS concentrating on invertebrates were focused on the aquatic habitats of the Purgatoire River and its tributaries (Fausch et al., 1985; Bramblett and Fausch, 1991; and Herrmann and Davis, 1991).

3.7.1.3 Sensitive Species

Threatened and endangered plant and animal species are protected under the Endangered Species Act or Colorado state law. The Endangered Species Act defines an endangered species as any species in danger of extinction throughout all or a major portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future. The Migratory Bird Treaty Act protects migratory birds and implements the United States' commitment to international conventions for the protection of migratory birds. Bald eagles and golden eagles are protected by the Bald and Golden Eagle Protection Act. Other sensitive species include wildlife species listed by CDOW and plant species identified by the Colorado Natural Heritage Program (CNHP) as Colorado Species of Concern.

Federally Listed Species

Table 3-18 presents the USFWS list of federally listed endangered, threatened, and candidate animal species that occur in Las Animas and Otero counties. No critical habitat for these species has been designated or proposed for designation in Las Animas County or any adjoining county (USFWS, 2005 and Linner, 2006).

TABLE 3-18

Federally Listed Endangered, Threatened, and Candidate Animal Species of Las Animas County
PCMS Transformation EIS, PCMS, Colorado

Scientific Name	Common Name	Species Type	Status	Distribution at the PCMS
<i>Etheostoma cragini</i>	Arkansas darter	Fish	C	Not known to occur at the PCMS.
<i>Haliaeetus leucocephalus</i>	Bald eagle ^a	Bird	T	Winter resident and migrant on the PCMS.
<i>Mustela nigripes</i>	Black-footed ferret	Mammal	E	Not known to occur at the PCMS.
<i>Lynx canadensis</i>	Canada lynx	Mammal	T	Not known to occur at the PCMS.
<i>Sterna antillarum athalassos</i>	Interior least tern ^b	Bird	E	Not known to occur at the PCMS.
<i>Strix occidentalis</i>	Mexican spotted owl	Bird	T	Not known to occur at the PCMS; potential to occur.
<i>Charadrius melodus</i>	Piping plover ^b	Bird	T	Not known to occur at the PCMS.

Notes:

^a The bald eagle is also state-listed as threatened.

^b Water depletions in the South Platte River might affect the species or critical habitat in downstream reaches in other states (USFWS, 2006). Note that the PCMS is located in the Arkansas River drainage, not the South Platte River drainage.

C = Candidate

E = Endangered

T = Threatened

The only federally listed wildlife species known to use the PCMS is the bald eagle, which is a late fall-through-winter (late October through late February) resident and migrant. Bald eagles primarily use the southwestern grassland section of the installation (DECAM, 2002a). No evidence of bald eagles nesting on the PCMS has been found (DECAM, 2002a and USACE, 2005).

No plant species appear on the USFWS lists of federally listed endangered, threatened, and candidate species for Las Animas or Otero counties, and no critical habitat for these species has been designated or proposed for designation in Las Animas County or any adjoining county (USFWS, 2005 and Linner, 2006). No federally listed threatened or endangered plant species or candidate for federal listing is known to occur at the PCMS.

State-Listed Species

Table 3-19 lists Colorado state-listed special status wildlife species that occur at the PCMS.

TABLE 3-19

Colorado State-Listed Endangered, Threatened, or CDOW Special Concern Wildlife Species Known to Occur at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Scientific Name	Common Name	Species Type	Status
<i>Platygobio gracilus</i>	Flathead chub	Fish	SC
<i>Rana blairi</i>	Plains leopard frog	Amphibian	SC
<i>Cnemidophorus neotesselatus</i>	Triploid checkered whiptail	Reptile	SC
<i>Leptotyphlops dulcis</i>	Texas blind snake	Reptile	SC
<i>Phrynosoma cornutum</i>	Texas horned lizard	Reptile	SC
<i>Athene cunicularia</i>	Burrowing owl	Bird	ST
<i>Coccyzus americanus</i>	Yellow-billed cuckoo	Bird	SC
<i>Buteo regalis</i>	Ferruginous hawk	Bird	SC
<i>Falco peregrinus anatum</i>	American peregrine falcon	Bird	SC
<i>Charadrius montanus</i>	Mountain plover	Bird	SC
<i>Numenius americanus</i>	Long-billed curlew	Bird	SC
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	Mammal	SC
<i>Vulpes velox</i>	Swift fox	Mammal	SC

Notes:

SC = CDOW Species of Special Concern

ST = Colorado State Threatened

The triploid checkered whiptail is designated as a Species at Risk (SAR) by the Army. In the summer of 2006, DECAM coordinated with CNHP to survey for the species at the PCMS. CNHP is developing a habitat model for triploid checkered whiptails based on habitat characteristics at 12 species observation locations (Klavetter, 2006).

No state-listed threatened or endangered plant species are known to occur at the PCMS. Table 3-20 lists Colorado Plant Species of Special Concern (as listed by CNHP) that occur on the PCMS (DECAM, 2002a).

TABLE 3-20
Colorado Plant Species of Special Concern Known to Occur at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Scientific Name	Common Name	Presence at the PCMS
<i>Amorpha nana</i>	Dwarf indigo amorpha	Resident; confirmed in Taylor and Spring Canyons.
<i>Asclepias macrotis</i>	Long-hood milkweed	Found in 1985 and 1999.
<i>Asclepias uncialis</i>	Dwarf milkweed	Nine known sites as of 2006 (Rifici, 2006).
<i>Oenopsis puebloensis</i>	Rayless goldenweed	Resident.
<i>Oxybaphus rotundifolius</i>	Round-leaf four o'clock	Confirmed in south-central portions of the PCMS during 1995 and 1997 surveys (DECAM, 2002a). One confirmed population on Gilligan Island as of 2006 (Rifici, 2006). Additional populations confirmed summer 2006 (Klavetter and Rifici, 2007).
<i>Portulaca parvula</i>	Dwarf purslane	Resident.
<i>Sapindus saponaria drummondii</i>	Southern soapberry	Resident.
<i>Sarcostemma crispum</i>	Twinevine	Found in 2001.
<i>Oenothera harringtonii</i>	Arkansas valley evening primrose	Resident

Of these Colorado species of special concern, round-leaf four o'clock, dwarf milkweed, and Arkansas valley evening primrose are well represented at the PCMS, both in terms of the number of known sites and numbers of individuals (Rifici, 2006). In accordance with the Army's SAR Program, DECAM has initiated surveys to determine population numbers and the distribution of these and other sensitive plant species (DECAM, 2002a). Target species for SAR-sensitive plant species surveys on the PCMS in 2006 and 2007 include dwarf milkweed, pueblo goldenweed (*Conopsis Puebloensis*), round-leaf four o'clock, and Arkansas valley evening primrose (*Oenothera harringtonii*) (CNHP, 2006; Klavetter, 2006; and Rifici, 2006).

3.7.1.4 Wetlands

Natural water bodies and wetlands are generally small and infrequent on the PCMS but are important in contributing to wildlife habitat diversity. The total wetland area on the PCMS is estimated to be about 370 acres, of which approximately 290 acres are man-made (USFWS, 1991). Most wetlands on the PCMS are associated with side canyons of the Purgatoire River and water developments. Playas (flat-bottomed depressions that are periodically covered by water) are also present, and additional small wetlands are associated with springs and other

water bodies, such as erosion control impoundments, stock watering ponds, and the overflow from windmills.

In 2002, USACE issued a *Regional Permit Under Section 404 of the Clean Water Act* (33 USC 1344) for Fort Carson and the PCMS Erosion Control Activities. This regional permit (permit number 2002-0707) authorizes the PCMS to conduct erosion control activities that may result in minimal individual and cumulative impacts to wetlands from dredge and fill activities. Typical erosion control measures include erosion control impoundments, stock watering impoundments, banksloping of erosion courses, check dams, rock armor, hardened crossings, culverts, bridges, erosion control terraces, water diversions, water turnouts, and other erosion control activities approved by USACE.

3.7.2 Consequences

This section presents the impacts to biological resources on the PCMS as a result of the No Action alternative and Proposed Action. This section presents the impacts to vegetation, wildlife, and sensitive species on the PCMS from implementing the No Action alternative and the Proposed Action. Wetlands on the PCMS are not discussed in detail in this section because no direct impacts to wetlands are anticipated from proposed construction or training activities. If future training or construction activities have the potential to affect wetlands, the Army would coordinate with USACE to assess impacts and mitigation for disturbance of wetland areas. Most direct impacts to wetlands would be avoided, and those that cannot be avoided would be mitigated through the Section 404 process (through complying either with the Fort Carson/PCMS regional permit or by applying for coverage under a nationwide or individual permit). Increased training could result in indirect impacts to wetlands from erosion and sedimentation processes in drainages upstream of the man-made erosion-control dams at the PCMS. Sediments could silt in these small wetlands, changing their nature or converting them to upland habitats if the erosion-control dams are not properly maintained. The impacts to soils resulting from training are discussed in Section 3.5.

3.7.2.1 No Action Alternative

Training

The following impacts to vegetation, wildlife, and wetlands from training currently occur at the PCMS and would continue to occur under the greater levels of training of the No Action alternative. The discussion focuses on maneuver training areas, small-arms live-fire ranges, dismounted training areas, and restricted areas.

Vegetation

Maneuver training area studies have been conducted for the PCMS to assess the effects of training activities on vegetation at the PCMS. The studies indicate that grasslands, woodlands, and shrublands have been affected by prior maneuver training on the basis of readily visible imprints of tracks on the soil (tracking) compared with untracked sites (Shaw and Diersing, 1989; Shaw and Diersing, 1990; and Diersing et al., 1988). Direct impacts from the passage of tracked vehicles include crushing of herbaceous and woody vegetation that might not resprout or otherwise recover and injury to shallow roots that might kill the plants or retard development. Pivoting of tracked vehicles can create high shear stress between the tracks and vegetation, resulting in loss of aboveground plant parts and

vegetation uprooting; these can create bare ground conditions. Indirect impacts from movement of tracked vehicles result from vegetation loss, soil disturbance, disaggregation, and compaction. These indirect impacts can lead to erosion or change the nature and availability of microsites for seed germination (Shaw and Diersing, 1989; Shaw and Diersing, 1990; and Diersing et al., 1988). Disturbance of the soil crust in arid ecosystems can accelerate erosion, decrease water retention, disrupt plant nutrient cycling at the microbial level, and expose the reservoir of weed seeds in the soil to conditions favorable for germination (USGS, 2002). Accidental wildfires could result from mechanized military training in maneuver training areas. Fires could be caused by hot mufflers and hot exhaust from tracked and wheeled vehicles and by field illumination flares, star clusters, tracer rounds, and grenade simulators (Klavetter, 2006a).

At the small-arms live-fire ranges, direct impacts to vegetation would be attributable to direct damage by small-arms ammunition and by crushing. Indirect impacts to vegetation include those previously described for maneuver training areas (that is, those occurring as a result of soil disturbance). Firing of live-fire tracer rounds could also result in accidental wildfires at the small-arms live-fire ranges. Prescribed burning to create buffer areas is conducted to provide additional protection from wildfires in and around the small-arms live-fire ranges (Klavetter, 2006)

For dismounted training areas, direct impacts to vegetation result mainly from pedestrian traffic. For grasses and herbaceous cover, these impacts could range from negligible to substantial depending on the numbers of dismounted troops traversing a particular area and how they move across the landscape. Direct damage to shrubs and trees from dismounted training is expected to be minimal.

Restricted areas, which have been designated to protect resources on particular sites from training impacts, are subject to various constraints to training. To the extent that training is excluded from these areas, there would be minimal impacts to vegetation in restricted areas from training under the No Action alternative.

It is anticipated that these existing impacts would occur under the No Action alternative, but at an increased level.

Cultural, mechanical, biological, and chemical control methods are currently used to reduce populations and stop the spread and of noxious weeds on the PCMS. Military vehicles are washed before and after their use at the PCMS to reduce the potential for spreading weed seeds on and off the installation. These practices would continue under the No Action alternative (DECAM, 2002a).

Wildlife

Various studies have been conducted for the PCMS to assess the effects of training activities on wildlife at the PCMS. Military training can reduce wildlife populations indirectly by damaging soils and vegetation that could lead to altered plant communities that are unsuitable as habitat for the wildlife species that once used them (Trame, 1997). Dismounted military training can flush or startle small mammals, ground nesting birds, and reptiles. This could lead to increased predation on young or the displacement and death of eggs or young. Impacts to reproductive success can cause decreased populations (Trame, 1997). Mule deer, elk, pronghorns, and many species of raptors are more readily flushed or

displaced by pedestrians than by moving vehicles. Wildlife species can be affected by mounted military training through direct disturbance and by the indirect alteration of their habitat. Small animals that den, nest, or live exclusively on the ground can suffer death from maneuver training. The eggs and young of ground-nesting birds can be destroyed. Human presence and noise from training exercises could disrupt wildlife species from foraging or reproducing. For example, some raptors abandon nests or territories as a result of human presence in the vicinity (Trame, 1997). Limited research exists on the indirect, habitat-related impacts of mounted military training on reptiles, amphibians, or aquatic species (Trame, 1997). However, military training results in the creation of two-track roads and wider corridors cleared of vegetation. The effects of these types of vegetation removal and surface disturbance on wildlife have been studied extensively and are discussed in existing literature (Gutzwiller, 1991; Trombulak and Frissell, 2000; Wisdom et al., 2000; USDI and USDA, 2001; Ingelfinger, 2001; Mader, 1984; Merriam et al., 1989; Oxley et al., 1974; Gibbs, 1998; and Busack and Bury, 1974). Impacts to wildlife from activities at the live hand grenade range would include local disturbance of habitat and possible mortality that are similar to impacts associated with training activities previously described.

Monitoring over the past 20 years has indicated that military training has not affected wildlife populations at the PCMS and that wildlife have generally adapted to activities at the PCMS.

Birds

Factors influencing the impacts of military training maneuvers on bird populations include changes in vegetation structure, composition, and development from military maneuvers; the response of birds to changes in vegetation characteristics at many different scales; training-related behavioral changes that can lead to site abandonment or colonization; the seasonal timing of training activities; total displacement of sensitive or secretive species; and attraction of exotic and disturbance-tolerant species to disturbed areas (Trame, 1997). Studies on changes in the avian community in response to military training for Fort Carson, which has grassland and pinyon-juniper habitat types similar to those on the PCMS, indicate that overall biomass and abundance of prairie habitats were not substantially decreased compared with control sites. However, the biomass of seed-eating, open-field species was higher on the training site, while the biomass of omnivorous, open-field species was higher on the undisturbed control site (Trame, 1997).

Destruction of trees, shrubs, and ground cover in forests leads to major changes in habitat structure and results in relatively substantial changes in bird abundance and community composition. The general result is an increase in open-field, edge, or disturbance-adapted species and a decrease in secretive, woodland, and/or ground-feeding species (Trame, 1997). Overall reduction of vegetation can also lead to a decrease in the prey base for raptors and other predators (Trame, 1997).

Migratory Birds

Most species in the PCMS grassland habitats nest on the ground. Most birds on the PCMS breed from mid-April to mid-July. Nesting begins in mid-April for several species and is well underway for most species by mid-May. Eggs and nestlings can be destroyed by vehicular traffic, and concentrated training activities can cause abandonment of territories and nests. By mid-fall, most young-of-the-year would be out of their nests, though some species would continue to nest into fall (USFWS, 1991). Songbirds are particularly

susceptible to noise. Male neotropical migrant birds that breed in short-grass prairie, sagebrush, and riparian communities use songs to establish and defend breeding territories and attract females. The volume and frequency of the noise interferes with this ability (Luckenbach, 1975; Luckenbach, 1978; Memphis State University, 1971; and Weinstein, 1978). Waterfowl have been shown to be distressed enough by helicopter overflights to flush, and in some cases normal feeding behavior was substantively disrupted (Trame, 1997). The area of disturbance would vary by species and training activity. Concentrated training activities could cause birds to abandon territories and nests. Limits on military training during the breeding season could have the effect of minimizing impacts to the bird community. Power lines and other infrastructure that are documented to have negative impacts to avian species are surveyed (Klavetter, 2006). The survey of power lines and communication towers helps to minimize impacts by identifying structural failures that may harm birds and make repairs efficiently in order to eliminate the amount of time that a threat to wildlife could be encountered. All recent construction of communication towers, and any proposed in the future, have and will follow USFWS recommendations and use the best scientific information available from the Avian Power Line Interaction Committee.

USDI issued a rule on February 28, 2007, exempting the DoD from the Migratory Bird Treaty Act (MBTA) for the incidental take of migratory birds during readiness activities. Although this exemption would apply to the PCMS, incidental takes of migratory birds from military readiness under the No Action alternative would not be substantial. A military activity is defined as "... all training and operations of the Armed Forces that relate to combat, and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use." PCMS staff will take protection of migratory birds into account during standard operations such as mowing, burning, tree removal, maintenance, and noxious weed management.

Raptors

Many raptors are intolerant of high levels of human activity, especially during the breeding season (April through June). When disturbed by humans (on foot and in a vehicle), by a gas-operated engine, or the sound of a rifle, fewer ferruginous hawks had successful nests and fewer young fledged from those nests (Trame, 1997). Some species of raptors can habituate to high levels of human activity. Short-term impacts to raptors from military training on the PCMS have been documented, including nesting failures, lowered nesting success, displacement, and changes in wintering distribution and behavior (Andersen et al., 1990 and Fyfe and Olendorff, 1976). It is possible these short-term responses can lead to long-term community changes, such as changes in breeding density and species composition. Resident raptors located in the area where military training occurred shifted the center of their home range and activity areas, made movements outside of the areas they had previously used, and increased the size of the area they used. Birds located in areas not exposed to training did not exhibit these changes to the same extent. In general, birds appeared to increase the size of their home range during periods of military activity. An alternative response to disturbance might have been to seek out areas within the home range but isolated from the disturbance.

Jet overflights on the PCMS have not been shown to influence nesting success of red-tailed hawks. Over a period of time, these birds habituate to low-level air traffic and avoidance behavior decreases. Golden eagles prefer to nest away from human disturbances, including

roads, and have reduced nesting success in nests located closer to roads than in nests farther from roads (Fernandez, 1993). Part of the Army's regular practice is to identify golden eagle nest sites annually and establish 1,640 feet (500-meter) buffers around each nest site. Training activities are restricted in these buffer zones from April through June (USFWS, 1991). Usually these buffers can be accommodated during training exercises, but in some cases, training could require encroachment on this buffer area. The G-3 coordinates with DECAM wildlife biologists before each exercise to devise a training plan that minimizes potential impacts to nesting birds.

Small Mammals

Impacts from military training on small mammals are similar to those on bird communities; species adapted to reduced vegetation, bare ground, or disturbance are favored, while more sensitive woodland species or those requiring intact short-grass prairie ecosystems decline. Studies of small mammal community composition at Fort Carson indicate that, in prairie habitats, small mammal species that prefer sandy soils and eat seeds of weedy plants replaced other species (Trame, 1997).

Pronghorn

Studies conducted on the PCMS indicate that movements or temporary shifts in home ranges caused by military training activities did not have measurable effects on pronghorn productivity or physical condition at the PCMS (Gerlach and Vaughan, 1990). Pronghorn groups have been alarmed by low jet and helicopter overflights at the PCMS. This could contribute to reduced winter survival rates, the poor condition of individuals entering the breeding season, reduced reproductive success and recruitment, and eventual population declines (Trombulak and Frissel, 2000; Wisdom et al., 2000). Pronghorn are especially vulnerable during fawning season (May 1 to June 30) and during severe winters (USFWS, 1991). Restricting training during these periods could have the effect of reducing impacts to pronghorn. Revegetating disturbed areas and areas around water with a mix of native shrubs, grasses, and forbs; and maintaining water guzzlers and windmill sites as open water sources could also have the effect of reducing impacts from military training on pronghorn (Klavetter, 2006 and Gerlach and Vaughn, 1990). Hunting on the PCMS is regulated by CDOW and, with input from DECAM wildlife staff, is used as a tool to manage pronghorn populations on the installation.

Population estimates from DoD surveys and CDOW surveys over the past 10 years have shown some fluctuations in the numbers, but overall antelope populations have been steady to increasing. Habitat management and hunting have been effective in maintaining a healthy antelope herd of 600 to 750 animals.

Mule Deer

One study of mule deer demonstrates that if harassed, mule deer exhibit increased overall activity levels, increased use of cover, increased sensitivity to vehicles, increased flight distance, and decreased reproduction the following spring (Yarmology et al., 1988; Trame, 1997). Mule deer may habituate to maneuvers and off-road vehicles if they are not actively pursued (Trame, 1997). In severe winters and during late gestation and lactation periods, helicopter disturbance could adversely affect deer (USFWS, 1991). Training restrictions during severe winters and the fawning season (June 20 to August 20) could minimize impacts to mule deer. Fawns are especially vulnerable at this time to mortality from accidents, abandonment, increased predation, and depletion of energy reserves from

excessive movement. Revegetating disturbed areas could also have the effect of reducing impacts from military training on mule deer (USFWS, 1991). Hunting on the PCMS is regulated by CDOW and, with input from DECAM wildlife staff, is used as a tool to manage mule deer populations on the installation.

The mule deer population at the PCMS is not actively monitored by the Army but the CDOW does annual surveys of mule deer populations, and the Army coordinates with the CDOW on the population numbers and trends. Overall, CDOW data show that the population associated with the PCMS has been stable to slightly increasing. The Army monitors both the habitat and health of the herd.

Coyote

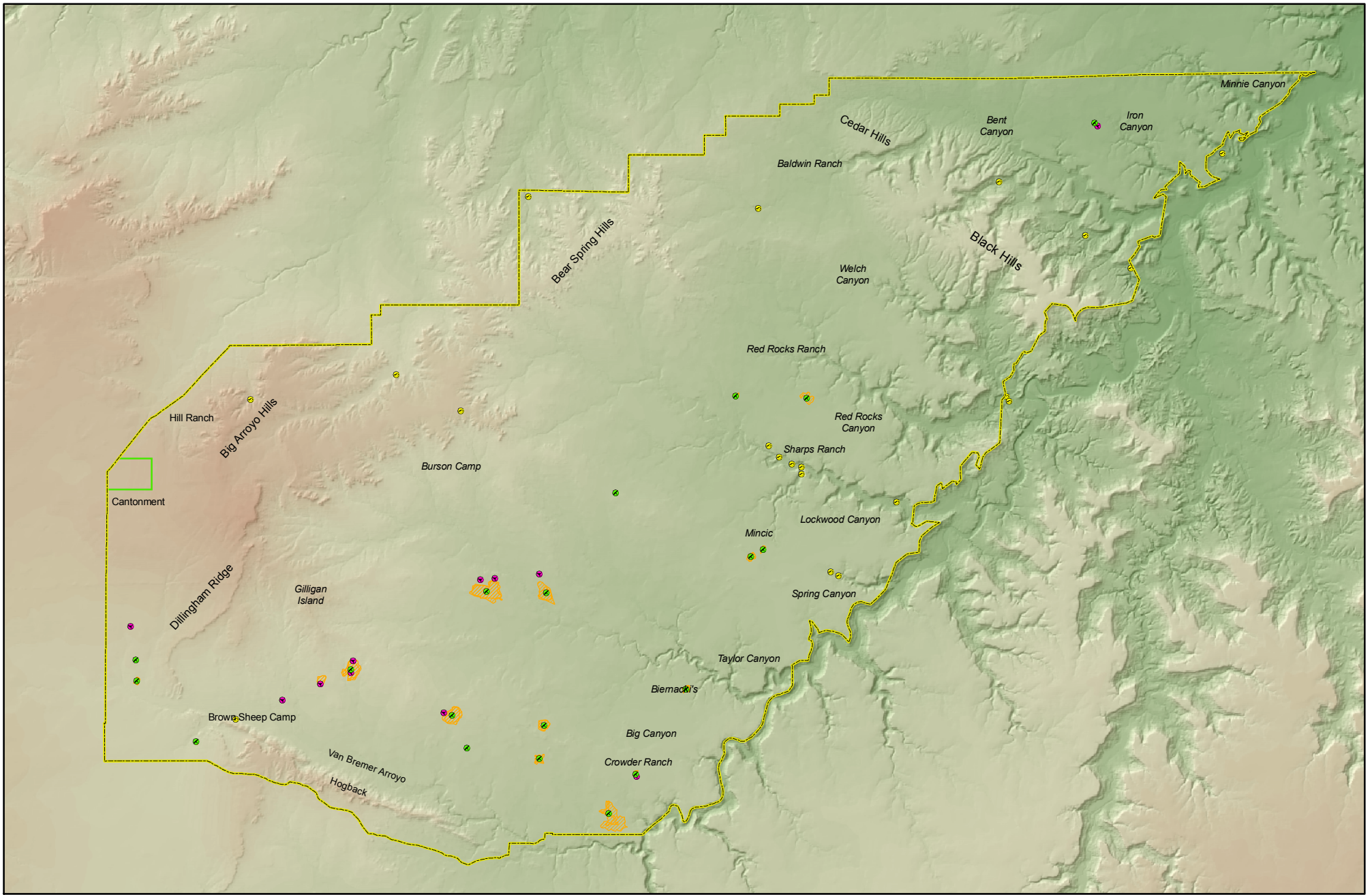
Coyotes are moderately affected by military training. Most changes in coyote movement from military activity are temporary, and coyotes resume their previous activity patterns and occupy similar home ranges after military activity ends (USFWS, 1991). Restricting military training during denning and other critical times for coyotes, and rehabilitating disturbed habitat could have the effect of maintaining the coyote prey base and escape cover (USFWS, 1991).

Swift Fox




Direct impacts to swift fox caused by military training are minimal. Extensive studies have been conducted on swift fox on the PCMS in 1987-1989 and 1997-2006 to understand their ecology better. All indications from those studies is that the species is doing well on the PCMS and needs little in the way of management to survive as long as sufficient prey sources and suitable habitat are available. Maintaining the range in good condition of which will allow for a diversity of small mammal populations should be what is needed to sustain viable swift fox populations. Besides the species natural requirements, one potential threat that will have to be monitored is the range expansion of the red fox. Red fox are a known predator of swift fox and a range extension onto the base could be a scenario where other BMPs would need to be considered. Overall degradation of shortgrass prairie habitat on a large enough scale also would likely result in a localized decline in swift fox populations (USFWS, 1991).

Sensitive Species

The following impacts to sensitive species from military training on the PCMS currently occur and would continue to occur under the No Action alternative. Figure 3-4 depicts the distribution of sensitive wildlife species habitat at the PCMS.



Legend

-  Installation Boundary
-  Cantonment Area
-  Black-tailed Prairie Dog Colony
-  Burrowing Owl Nesting Sites
-  Triploid Checkered Whiptail Observation Locations
-  Mountain Plover Nesting Sites

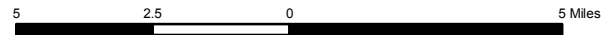


FIGURE 3-4
Known Distribution of Sensitive Wildlife Species at the PCMS

Black-Tailed Prairie Dog

Prairie dog habitat at the PCMS is found in maneuver training areas. Mine plows can damage active burrows of prairie dogs. Prairie dog burrows usually have multiple entrances and are generally deeper than the surface disruption associated with mine plows; therefore, mine plow deployment within a colony would have little long-term effect on the colony. Prairie dogs could also be affected by off-road vehicles, trench obstacles, and live, small-arms fire. It is unlikely, however, off-road vehicles would permanently damage burrows or kill the occupants of a burrow. Damage to burrows or death attributable to trench obstacles would not be substantial. Small-arms live-fire poses minimal or no threat to prairie dogs. However, prairie dog burrowing activities on small-arms ranges with electronic targeting mechanisms have caused problems because of buried electrical power wires. In these cases, prairie dogs may be controlled according to the practices outlined in the *Biological Assessment and Management Plan for the Black-tailed Prairie Dog on Fort Carson and the PCMS* (DECAM, 2004g). In 2004, black-tailed prairie dogs were removed from the USFWS candidate species list; however, the PCMS still follows this management plan.

The Army has conducted surveys for black-tailed prairie dogs. Approximately 700 to 1,200 acres on the PCMS are populated by black-tailed prairie dog colonies. Population numbers fluctuate, primarily in relation to occurrence of plague in the region. Prescribed burning has been effective in maintaining and establishing prairie dog habitat. Pesticides can be used to limit the spread of plague in prairie dog colonies.

Burrowing Owl

Burrowing owls use active prairie dog colonies and other burrows on the PCMS. Observations of this species show that it has been a summer/breeding resident on the PCMS annually. Numbers of breeding pairs fluctuate annually due to many variables but appear to be most attributed to availability of nesting sites in black-tailed prairie dog colonies and other abandoned fossorial mammal dens. During the 2006 breeding season, 30 nesting pairs with young were observed. In addition, recent observations show that burrowing owls maybe adapting to reside over the winter during years when favorable weather conditions prevail. Military training impacts to burrowing owls would be similar to those of prairie dogs. Since nearly all (≥ 98 percent) of observations of the species nesting have been in black-tailed prairie dog colonies managing for the persistence of healthy colonies is the most effective tool for managing the burrowing owl populations on the PCMS.

Identifying prairie dog towns occupied by burrowing owls annually and establishing an approximate 330 to 980 feet (100- to 300-meter) radius buffer around nest sites could have the effect of reducing impacts from military training on burrowing owls (Partners in Flight, 2000). Usually, these buffers can be accommodated during training exercises, but in some cases, training may require encroachment of this buffer area. The G-3 coordinates with DECAM wildlife biologists before each exercise to devise a training plan that minimizes potential impacts to nesting birds.

Mountain Plover

Dismounted troops and off-road vehicle traffic are the greatest threats to mountain plovers in maneuver training areas. People walking across the prairie or exiting vehicles caused mountain plovers to perform their distraction display, or flush and fly a short distance. Plovers rarely responded to military convoys and other traffic by flushing unless the plovers

were near the roadway. Vehicles traveling cross-country, including travel adjacent to roads, could kill juveniles sheltered in tall vegetation adjacent to the road and destroy nests on the open prairie. Prolonged human presence near breeding territory would likely disrupt egg incubation or chick brooding, resulting in death of the eggs or chicks (Bunn et al., 1996). The effect of military helicopter overflights on nesting mountain plovers is unknown, but the effect of flybys from jet aircraft has been studied, which determined jet overflights did not alter or interrupt the normal behavior routine of the adult plovers (Bunn et al., 1996). The mountain plover was proposed for listing as a threatened species in 1999, and in 2003, the USFWS withdrew the proposal. Because the mountain plover is no longer proposed for listing, the *Biological Assessment and Management Plan for the Mountain Plover on Fort Carson and the Pinon Canyon Maneuver Site* (DECAM, 2002d), which required an approximate 660 feet (200-meter) radius buffer zone around each mountain plover nest site, is no longer in force. The Army, however, does maintain these buffers during training exercises, but in some cases, training may require encroachment on this buffer area. The G-3 coordinates with DECAM wildlife biologists before each exercise to devise a training plan that minimizes potential impacts to nesting birds. Buffer zones can be cordoned off using engineering tape attached to metal fencing posts, by placing painted automobile tires around the perimeter with off-limits signs attached, or by placing Colorado certified weed-free straw or hay bales with appropriate signage around off-limits areas (DECAM, 2002d).

Mountain plovers are rare on the PCMS, with two to 10 plover nests generally found on the PCMS annually. Only a small percentage of available habitat (black-tailed prairie dog colonies and other heavily disturbed areas) is occupied. The population has been generally stable on the PCMS.

Bald Eagle

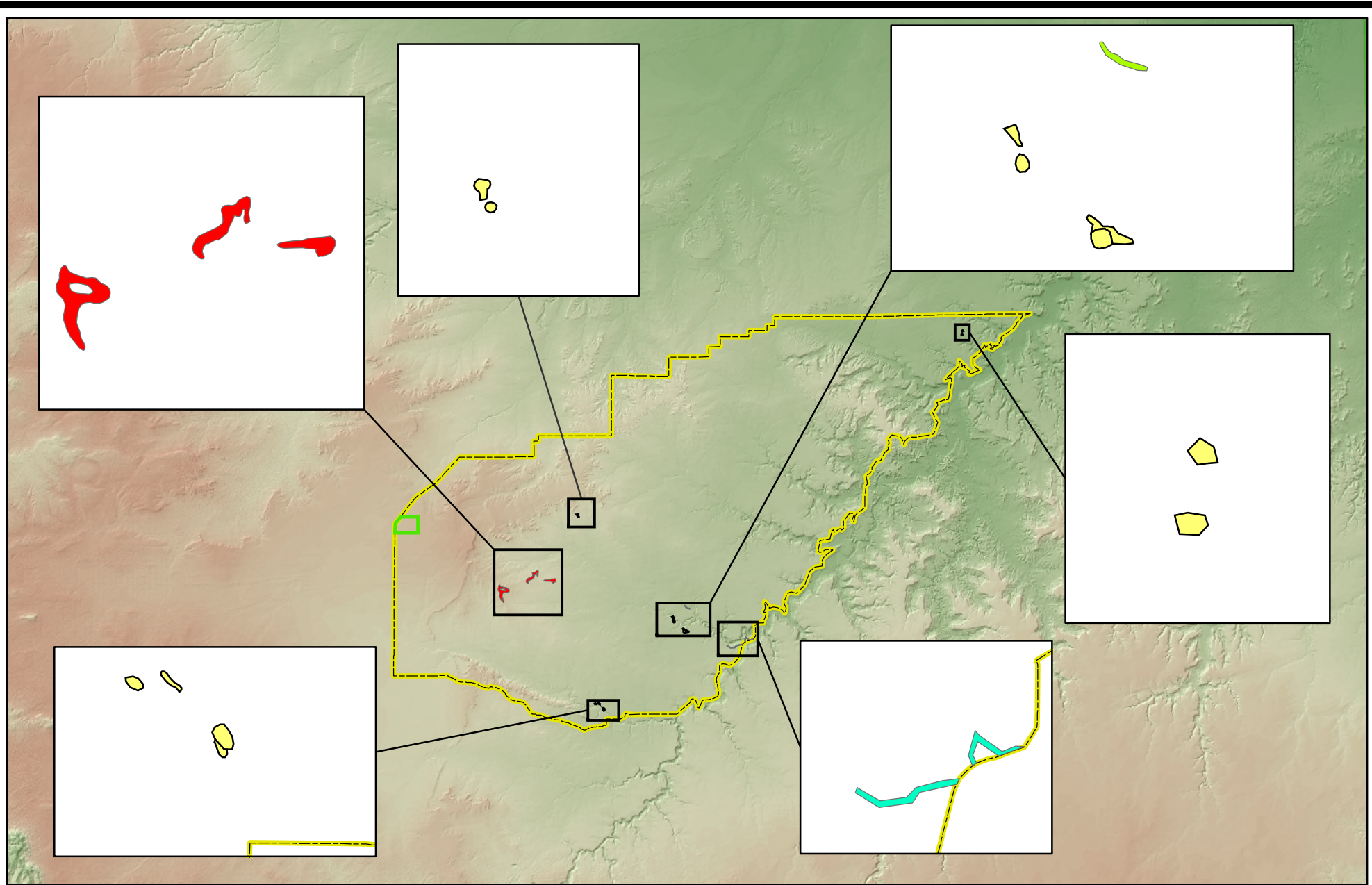
Impacts to the bald eagle from military training are primarily related to the availability of black-tailed prairie dogs as prey. No training restrictions are associated with the management of the bald eagle. Bald eagles are sensitive to human disturbance, including military training. Fewer wintering bald eagles have been found in areas with high human activity compared to areas with moderate human activity. Appendix E, Attachment E.3 provides a management plan for wintering bald eagles on the PCMS.

Triploid Checkered Whiptail

Impacts to triploid checkered whiptails from military training would be similar to those described for small mammals and ground-nesting birds. Although the majority of the suitable habitat is within dismantled training areas, habitat could be disturbed and animals might be killed as a result of training maneuvers.



Plants



Available information on the distribution of sensitive plant species known to occur at the PCMS is limited but surveys are ongoing. Figure 3-5 displays the known distribution of sensitive plant species on the PCMS. *Asclepias macrotis* has been confirmed in Bravo Canyon; dwarf indigo has been confirmed in Taylor and Spring Canyons; soapberry has been confirmed in the Taylor Arroyo; and Twinvine has been confirmed in Welsh Canyon. Pueblo goldenweed, Arkansas valley evening primrose, and round leaf four o'clock occur in upper Burke, Taylor, and Van Bremer Arroyo watersheds. Dwarf milkweed has been found in the north, south, and central parts of the installation (Klavetter, 2006; Rifici, 2007). Impacts to these and other sensitive plant species from mechanized and dismantled



Legend

Sensitive Plant Species

-  Cantonment Area
-  Installation Boundary

-  Dwarf Indigo Amorpha
Amorpha nana
-  Dwarf Milkweed
Asclepias uncialis



-  Round-leaf Four O'clock
Oxybaphus rotundifolius
-  Southern Soapberry
Sapindus saponaria drummondii



FIGURE 3-5
Known Distribution of Sensitive Plant Species at the PCMS

military training under the No Action alternative would be similar to the general impacts previously described for vegetation in the particular type or types of training areas where they occur. These impacts currently occur at the PCMS and would continue to occur under the No Action alternative.

Construction and Operation

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.7.2.2 Proposed Action

Training

To protect long-term land sustainability at the PCMS, training under the Proposed Action may or may not be conducted 52 weeks per year. To ensure the continued availability of quality training lands, the Proposed Action would continue the use of the INRMP and the Army's ITAM program at the PCMS to provide for sustainable land management (see Section 1.2.5) and to apply existing processes for interpreting the training mission (see Section 2.2.4.3). The ITAM program balances the Army's training needs with the need to sustain the quality and sustainability of environmental resources in the training areas.

Because of the limited quantitative baseline data, not all potential environmental effects resulting from increased training levels can be precisely determined at this time. For this reason, environmental conditions would be monitored under the Proposed Action, evaluated, and considered if and as the level of training were increased. This process of monitoring and adaptive management feedback would continue to be governed by the ITAM program, document the level of impact that is occurring, and serve to establish the upper acceptable level of impacts that would be allowed to occur without precluding achievement of sustainable land management goals under the Army's ITAM program. This process for balancing mission needs with environmental conditions also applies to the No Action alternative.

The types of impacts expected to occur to vegetation communities and to wildlife and their habitats in each of the PCMS training areas under the Proposed Action would be the same as described under the No Action alternative. Because baseline data are not available for quantifying the extent (number of acres) and magnitude (severity) of training-related impacts to vegetation and wildlife resources, it is not possible to quantitatively estimate impacts to habitats and wildlife populations from implementation of the Proposed Action or what the magnitude or severity of those impacts would be compared to the No Action alternative.

Vegetation

Increased training levels on the PCMS under the Proposed Action would increase the potential impacts to vegetation described under the No Action alternative. Training activities specific to the different types of training areas would increase and, with the exception of restricted areas, training-related impacts would generally increase in proportion to increases in the areas' primary designated training uses. For example, impacts to dismounted training areas and maneuver training areas would be expected to increase under the No Action alternative, in either extent (number of acres), magnitude (severity), or a combination of both, as previously described and depending on land sustainability

considerations. Increased live-fire training under the Proposed Action would decrease the availability of these areas for maneuver training and dismounted training and the impacts associated with these uses. At the live hand grenade range, vegetation would be destroyed as a result of the explosion of the grenades.

Weeds

The greater potential for noxious weed infestations under the Proposed Action would continue to be addressed by the weed prevention strategies and weed control methods described under the No Action alternative.

Wildfire

The risk of accidental wildfires caused by training at the small-arms live-fire ranges and in maneuver training areas, as described under the No Action alternative, would likely increase under the higher training loads of the Proposed Action. Prescribed burning would continue to be used to create buffer areas that provide additional protection from wildfires in and around the small-arms live-fire ranges and the live hand grenade range. The increased risk could be offset by the availability of trained military personnel at the site to suppress fires in their initial stages.

Wildlife

Increased training levels at the PCMS under the Proposed Action would increase the potential impacts to wildlife, as described under the No Action alternative in Section 3.7.2.1. The BMPs for species (also described in Section 3.7.2.1) could be implemented to minimize impacts to wildlife under the Proposed Action. Impacts to wildlife habitat from increased military training would parallel those described for vegetation under the Proposed Action. In general, species adapted to reduced vegetation, bare ground, or disturbance would be increasingly favored.

Increased military training at the PCMS might displace maneuvers on the grassland/pinyon-juniper interface farther into current pinyon-juniper habitat. Revegetating disturbed areas with plant species that are valuable to deer for forage and cover as soon as possible after military training would continue to provide suitable mule deer habitat at the PCMS (USFWS, 1991). Direct disturbance to wildlife species would increase in areas where vehicle activity and noise would increase, particularly the maneuver training areas and the live hand grenade range. Increased pedestrian activity in dismounted training areas would increase disturbance of wildlife species sensitive to human presence. Species that are more tolerant of human presence, vehicle activity, and noise would be increasingly favored in areas where military training occurs, while species that are less tolerant of these factors would decline.

Sensitive Species

Impacts to sensitive wildlife species from increased military training under the Proposed Action would be similar to the impacts to other wildlife species. Increased military training activities would likely increase prairie dog burrow damage, and direct mortality could increase because of increased maneuver training in prairie dog habitat. Impacts to prairie dogs from increased military training would directly and indirectly affect associated species, including the burrowing owl, mountain plover, and bald eagle. Disturbance and destruction of prairie dog habitat would directly impact burrowing owls and mountain plovers if these

species are present in the colony. If prairie dog populations decline at the PCMS, bald eagles would most likely not use the installation for foraging.

Impacts to sensitive plant species from increased military training under the Proposed Action would be similar to those previously described for vegetation in general within the particular type or types of training areas where they occur. However, populations of rayless goldenweed, a species known to increase on disturbed ground, are likely to expand in response to increased ground disturbance in maneuver training areas and other training areas where they occur (Schulz and Shaw, 1992).

Construction and Operation

Construction activities in the PCMS Cantonment and the training areas under the Proposed Action would cause temporary ground disturbance and result in permanent loss of small areas of native vegetation in those areas. Disturbed areas would be reclaimed and revegetated with native or other suitable vegetation, as appropriate. Because of the predominance of the blue grama/galleta shortgrass prairie community, permanent loss of small areas within the existing cantonment area would not be considered adverse. Construction would also result in direct wildlife habitat loss and direct and indirect impacts from habitat disruption and wildlife disturbance. A small area of potential habitat would be permanently lost. However, land in the cantonment area is currently disturbed, and available habitat is primarily developed. In the cantonment area, the loss of native habitat, if any, would be minimal.

Direct impacts from mortality to ground nesting migratory birds, small mammals, reptiles, and amphibians could occur during site construction if they are present. Noise, human presence, and heavy equipment are likely to displace wildlife that could be present on or near construction sites temporarily. The duration and distance an animal is displaced is generally dependent on the individual species. An individual's response to disturbance could change with time. Wildlife species would likely return soon after construction is completed. This is an indirect short-term impact to wildlife at the PCMS. The disturbance to wildlife in the cantonment area is expected to be minor. Sensitive plant and wildlife species are not known to occur in the cantonment area. If present, construction and operation of facilities under the Proposed Action could result in impacts similar to the construction and operation impacts previously described for vegetation and wildlife in general. Known locations of sensitive species are in restricted areas and protected from the impacts of training. Wetlands in the PCMS Cantonment and training areas would be avoided during construction activities under the Proposed Action; therefore, there would be no direct or indirect impacts to wetlands.

3.8 Cultural Resources

3.8.1 Affected Environment

Cultural resources management at the PCMS encompasses conservation of resources of significance to the history or prehistory of the United States and of traditional, religious, or cultural importance to Native Americans. Appendix F, Attachment F.1 contains a detailed description of the prehistoric and historic cultural sequences, including the historic development of the PCMS.

3.8.1.1 Description of Resources

Archaeological Resources

Although archaeologists identified sites in the PCMS area prior to 1980, large-scale archaeological investigations of the region did not occur until the early 1980s in preparation for the opening of the PCMS. Since that time, intensive efforts to identify archaeological sites at the PCMS have continued. The history of archaeological investigations is available for inspection at the Fort Carson Curation Facility, Building 2420.

To date, 5,113 archaeological sites have been recorded on the PCMS (see Table 3-21), of which 488 have been determined eligible for inclusion in the National Register of Historic Places (National Register). Prehistoric sites predominate on the PCMS, encompassing approximately 77 percent of the total number of sites recorded. Prehistoric site types include complex habitation sites, temporary field camps, lithic sites, and food procurement and processing locations. Historic site types include old stage route and station remnants, ranching complexes, homesteads, and small mining operations. Both prehistoric and historic rock art is found on the PCMS, with prehistoric elements predominating. Most rock art is located on and along the Hogback formation and in the canyon areas, but other isolated panels and sites exist in open prairie settings.

TABLE 3-21

Archaeological Resources Identified to Date at the PCMS
PCMS Transformation EIS, PCMS, Colorado

	Prehistoric	Historic	Multi-Component
Archaeological Sites	4,037	602	474
National Register-Eligible Sites	279	64	145
National Register-Eligible Districts	0	11	0
Traditional Cultural Properties	3	0	0
Native American Sacred Sites	5	0	0

Architectural Properties

The only intact architectural properties on the PCMS with construction predating Army acquisition are homesteads. These were all abandoned by 1983, many having been unoccupied since the 1920s. The varying condition of these properties resulted in their treatment as both archaeological sites and historic architectural properties. The following properties are managed in the same manner as archaeological sites, but they have also been determined to be historic district-eligible, most with contributing and non-contributing properties:

- La Placita Hispanic Settlement;
- Cross Ranch;
- Bar VI Ranch;
- Mary Doyle Homestead;
- Red Rocks Ranch;

- Sharps Ranch;
- Crowder's Ranch and Big Canyon;
- Brown's Sheep Camp;
- Bent Stage Station;
- Lockwood Stage Station; and
- Pinon Booster Station.

Paleontological Resources

Paleontological resources (fossil remains) are located on the PCMS and throughout the surrounding area, but they are not classified as cultural resources. While fossils are important scientific resources, they do not have the same federal mandates for identification and protection as cultural resources at the PCMS (or at other Army facilities). The Army, however, avoids impacts to paleontological resources as part of its management of the PCMS.

The Purgatoire River valley and its tributaries and side canyons contain abundant and diverse paleontological resources, including trace, plant, and invertebrate fossils spanning Permian through Cretaceous geological periods (USFS, 2005). Two paleontological studies have been conducted on the PCMS, and 13 localities of deposits have been documented. Four of these localities were determined to be of high paleontological significance based on the presence of rare taxa, the diversity of plant and animal fossils, and the abundance of fossils in a stratigraphic unit (Evanoff, 1998).

3.8.1.2 Cultural Resources Laws, Regulations, and Sections 110 and 106 Consultation

The foundation of broad legislation for the preservation of cultural resources is the National Historic Preservation Act (NHPA) (36 CFR 800). Section 110 of the NHPA requires federal agencies to institute programs to identify and evaluate historic properties under their care that are eligible for the National Register. Historic properties are defined under the NHPA as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register." Section 106 requires federal agencies to consider the effects of undertakings on historic properties listed in or eligible for inclusion in the National Register through a process of consultation. Evaluative studies constitute the mechanism by which inventoried resources are assessed against criteria of the National Register and upon which all subsequent management actions are based. Documentation for each inventoried resource is submitted to the Colorado State Historic Preservation Office (SHPO).

The process for compliance with Section 106 consists of the following steps:

1. Identification of historic properties – within the area of potential effect.
2. Historic property evaluation – conducted using National Register criteria (36 CFR 63). Properties that meet the criteria are considered eligible for listing in the National Register and are subject to further review under Section 106. Properties that do not meet the criteria are considered not eligible for inclusion and are generally not subject to further review.
3. Determination of effect – one of the following effect findings will be made: No Historic Properties Affected, No Adverse Effect, or Adverse Effect.

4. Resolution of Adverse Effects and Mitigation – occurs when adverse effects are found. Consultation continues between the federal agency and consulting parties to attempt resolution.

The Army has not initiated Section 106 consultation for the transformation action at this stage because details of undertakings potentially affecting cultural resources have not been developed. The Army provided the DEIS to the Colorado SHPO for review and has committed to future Section 106 consultation as specific training exercises are proposed. The Colorado SHPO did not provide comments on the DEIS but did send correspondence stating that Section 106 consultation requirements follow the steps identified above. See Appendix H for SHPO correspondence.

3.8.1.3 Resource Management

Documents relating to implementation of the NHPA on the PCMS include the following:

- *1980 Memorandum of Agreement Regarding Fort Carson Military Reservation* among Fort Carson, the SHPO, and the Advisory Council on Historic Preservation (see Appendix F, Attachment F.2);
- ICRMP (DECAM, 2002b); and
- Environmental Quality: Cultural Resources Management, AR 200-4 (Army, 1998).

The 2006-2010 ICRMP is under development, as is a Programmatic Agreement among the SHPO, the Advisory Council on Historic Preservation, and four Native American tribes that have a cultural affiliation with lands administered by Fort Carson.

AR 200-4 outlines responsibilities regarding cultural resources legislation for Army posts, major commands, and supporting organizations.

Surveyed Areas

Much of the PCMS has been inventoried for cultural resources, with historic properties identified in the following categories: districts, buildings, structures, prehistoric, historic, and multi-component archaeological sites. To date, 5,113 archaeological sites have been recorded on the PCMS (see Table 3-21). The cantonment area of the PCMS has been 100 percent surveyed for cultural resources and is devoid of known prehistoric sites. Prehistoric sites predominate on the PCMS, encompassing approximately 77 percent of the total number of sites recorded to date.

Unsurveyed Areas

A comparative analysis was developed to complement the analysis in this EIS (see Appendix F, Attachment F.3). This analysis establishes projections of the number of archaeological sites and historic properties that are potentially eligible for inclusion in the National Register and that may be encountered or adversely affected as a result of increased military training activities at the PCMS. The data contained in the comparative analysis assist in the planning and budgeting process for compliance with NHPA Section 110 and are not intended to be used in lieu of archaeological pedestrian inventories. For undertakings such as increased training activities, the Army would continue to comply with the requirements of Section 106 to identify resources that may be affected, determine effects, and initiate the Section 106 consultation process.

Geographical settings were recorded as part of the comparative analysis effort. The criteria for designating the settings were based on physiographic differences in landform types. The analysis results are summarized in Table 3-22.

TABLE 3-22
PCMS Comparative Analysis Results
PCMS Transformation EIS, PCMS, Colorado

	Canyon Top	Hill	Open Prairie	Talus	Valley
Unsurveyed Acres	11,573	8,875	39,430	3,810	5,176
Anticipated Number of Additional Sites	142 sites (1 site per 81 acres)	555 sites (1 site per 16 acres)	680 sites (1 site per 58 acres)	265 sites (1 site per 14 acres)	398 sites (1 site per 3 acres)
Anticipated Number of Additional National Register-Eligible Sites	36 sites	79 sites	49 sites	110 sites	132 sites

Because of its relatively pristine condition, the PCMS would likely have sites from all time periods and in all settings. A total of 2,040 sites are projected, with 406 of the sites potentially eligible for inclusion in the National Register. Assumptions for the comparative analysis input were conservative; therefore, this number is likely overestimated.

3.8.1.4 Native American Consultation and Initiatives

Eleven federally recognized Indian tribes have expressed a cultural affiliation with land at the PCMS. These include the Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes of Oklahoma, Comanche Nation of Oklahoma, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, Oglala Sioux Tribe of the Pine Ridge Reservation, Shoshone Tribe (Eastern Band), Southern Ute Indian Tribe, Ute Mountain Ute Tribe, and the Jicarilla Apache Nation.

Ethnohistoric research to identify Native American tribes having traditional ties to lands administered by Fort Carson began in the 1980s as part of the cultural resources surveys in support of Army acquisition of the PCMS. Fort Carson has inventoried its collection and completed repatriation of all human remains and cultural artifacts in accordance with the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (USACE, 1997). Native American consultation will continue on the PCMS as additional potentially important sites are identified.

In 2002, Fort Carson initiated a project to complete the required Native American consultation in accordance with NHPA Section 106, the American Indian Religious Freedom Act of 1996, and NAGPRA. Nine field visits occurred at the PCMS and Fort Carson, with 23 tribal representatives from 11 federally recognized tribes participating. In November 2004, a comprehensive agreement (CA) was signed by 10 affiliated tribes in a ceremony held at Fort Carson. The Jicarilla Apache Nation signed a separate, but identical, CA in May 2005. A copy of the CA is provided in Appendix F, Attachment F.4.

Traditional cultural properties (TCPs) and sacred sites were also identified during the consultation process. On the PCMS, five sacred sites, three TCPs, and two sites of concern

were identified. Within Native American traditions, rock art often serves as a locus of sacred power and cultural significance. Over the course of consultation, rock art on the PCMS was linked directly to the traditions of four groups; the Jicarilla Apache, Kiowa, Comanche, and Southern Cheyenne.

The Hogback Traditional Site was identified as a TCP by the Jicarilla Apache Nation. In May 2005, a Memorandum of Understanding between Fort Carson and the Jicarilla Apache Nation was signed defining future management and protection of the site.

3.8.2 Consequences

The consequences of BRAC 2005, IGPBS, and AMF would affect nearly all available land within the boundaries of the PCMS. Military training activities have the potential to result in adverse impacts to cultural resources. The extent of the impact is contingent upon two factors: the type of training and the landform where the training takes place.

All training activities that could affect properties eligible for inclusion in the National Register must be considered undertakings in accordance with NHPA Section 106. As of May 2006, approximately 65,600 acres remain unsurveyed on the PCMS, and archaeological investigations would be required prior to additional training use. Archaeological work on the PCMS is ongoing, and the unsurveyed acreage will continue to decrease.

3.8.2.1 No Action Alternative

The No Action alternative includes two components: 1) construction activities and 2) increased training activities, with a greater number of rotations and use of larger geographic areas.

Construction of Support Facilities

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

Training Requirements

Under the No Action alternative, increased training could occur in any area that is not restricted from training. If this were to occur, the PCMS would initiate NHPA Section 106 consultation procedures as described in Section 3.8.2.2.

3.8.2.2 Proposed Action

The Proposed Action at the PCMS includes two components: 1) construction activities in support of training at the PCMS and 2) increased training activities, with a greater number of rotations and use of larger geographic areas.

Construction of Support Facilities

Cantonment Area Construction

The cantonment area of the PCMS has been 100 percent surveyed for cultural resources and is devoid of known prehistoric sites. Construction within the Cantonment began in the mid-1980s. Architectural evaluations are not anticipated to be conducted until 2030, when the oldest structures attain 50 years of age. As such, construction activities at the Cantonment would not result in adverse impacts to cultural resources. If cultural materials or human remains are uncovered during ground-disturbing construction activities, the "Inadvertent Discovery of Archaeological Resources or Burials" standard operating

procedure (SOP) and NAGPRA would be applied and enforced (DECAM, 2002b and USACE, 1997).

Construction in the Training Areas

The live hand grenade range, ammunition holding area, protective equipment training facility, upgrades to an existing small-arms range, and communication facilities described in the Proposed Action are all within previously inventoried areas of the PCMS. Their operation would have no impact to known cultural resources. If proposed and future range projects are determined to have the potential to result in adverse impacts to cultural resources, NHPA Section 106 consultation procedures would be followed.

Three historic district-eligible properties downrange are used by Fort Carson environmental personnel as base camps for field operations, including Red Rocks Ranch, Sharps Ranch, and the Big Canyon Complex. A co-use agreement has been established for the Red Rocks and Sharps Ranches for use as simulated Iraqi villages in urban training scenarios. The Proposed Action poses a small potential for adverse impacts to these ranch sites during training exercises. However, the Fort Carson Cultural Resources Program has established a strict monitoring schedule during and after training rotations to minimize this potential. No adverse impacts would be expected at the Big Canyon Complex.

The “Fort Carson Inadvertent Discovery of Archaeological Resources or Burials” SOP and NAGPRA would be applied and enforced for subsurface cultural materials uncovered as a result of ground-disturbing activities.

Equipment

The types of equipment proposed for use at the PCMS would have no direct impacts to cultural resources. However, the use of certain equipment in downrange training activities could have adverse impacts.

Training Requirements

Training requirements described in the Proposed Action use all available land on the PCMS. In accordance with NHPA Sections 110 and 106 and the stipulations of all agreement and management documents in force for the PCMS prior to training use (unless a project-specific agreement has been developed through the consultation process), the following would apply:

- Use of areas that have been inventoried for cultural resources and that contain no historic properties eligible for inclusion in the National Register would not be restricted because there is no potential for adverse impacts to significant resources.
- Areas that have been inventoried for cultural resources and contain known historic properties eligible for inclusion in the National Register would be used only for dismounted training until the area has been evaluated to determine that cultural resources can be protected against adverse impacts. If impacts cannot be avoided, further consultation with the SHPO and/or Native American Tribes (if applicable) regarding mitigation would occur prior to ground-disturbing activities.
- Areas that have not been inventoried for cultural resources will not be used for activities other than dismounted training until an archaeological investigation has been conducted and resources determined for eligibility in the National Register have been evaluated

against potential adverse effects. If impacts cannot be avoided, further consultation with the SHPO and/or Native American Tribes (if applicable) regarding mitigation would occur prior to ground-disturbing activities

3.9 Socioeconomics

This section addresses the following resource areas:

- Economic development;
- Demographics;
- Housing;
- Quality of life;
- Public finance;
- Environmental justice in minority and low-income populations; and
- Protection of children from environmental health risks and safety risks.

The impacts are assumed to occur in the ROI, which is defined according to local residential, shopping, and commuting patterns. The ROI encompasses the geographical area where linkages are strongest between businesses involved in construction activities and the long-term operation of the new facilities.

The ROI for the Proposed Action at the PCMS comprises Huerfano, Las Animas, and Otero counties. The major communities in the vicinity of the PCMS are Trinidad, in Las Animas County, and La Junta, in Otero County.

3.9.1 Affected Environment

3.9.1.1 Economic Development

Characteristics of economic development include employment and its distribution across industrial sectors, unemployment, earnings, sources of income, and contributions to the regional economy by military installations, their personnel, and retired service members.

3.9.1.2 Employment

The counties in the ROI are rural; ranching and agriculture support much of the local economy. Employment data for the ROI were obtained from the Colorado Department of Labor and Employment (State of Colorado, 2006a). Between 1995 and 2005, the number of jobs increased from approximately 17,400 to approximately 19,400, at an average annual rate of 1.1 percent (almost 12 percent over the 10-year period). This pace of growth was well below that exhibited by the State of Colorado, which experienced an increase of approximately 21 percent over the same period (see Appendix G, Attachment G.1, Table G.1-1). Most of the growth took place in Las Animas County, which accounted for over 80 percent of the growth in employment.

Compared with the State of Colorado, where only 1.5 percent of the workforce is engaged in farming, the three counties in the ROI have high employment in farming – almost 10 percent in Huerfano County and almost 8 percent in Las Animas and Otero counties. Employment in government and government enterprises (federal, state, and local) is high in Las Animas County (25.6 percent) and Otero County (20 percent). Huerfano County (13.2 percent) is slightly below the state average (13.6 percent). Federal, civilian, and military employment is

below the state average, whereas employment in state and local government is high in Las Animas and Otero counties (24.2 percent and 18.5 percent, respectively) compared to the state (10.4 percent).

Major employers in Las Animas County include Burlington Northern/Santa Fe Railroad, Trinidad State Junior College, oil and gas drilling enterprises, and related support businesses. A new minimum-security correctional facility opened in 2003. The economy of Otero County is closely linked to agriculture, including livestock (primarily cattle) production and farming. Major crops include dry land wheat, irrigated corn, and alfalfa hay. The largest employers are local and county government entities. Huerfano County has a larger, medium-security correctional facility that provides employment in the area.

Unemployment

The unemployment rate in all counties of the ROI (see Appendix G, Attachment G.1, Figure G.1-1) has consistently been above that of the state. The rate gradually fell from highs between 7.5 and 10 percent in 1992 to lows between 4 and 5.5 percent in 2000. Between 2000 and 2003, the unemployment rate ranged between 6.5 and 9 percent, and it fell again slightly through 2005 (State of Colorado, 2006b).

Earnings and Income

Total non-farm wage and salary earnings in the ROI in 2004 totaled more than \$544 million. The majority was contributed by Otero County (46 percent) and Las Animas County (40 percent). The concentration of well-paying jobs in the government sector is evident when comparing the share of earnings contributed by the sector to the share of employment in the same sector. The share of earnings is noticeably higher than the share of employment.

Earnings from the private sector are lower for each of the three counties in the ROI than for the state, as can be seen on Figure G.1-2 (see Appendix G, Attachment G.1). This is also true for earnings in the federal, civilian, and military sectors. Earnings in the state and local government sectors are noticeably higher than the state average, especially for Las Animas County where this category comprises almost 30 percent of total earnings.

Military Activities

Little permanent employment is directly associated with the PCMS. The majority of supplies needed for training activities at the PCMS are assembled at Fort Carson and transported to the PCMS with the troops. No other military installations exist within the ROI, and only limited contracts are awarded to businesses in the ROI. Contracts totaling more than \$350,000 and \$140,000 annually were awarded to businesses in the three counties by the Army and USACE, respectively, between 2001 and 2005 (DoD, 2005).

Demographics

The PCMS does not support a resident population. All troops that train at the PCMS are permanently stationed either at or near Fort Carson or other Army installations.

Demographic information is based on data from the U.S. Census Bureau (U.S. Census Bureau, 2000 and 2006a) and the Colorado State Demography Office (State of Colorado, 2006b). The population of the ROI declined slightly over the 24-year period between 1980 and 2004 (from 43,904 to 43,875). Growth was highest in the 1990s, with an average annual growth rate of 0.82 percent. This rate slowed to 0.28 percent between 2000 and 2004.

Between 1980 and 1990, all three counties lost population (see Appendix G, Attachment G.1, Table G.1-2).

The share of the regional population contributed by Otero County decreased steadily from 51.4 percent in 1980 to 44.8 percent in 2004. The contribution of Las Animas County increased slightly from 33.9 percent in 1980 to 37.0 percent in 2004. Huerfano County's contribution, the smallest of the three counties, increased from 14.7 percent to 18.3 percent from 1980 to 2004.

Each of the three counties in the ROI is characterized by a single population concentration with a large percentage of the population. Walsenburg, in Huerfano County, has 46 percent of the county population; Trinidad, in Las Animas County, has 58 percent of the county population; and La Junta and Rocky Ford, in Otero County, together have 59 percent of the county population.

Forty-four percent of the population changed residences at least once between 1995 and 2000.

3.9.1.3 Housing

There is no housing at the PCMS. Family housing and barracks for personnel training at the PCMS are located at Fort Carson.

In 2000, approximately 21,041 housing units were documented in the three-county ROI. The vacancy rate varied from 10 percent in Otero County to 19 percent in Las Animas County and 33 percent in Huerfano County. The high vacancy rate in Huerfano County is attributable to the high number of units having seasonal, recreational, and occasional use. The proportion of owner-occupied housing units was about 70 percent in all counties and, of these, between 75 and 80 percent was single-family units. Few structures contain 10 or more units. Mobile homes comprise between 8 and 15 percent of the housing units. The housing stock is relatively old; the median age (year built) of the units is oldest in Las Animas County (1953) and most recent (1967) in Huerfano County. The proportion of units lacking complete plumbing and kitchen facilities (a surrogate measure for quality) is low in Otero County, but rises to 4 percent in Las Animas County and 5 percent in Huerfano County. Median rent values are \$351 per month in Huerfano County, \$316 per month in Las Animas County, and \$301 per month in Otero County. Median home values are approximately \$80,000 in Huerfano County, \$86,000 in Las Animas County, and \$68,000 in Otero County. See Appendix G, Attachment G.1, Table G.1-3 for selected housing characteristics for 2000.

Residential construction activity is cyclical and highly responsive to economic conditions. The number of housing units authorized for construction in the ROI from 1985 through 2005 varied (see Appendix G, Attachment G.1, Figure G.1-3) (Department of Housing and Urban Development, 2006). Building activity remained relatively constant from 1985 through 1993 and then rose rapidly to peak in 1999. This was followed by an equally steep decline in building activity through 2005.

3.9.1.4 Public Finance

For the three counties of the ROI, the main sources of revenue are transfers from the state government, property taxes, and transfers from the federal government (see Appendix G,

Attachment G.1, Table G.1-4) (State of Colorado, 2006c). Intergovernmental transfers account for 48.8 percent to 52.1 percent of county revenues.

The major operating expenditure categories for the counties are social services, public works, and public safety. The provision of social services consumes about 30 percent of operating expenditures in Las Animas and Otero counties and 18 percent in Huerfano County. Expenditures on public safety comprise 11 to 15 percent of operating expenses for the three counties (see Appendix G, Attachment G.1, Table G.1-5) (State of Colorado, 2006c).

3.9.1.5 Public Schools

The ROI contains 14 school districts, with a total combined student population of over 8,000 in 2005 (State of Colorado, 2006a). The student-to-teacher ratio varies among school districts from a high of 18.5:1 (Branson School District in Las Animas County) to a low of 9:1 (Aguilar School District, also in Las Animas County) (see Appendix G, Attachment G.1, Table G.1-6).

3.9.1.6 Environmental Justice

On February 11, 1994, President William Clinton signed EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The order requires federal agencies to identify and address any disproportionately high and adverse environmental or economic effects that its programs and policies might have on minority or low-income populations.

Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ, 1997) defines minorities as members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black or African American, and Hispanic¹. A minority population should be identified when the minority population of the affected area exceeds 50 percent or when it is meaningfully greater than the minority population percentage in the general population.

Low-income populations are identified using the Census Bureau's statistical poverty threshold, which varies by household size and the number of children. For example, the 2000 poverty threshold for a family of four with two children was \$17,463. The nationwide poverty rate was 12.4 percent at the 2000 Census and 12.5 percent in 2003 (U.S. Census Bureau, 2006b). The U.S. Census Bureau defines a poverty area as a census tract where 20 percent or more of the residents have incomes below the poverty threshold; an extreme poverty area has 40 percent or more of the residents below the poverty level (U.S. Census Bureau, 1995).

Table G.1-7 (see Appendix G, Attachment G.1) presents demographic information on race, ethnicity, and poverty status in the census tracts including and surrounding the PCMS. Figure G.1-4 (see Appendix G, Attachment G.1) shows the locations of the census tracts included in Table G.1-7. Statistics for Las Animas County and the ROI are presented to provide context.

¹ Persons of Hispanic or Latino origin may be members of any racial group. Nationwide, in 2000 about 14.2 percent of Whites, 3.0 percent of Blacks, 1.9 percent of Asians and Pacific Islanders, and 11.0 percent of American Indians and Alaska Natives were of Hispanic origin.

The populations of the census tracts surrounding the PCMS have a slightly lower percentage of minority population than Las Animas County and the ROI (U.S. Census Bureau, 2006c). For the counties in the ROI, the black population comprises less than 1 percent. The Hispanic or Latino share of the total population ranges from 35.3 percent in Huerfano County to 37.9 percent in Otero County and 41.7 percent in Las Animas County.

None of the census tracts surrounding the PCMS meets the 20 percent definition of a poverty area (U.S. Census Bureau, 2006c). The poverty rate in these areas was about the same as that for Las Animas County and the ROI; however, the poverty rates in the PCMS area, Las Animas County, and the ROI are about twice the state level.

3.9.1.7 Protection of Children

On April 21, 1997, President William Clinton issued EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," which seeks to protect children from disproportionately incurring environmental health or safety risks that might arise as a result of government policies, programs, activities, and standards.

No children live on the PCMS, and the PCMS is secured to prevent trespassing. There are few residences immediately adjacent to the PCMS.

3.9.2 Consequences

3.9.2.1 No Action Alternative

Training

Although training activities would increase under the No Action alternative, these activities are not expected to affect local economic activity. As previously noted, almost all the supplies needed for the training activities that take place at the PCMS are assembled at Fort Carson and transported to the PCMS with the troops. Permanent housing for troops training at the PCMS is provided at Fort Carson.

Construction and Operation

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.9.2.2 Proposed Action

Economic Measures of Project Effects

In evaluating the economic effects that the project could have on the regional economy, several measures can be used, such as net changes in regional employment, output, wages, tax revenue, and value added. Attention is focused here on the effects on population, employment, income, and sales.

Impact Methodology

Socioeconomic effects are estimated by characterizing aspects of the construction and operational phases of the Proposed Action with the aid of economic impact modeling techniques.

The Army's Economic Impact Forecast System (EIFS) is used to assess the economic effects on the installation and its vicinity. The EIFS model, its inputs, outputs, and significance measures are discussed in more detail in Appendix G, Attachment G.2.

Training

As described under the No Action alternative, no changes in economic activity from training activities at the PCMS are anticipated under the Proposed Action because Soldiers training at the PCMS would be self-sufficient and would not have the opportunity to leave the installation. Soldiers would travel in buses between Fort Carson and the PCMS. No population changes would occur as a result of implementing the Proposed Action for the PCMS.

Construction and Operation

Economic Impacts of Construction

Most of the effects of construction would be in the three-county ROI. Although the schedules of the proposed construction projects are subject to change, the best available information indicates that the greatest level of construction expenditures at the PCMS would occur in FY 2008. Therefore, economic modeling is based on estimated construction expenditures that could occur during that year.

Economic Development

Minor short-term beneficial effects would be expected. In the short term, the expenditures and employment associated with construction projects would increase sales volume, employment, and income in the ROI, as estimated by the EIFS model. Table 3-23 displays the rate of direct and total economic growth (which includes induced growth) during the anticipated peak construction year (2008).

TABLE 3-23

EIFS Model Output for the Proposed Construction Projects at the PCMS
PCMS Transformation EIS, PCMS, Colorado

Indicator	Projected Change	Percentage Change	RTV Range (percent)
Direct Sales Volume	\$87,000,260		
Total Sales Volume	\$180,090,500	20.58	-6.83 to 6.93
Direct Income	\$56,477,480		
Total Income	\$73,935,930	9.84	-7.33 to 6.57
Direct Employment	1,760		
Total Employment	2,257	10.6	-3.31 to 5.34
Local Population	0	0	-1.3 to 2.3

Notes:

EIFS model results are based on the peak construction year (2008) when the majority of construction projects would be expected to take place. See Appendix G, Attachment G.2 for the detailed EIFS model report.

RTV = rational threshold values.

These economic benefits would be temporary, lasting only during construction. Changes in specific economic parameters would exceed historical fluctuations, as represented by the RTV shown in Table 3-23 and, therefore, would be considered significant and beneficial in the ROI.

The Army's EIFS model is used to assess the economic effects of BRAC 2005 recommendations. Results are compared with RTVs to evaluate the significance of these

effects on the regional economy. The RTVs are expressed as positive and negative percent changes in population, employment, sales volume, and income that indicate an acceptable range around the maximum historical fluctuations in the ROI. The RTVs were calculated by the EIFS model for the period from 1969 to 2000. RTVs represent the degree of economic change that the ROI has experienced in the past. In assessing impacts, negative change is weighted more heavily than positive change. The EIFS model, its inputs, outputs, and significance measures are discussed in more detail in Appendix G, Attachment G.2.

The construction projects would create an estimated 1,295 full-time equivalent construction jobs during the peak construction year (see Appendix G, Attachment G.2), which would exceed recent construction employment in the ROI. The 1,234 construction jobs in the three-county ROI in 2004 would be equivalent to 95 percent of the anticipated demand created by the PCMS construction projects.

The local labor force would meet some of the demand for construction workers, temporarily reducing unemployment in the region. Some of the demand for workers, however, would likely be met by workers from outside the ROI. Construction workers who commute long distances (50 to 100 mi or more) might stay in the area during the week, creating demand for day housing and recreational vehicle campgrounds. Owners of seasonal rental housing could benefit from increased off-season rentals for several years.

Because of the largely agricultural nature of the economy in the ROI, the purchase of materials and services would likely benefit suppliers outside the ROI. However, local businesses, such as gas stations, restaurants, and convenience retail shops located near the PCMS or between the PCMS and major highways would benefit from the influx of construction workers.

Economic Impacts of Operations

No changes in economic activity related to ongoing operations at the PCMS are anticipated under the Proposed Action because units training at the PCMS would be self-sufficient and would not have the opportunity to leave the installation. Soldiers would travel in buses between Fort Carson and the PCMS. The Proposed Action would not result in population changes in the vicinity of the PCMS.

Environmental Justice

Construction impacts would be temporary, but they could be a nuisance for those living near a construction site. Because most of the construction activity would occur within the PCMS, and no adverse impacts to low-income and minority communities would be expected.

Protection of Children

No adverse effects to the protection of children would occur. No children live on the PCMS, and the residential population in the adjacent area is low. Existing security measures that prevent trespassing on the PCMS would protect children from hazards during construction.

3.10 Transportation

This section identifies the affected environment and the environmental consequences of the Proposed Action on transportation in the EIS study area.

3.10.1 Affected Environment

3.10.1.1 Regional Transportation

Roadway Network

The sole access point to the PCMS is provided via U.S. 350, approximately 30 mi northeast of Trinidad. Deployments from Fort Carson follow a fixed route along I-25 approximately 117 mi south to U.S. 160, along U.S. 160 approximately 7 mi northeast to U.S. 350, and along U.S. 350 approximately 24 mi northeast to the main gate at the PCMS cantonment area.

I-25 is the primary north-south interstate highway through Colorado. The City of Pueblo, located approximately 30 mi south of the Fort Carson cantonment area, is the only city transected by the I-25 portion of the deployment route. The remainder of the route runs through sparsely populated rural areas.

Traffic

I-25 is a four-lane, designated truck route that connects Fort Carson and Trinidad. The posted speed limit along the majority of I-25 is 75 mi per hour (mph) and 55 mph through the urban areas of Pueblo and Trinidad. Traffic volumes on I-25 vary from a high of 72,200 ADT through downtown Pueblo to a low of 8,300 ADT near Walsenburg. Volumes on I-25 between Fort Carson and Pueblo range from 28,100 ADT to 44,300 ADT near State Highway (SH) 16. According to the Colorado Department of Transportation (CDOT), there is sufficient excess roadway capacity along the majority of this segment of I-25. However, through Pueblo and in the immediate proximity of Fort Carson at SH 16, I-25 is near capacity (CDOT, 2006a).

U.S. 160 is a two-lane, designated truck route between I-25 and U.S. 350. Posted speed limits on U.S. 160 are 35 mph near Trinidad and 60 to 65 mph elsewhere. Traffic volumes on U.S. 160 vary from 3,800 ADT near Trinidad to 1,900 ADT at U.S. 350. Traffic volumes on U.S. 160 drop substantially east of the junction of U.S. 160 and U.S. 350, which is a two-lane, designated truck route between U.S. 160 and the main gate at the PCMS cantonment area. The posted speed limit for U.S. 350 is 65 mph. Traffic volumes on U.S. 350 vary from 1,300 ADT near U.S. 160 to 740 ADT near the main gate at the PCMS. According to CDOT, excess roadway capacity exists because of minimal traffic volumes on both U.S. 160 and U.S. 350 (CDOT, 2006b and 2006c).

The full time staff at the PCMS is limited to fewer than 15 civilian maintenance and administrative staff (DPW, 2006). No troops are stationed at the PCMS; therefore, traffic to the installation is primarily generated from training deployments from Fort Carson.

Military convoy traffic between Fort Carson and the PCMS is generally limited to wheeled vehicles. Tracked vehicles are generally transported to and from the PCMS by rail. Special circumstances could require the movement of a limited number of tracked or other vehicles that cannot travel on public roads or by commercial transport truck. The use of the Heavy Equipment Transporter System in support of deployments between Fort Carson and the PCMS is prohibited by CDOT. To reduce traffic conflicts, current military convoy movements are scheduled to avoid peak traffic periods in the Pueblo metropolitan area (DPW, 2006).

3.10.1.2 Installation Transportation

Roadway Network

The roadway network at the PCMS is divided into three categories—cantonment area roads, MSRs, and secondary roads in the training areas. Each roadway category serves a specific function in moving people and freight at the PCMS cantonment area. Roads serve the movement of people and freight within the cantonment area and funnel them onto the MSRs. The cantonment area roads provide a direct connection between the off-post deployment route and the MSRs. The MSRs serve the movement of Soldiers' equipment and supplies over extended distances throughout the PCMS. Secondary roads provide access from the MSRs to adjacent training areas and move vehicle traffic through the training areas (DPW, 2006).

With the exception of 1 mi of paved road in the cantonment area, the roadway network at the PCMS consists almost entirely of unpaved roads. There are approximately 107 mi of MSRs and 490 mi of secondary roads on the PCMS (DPW, 2006).

Traffic

Traffic volumes on the PCMS road network vary widely between training deployment and nondeployment periods. During nondeployment periods, traffic on the PCMS is limited to a small number of maintenance and administrative vehicles, and traffic on the main entrance road is limited to light administrative and maintenance-related traffic totaling fewer than 25 vehicles per day. During deployments to the PCMS, daily vehicle traffic entering the cantonment area increases by approximately 350 vehicles for a period of approximately 3 days. After this initial peak traffic period, administrative and service support traffic would remain slightly increased during the training rotation. At the completion of training and the departure of the unit vehicles, traffic entering the PCMS would return to an ADT of 25 vehicles per day (DPW, 2006).

During a full HBCT rotation, as many as 1,500 additional vehicles would use the road network. The volume of traffic on a given section of road, with the exception of the main entrance road into the PCMS, will be variable because it is contingent on the nature of the maneuver training and variations of training mission requirements (DPW, 2006).

3.10.1.3 Other Transportation

The remote location of the PCMS limits access to the installation by modes other than vehicular transportation. Descriptions of the rail, aviation, and transit systems that serve the PCMS are presented below.

Rail

Freight rail service is provided to and from the PCMS. The movement of tracked and other vehicles that cannot use public roads between Fort Carson and the PCMS is almost exclusively by rail. The PCMS railyard is designed to accommodate the large-scale movement of military vehicles and material. The railhead has six spurs and can accommodate up to 165 train cars at a one time (DPW, 2006).

A typical HBCT movement requires four trains (approximately 225 rail cars total) to meet its one-way rail transport requirement. The movement schedule for this type of unit generally

consists of one train per day for 4 days. The average travel time for a rail shipment between Fort Carson and the PCMS is 18 hours (DPW, 2006).

Aviation

The two small municipal airports located near the PCMS are the Perry F. Stokes Airport in Trinidad and the La Junta Municipal Airport in La Junta. Both facilities support general aviation. Neither airport is serviced by a commercial passenger air carrier (DPW, 2006).

The military airstrip at the PCMS is 5,000 feet long and can accommodate C-130 traffic. An apron and parallel taxiway allow four C-130 aircraft to be on the ground at one time (DPW, 2006).

Transit

No public bus or rail transit is servicing the area surrounding the PCMS. Private charter buses are used by the Army to transport military personnel to and from the PCMS for training. The number of personnel per bus is usually limited to 35 to allow adequate room for the Soldiers and their personal equipment. These buses travel individually or in limited numbers, independent of the military vehicle convoys (DPW, 2006).

3.10.2 Consequences

3.10.2.1 No Action Alternative

Training

Regional Traffic

Under the No Action alternative, traffic volumes on the regional roadway network surrounding the PCMS and the route that would be used for training deployments would increase as planned growth in Colorado occurs. Because the standard planning horizon for assessing traffic impacts is 25 years, the year 2030 is used in this EIS for traffic volumes to maintain consistency with regional and Fort Carson traffic planning. Traffic volumes obtained from CDOT and subsequent analysis of these data indicate that general traffic on the roadways that would be used for the PCMS-related traffic would increase by an average of 42 percent on U.S. 160 and 59 percent on U.S. 350 by the year 2030. With these volume projections, excess roadway capacity would exist on both of these roadways, and the excess capacity would accommodate the volumes projected to occur under the No Action alternative. Traffic on I-25 is projected to increase by 128 percent near Fountain, 41 percent through Pueblo, 38 percent near Walsenburg, and 45 percent near Trinidad by the year 2030 (CDOT, 2006d; 2006e; and 2006f). Traffic growth on I-25 in 2030 would result in much of the roadway being at or near capacity near Fountain and through Pueblo. Excess roadway capacity exists on I-25 south of Pueblo under 2030 traffic conditions.

Under the No Action alternative, training deployments to the PCMS and associated traffic would increase. Adequate roadway capacity is expected to be available on the regional roadway networks except for I-25 near Fountain and through Pueblo under 2030 traffic conditions. Potential effects on I-25 could be minimized by scheduling all movements to occur during off-peak traffic periods through these areas.

Other Transportation

Under the No Action alternative, the increase in training activities could result in increased rail use to transport equipment and supplies to the PCMS and increased private charter bus

use to transport personnel. The typical movement schedule for rail shipments would continue to be one train per day, but would occur on more days compared with historical levels. Shipments by rail, including transport of vehicles and equipment back to Fort Carson, would be less than one shipment per day for 100 days. Adequate rail capacity is available to support the increased shipment.

Construction and Operation

Installation Operation Traffic

Under the No Action alternative, deployments to the PCMS would not increase above current levels, and no increase is expected in the number of full-time military personnel staff at the PCMS. Therefore, no additional impact to the installation's roadway networks would result from military operations at the PCMS.

Construction Traffic

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.10.2.2 Proposed Action

Training

Regional Traffic

Under the Proposed Action, traffic volumes would increase on the regional roadway network surrounding the PCMS and the route that would be used for training deployments would continue to increase in general as planned growth in Colorado occurs, as described under the No Action alternative. In addition to this increased traffic growth, volumes would increase during increased training deployments as military vehicles and personnel are transported to the PCMS.

Training deployment traffic is cyclical in nature; therefore, it is appropriate to discuss traffic impacts as a result of an individual training rotation. A single BCT training rotation comprises the greatest number of vehicles and personnel and is representative of the highest single traffic volume increase that would result from training deployments. Currently, only one BCT training rotation or two battalion training rotations can occur simultaneously at the PCMS. The analysis for this EIS assumes that all company training rotations would occur in conjunction with BCT or battalion training deployments and that only one BCT, or no more than two battalion convoys, would occur in each direction at the same time.

During training deployments for a single BCT, the 2030 daily traffic volumes attributable to military convoys and charter buses transporting troops on I-25 would either not increase or could increase up to 3 percent along the 117-mi route. In 2030, daily traffic volumes on U.S. 160 would increase by up to 11 percent, and U.S. 350 daily traffic volumes would increase by up to 23 percent during convoy and bus movements. This traffic volume increase would result in a slight decrease in roadway capacity along the deployment route. Under maximum training conditions, three BCT rotations and the equivalent of two IBCT rotations would occur each year. The increase in traffic volumes from BCT training deployments would occur five times per year over a period of 3 days for each direction of convoy and bus movement. Therefore, the slight decrease in roadway capacity as a result of BCT training deployments would be expected for approximately 30 days of the year under maximum training conditions and would not constitute an adverse effect.

Training deployments for battalion units would result in traffic volume increases one-third less than BCT deployments along the convoy and bus route; however, the battalion traffic increase would occur 15 times per year over a period of 1 to 2 days for each direction of travel. Therefore, the traffic impact resulting from battalion training deployments would be expected for approximately 30 to 60 days of the year under maximum training conditions. It is possible for two battalions to convoy and train at the same time. If this were to occur, I-25 would experience a negligible traffic volume increase compared with the BCT traffic levels from a BCT convoy. U.S. 160 and U.S. 350 would also experience slight traffic increases ranging from 2 to 5 percent above BCT convoy traffic levels.

Because I-25 through Pueblo is expected to be operating at or near capacity by 2030, traffic from training deployments could adversely affect traffic on I-25 through Pueblo. Impacts to the regional roadway network from training deployment convoys would be mitigated by scheduling all movements to occur during off-peak traffic periods through Pueblo and staggering convoy vehicles into groups of no more than 24 vehicles each that are spaced at least 15 minutes apart. The addition of passing lanes on U.S. 160 and U.S. 350 were recommended in the *Pinon Canyon Maneuver Site Traffic Study* (DPW, 2006) and could be implemented by State and local agencies to mitigate the impacts of military convoys on regional roadways.

In addition, all roadway and rail convoy movements would be scheduled through the Installation Transportation Officer at least 60 days in advance of the training rotation to file a movement request. This would allow the Installation Transportation Officer to complete adequate coordination with CDOT and the Burlington Northern Santa Fe Rail Line prior to convoy movement.

Other Transportation

Implementation of the Proposed Action would increase the frequency of rail shipments from Fort Carson to the PCMS to support training rotations. A typical HBCT would require four train shipments to the PCMS, one per day for 4 days, consisting of 225 cars total. All vehicles shipped by train would be shipped back to Fort Carson at the conclusion of the training rotation. Rail shipments between the PCMS and Fort Carson would not exceed one shipment per day for a total of 40 days per year for BCT training rotations. Shipments of vehicles for battalion units would occur over a 1- to 2-day period. These shipments would not exceed one shipment per day for a total of 60 days per year for battalion training rotations. The analysis conducted for this EIS assumes that all company operations would occur in conjunction with BCT or battalion training deployments. Sufficient rail capacity is available to accommodate this shipment schedule. As noted above, all rail convoy movements would be scheduled through the Installation Transportation Officer at least 60 days in advance of the training rotation.

The frequency of aviation-related training missions at the PCMS would not change and no additional types of aircraft would be used during training rotations. Therefore, no impacts to aviation would occur as a result of implementing the Proposed Action.

Impacts as a result of the increased use of private charter buses used for transporting Soldiers to the PCMS are included in the impacts previously discussed for regional traffic.

Construction and Operation

Installation Operation Traffic

Under the Proposed Action, installation traffic volumes that would occur between training deployments would not change from existing conditions. During training rotations at the PCMS, all deployed vehicles involved in the training exercise would be routed through the cantonment area, and the units and their vehicles would disperse throughout the PCMS training areas as their training mission requires. MSRs 1 and 2 are the primary arterial roads linking the cantonment area with the training areas, and the level of their use is based on the location of each unit's primary training area and mission requirements (DPW, 2006).

Traffic on the PCMS roadways will be variable because the distribution and volume of traffic is contingent on the nature of the maneuver training and variations of training mission requirements. Increased traffic levels during training deployment are not expected to hinder training exercises at the PCMS because the installation is large enough to accommodate one BCT. Increased traffic is not expected to result in capacity constraints on the installation roadway system.

Construction Traffic

Under the Proposed Action, the construction of new facilities would increase construction traffic on installation roadways and on roadways surrounding the PCMS. Construction traffic would consist of construction and passenger vehicles and equipment. Transport vehicles would move the construction equipment (other than trucks) to and from the work site. Traffic from the Proposed Action construction could result in temporary closure of the PCMS roadways. The closures, however, would be temporary and of short duration. Construction activities would also be scheduled so that they would not interfere with training. Construction-related impacts would be reduced through use of traffic control procedures, including the use of flaggers and posted detours, where appropriate. No road closures would be expected to occur on roadways surrounding the PCMS.

3.11 Utilities

This section describes the existing utilities at the PCMS for potable water, stormwater, wastewater, energy sources, communications, and solid waste. It also includes an evaluation of the environmental consequences for these utilities from increased training and the construction and operation of new facilities.

3.11.1 Affected Environment

The PCMS is a training installation with an austere cantonment area and minimal utility services. Management plans and programs applicable to utilities under which the installation operates are listed in Appendix A.

As noted in the *Real Property Master Plan Digest, Pinon Canyon Maneuver Site* (Fort Carson, 2005) for the PCMS, the existing information on utilities infrastructure is limited. The information presented in this analysis is based on the best available published data.

3.11.1.1 Potable Water Supply

Regional Setting

Potable water for the PCMS and the surrounding area is supplied by the City of Trinidad. The existing 8-inch-diameter main water line, which originates in Trinidad, provides service for the PCMS and a state prison facility (Hamilton, 2006).

Project Setting

The PCMS purchases treated potable water from the City of Trinidad for use in the Cantonment (DECAM, 2002a; and Fort Carson, 2005). The potable water enters the installation west of the Cantonment via a connection to a water supply pipeline adjacent to U.S. 350. After the water is delivered to the PCMS, it is stored in a 500,000-gallon tank. From this tank, potable water is distributed to the Cantonment via approximately 14,000 linear feet of underground water line (Fort Carson, 2005) and to the training areas by water truck. The location of the potable water supply and distribution lines in the Cantonment is generally known (Fort Carson, 2005).

The potable water system is adequate to support a maximum of approximately 5,000 personnel based on a water consumption rate of 35 gallons per person per day and other installation-related support activities (such as dust control and emergency fire suppression) (Fort Carson, 2005). The water tank and potable water distribution system in the Cantonment is currently operating within capacity. The water supply pipeline along U.S. 350 has deteriorated in some areas and is leaking (Fort Carson, 2005). The Army is working with the City of Trinidad to repair the deteriorated water supply line.

The Army and the City of Trinidad have a contract for the supply of potable water to the PCMS, which allows for delivery of up to 2,702,703 cubic feet (20,217,620 gallons) annually. In fiscal year 2006 (October 2005 through September 2006), the Army purchased approximately double the contract-allowed amount from the City of Trinidad. The difference between the contracted water supply amount and the purchased amount is attributed to the deteriorated water supply line. Historical actual consumption of water at the PCMS has been approximately 6 million gallons per year (Hamilton, 2007).

Existing wells are present on previously occupied ranches at the PCMS (DECAM, 2002a). Potable water for consumption in the training areas is trucked from the Cantonment. Water from the wells is used for emergency fire suppression and made available to wildlife (DECAM, 2002a).

3.11.1.2 Wastewater and Stormwater System

The Cantonment primarily uses evaporative, nondischarging treatment/oxidation ponds, constructed in 1985 for sanitary wastewater and stormwater treatment (DECAM, 2005a). The Cantonment is sloped to drain to a central stormwater collection pipe, connected by underground pipe to a dedicated pond equipped with a dedicated oil water separation. The combined treatment facility is located in the southwestern corner of the Cantonment. The treatment/oxidation ponds are currently operating at levels below their capacity (Fort Carson, 2005).

The combined treatment facility was originally designed for continuous use by a brigade-sized unit (Fort Carson, 2005). The number of personnel at the Cantonment varies over time

from fewer than 10 to several thousand. The treatment/oxidation ponds were upgraded in summer 2006 and subdivided into smaller ponds to more readily accommodate the fluctuation in flows (DECAM, 2005a). The modified system was designed for an average daily flow capacity of 10,052 gallons per day (Stoner, 2006). The wastewater ponds do not have a discharge permit because the ponds are designed to be nondischarging.

Sanitary wastewater and stormwater are conveyed to the treatment ponds through separate underground pipes. Wastewater and stormwater from the Cantonment are conveyed via approximately 7,000 feet of 8-inch-diameter and 12-inch-diameter mains (DECAM, 2005a). The location of this conveyance system is generally known.

Not all facilities within the Cantonment direct their sanitary wastewater to the treatment ponds. The guard trailer, HQ building, and the chlorination building are within the Cantonment, and wastewater at those facilities is treated using septic systems (DECAM, 2005a). The septic system for the HQ, Building 300, is not adequate to meet existing treatment design and a new 2,000-gallon septic system would be constructed in 2006 for use by the HQ building (DECAM, 2005a).

Most facilities located outside of the Cantonment have septic systems and leach fields (Fort Carson, 2005). Portable toilets are used in the training areas when septic systems are not available (such as during training activities in the training areas).

3.11.1.3 Energy Sources

Regional Setting

Electricity is supplied to the region by San Isabel Electric Association via high-voltage overhead power lines that parallel U.S. 350. Colorado Interstate Gas (CIG) owns and operates a 10-inch-diameter, high-pressure gas main that runs through the PCMS from southwest to northeast. The City of Trinidad owns an existing 10-inch-diameter, low-pressure, odorized natural gas main that is operated by El Paso Gas. The low-pressure gas main is located adjacent to the CIG high-pressure main and extends from the southwest to the northeast for approximately one-third of the distance of the CIG high-pressure line (the line ends on the PCMS) (Fort Carson, 2005). The City of Trinidad and CIG each have an easement for their respective gas lines, and CIG maintains the access road that extends the full length of its pipeline.

Project Setting

The PCMS purchases electricity from San Isabel Electric Association (DECAM, 2002a). High-voltage overhead power lines enter the installation on the west side of the Cantonment, where the power lines connect to an electrical substation. The capacity of the existing transformer is 2,000 kilovolt ampere (KvA), and the existing demand is 164 KvA; therefore, electricity demand at the site is below the design capacity of the existing transformer.

The substation supplies electricity to the existing buildings in the Cantonment through underground distribution lines located adjacent to the roads. The exact location and condition of these lines is not fully known (Fort Carson, 2005).

Electric service is not available outside the Cantonment (Fort Carson, 2005). Batteries and portable generators are used to supply power to the training areas.

Trucked-in heating oil and propane provide adequate fuel for heating at the PCMS. Most buildings in the Cantonment are heated by oil-fueled furnaces. Heating oil is trucked to the Cantonment and stored in building-specific underground storage tanks. Heating oil is not used outside the Cantonment. Propane is used to heat some buildings at the PCMS. Distribution lines are not required because storage of these fuels occurs at the point of use. Natural gas is not currently used at the PCMS (Fort Carson, 2005).

3.11.1.4 Communications

Project Setting

The existing communication infrastructure at the PCMS consists of telephone lines that enter the Cantonment from U.S. 350. The location of buried telephone lines has not been identified.

No communications infrastructure is present in the training areas at the PCMS (Fort Carson, 2005).

3.11.1.5 Solid Waste

Project Setting

Solid waste pickup at the PCMS is managed via contracts with local waste haulers, and wastes are transported to appropriately permitted disposal facilities. The *Integrated Solid Waste Management Plan, Fort Carson, Colorado* (DECAM, 2004h) contains details of this program at the PCMS. The ISWMP complies with AR 200-1 and AR 420-49. The PCMS is included as a source in Fort Carson's solid waste goals. The goals would achieve a 50 percent annual reduction/diversion rate of Fort Carson's solid waste sent to landfills by 2010 through recycling, reuse, and reduction (based on a 1992 baseline generation rate) while ensuring that integrated nonhazardous solid waste management programs provide an economic benefit compared with disposal using landfill and incineration alone. Refuse and construction-related solid waste are managed by DPW, and DECAM manages recyclable materials (DECAM, 2004i). Solid waste generated in the training areas is collected and returned to the Cantonment for disposal. From the Cantonment, solid wastes are transported to appropriately permitted facilities.

3.11.2 Consequences

3.11.2.1 No Action Alternative

Training

The No Action alternative would increase the level of training at the PCMS. As a result, the demand on utilities is expected to increase, as described in the following sections.

Potable Water Supply

The existing water system is designed to support a maximum of 5,000 personnel per day in the Cantonment and training areas, which is the approximate number of personnel who would use the PCMS during training activities. If more than 5,000 personnel per day use the Cantonment and training areas, adequate potable water supplies might not be available from the existing potable water supply system to meet the demand. To meet this excess demand, additional potable water would be trucked to the PCMS. This additional water would represent a relatively small percentage of the overall use at the PCMS. Additional

water would be needed only on a short-term basis and can readily be accommodated with existing supplies from the water provider.

Wastewater and Stormwater System

Increased personnel and training activities would result in increased generation of wastewater. With the recent upgrade of the treatment/oxidation ponds, the existing wastewater system now has the capacity to accommodate very low flows during nontraining periods and high flows during storms or training events. The upgrade provides adequate capacity for increased wastewater flows. No adverse impact to the wastewater treatment system would result from the No Action alternative.

Increased numbers of personnel and training activities under the No Action alternative could result in the generation of wastewater that exceeds the capacity of existing septic systems and portable toilets. To mitigate this impact, the PCMS would arrange for septic systems to be serviced at a greater frequency and contract for additional portable toilets. No additional mitigation would be required.

Increased training activities on the Cantonment and training areas would not generate increased stormwater runoff; therefore, impacts to the stormwater system would not occur under the No Action alternative.

Energy Sources

Increased frequency of training would result in increased electricity demand in the Cantonment. The current demand is below the design capacity of the existing transformer. Electricity demand in the Cantonment would be met by the available electrical supply.

Increased frequency of training would result in increased power demand in the training areas. Additional power demand in the training areas would continue to be met with batteries and portable generators.

Facilities in the Cantonment are heated by fuel oil or propane. Increased training would increase the quantity of heating oil and propane used. This increase is not anticipated to exceed the available supply of heating oil or propane.

Increased frequency of training and increased use of facilities in the Cantonment would result in increased energy consumption. To mitigate the environmental effects from increased energy consumption, the Army will continue its utility management programs to reduce energy consumption and specifically fossil fuel consumption.

Communications

The PCMS would continue to use the existing the communications infrastructure under the No Action alternative and no changes would be implemented. Because existing training communication needs are not being met (Fort Carson, 2005), the adverse effect to communications would persist under the No Action alternative.

Solid Waste

Solid waste generation in the Cantonment and the training areas would increase with increased training. Solid waste is currently managed in accordance with the ISWMP. Appropriate policies and practices in the existing ISWMP would continue to be implemented to address the increased solid waste generation under the No Action alternative. Solid waste generated in the training areas would be collected and transported

to the Cantonment; from the Cantonment, all solid waste would be transported to an appropriately permitted disposal facility.

Construction and Operation

Facility construction would not be conducted under the No Action alternative; therefore, no impacts would occur.

3.11.2.2 Proposed Action

Training

Impacts to potable water supply, the wastewater and stormwater system, energy sources, communications, and solid waste as a result of training under the Proposed Action would be the same as described under the No Action alternative, although the training load resulting from increased training at the PCMS would approximately double under the Proposed Action throughout the year. However, the maximum training load during any one rotation would not change from the No Action alternative condition; flow rates would remain constant under the Proposed Action whereas overall usage would increase.

Utility managers expect that annual water usage will be approximately 10 million gallons per year after implementation of the Proposed Action at the PCMS, much less than City of Trinidad contract limits and historical potable water purchases. The expected reduction in water supply from the City of Trinidad is attributed to the repair of the deteriorated water supply line.

Measures to minimize impacts of the Proposed Action on utilities could include the following:

- To meet excess potable water demand when more than 5,000 personnel are training, additional potable water would be trucked to the PCMS, although this is considered unlikely.
- To address increased generation of wastewater in the training areas, the PCMS would arrange for septic systems to be serviced at a greater frequency and contract for additional portable toilets.
- To address the increased generation of solid waste, appropriate policies and practices in the existing ISWMP would continue to be implemented.
- To address the increased energy consumption, the Army will continue its utility management programs to reduce energy consumption and specifically fossil fuel consumption.

The Proposed Action includes upgrades to infrastructure that would support the expected increased demands on utilities resulting from the number of Soldiers at the PCMS under the Proposed Action. The upgrades would address the current deteriorated quality of some infrastructure and include the following:

The installation of power distribution lines to provide electricity to training facilities on the west side of the training areas and natural gas lines within the Cantonment. These projects would support increased demand for energy sources that would result from the Proposed Action.

The installation of communication facilities would result in an improved communication system for training activities. Because the PCMS would have an improved ability to carry out its training mission, a beneficial effect would occur under the Proposed Action.

The completed upgrade to the treatment/oxidation ponds and installation of the new 2,000-gallon septic system for the HQ (Building 300) would enhance the existing wastewater system's capacity to accommodate very low flows during nontraining periods and high flows during storms and training events.

Construction and Operation

Potable Water Supply

The locations of the water supply pipeline and distribution pipelines in the Cantonment are generally known. Damage could occur to the pipelines during ground-disturbing activities. To minimize the potential for adverse effects to water pipelines, standard engineering practices would be implemented to locate utilities precisely prior to construction to avoid inadvertent utility damage.

The *Real Property Master Plan Digest, Pinon Canyon Maneuver Site* (Fort Carson, 2005) estimates that the potable water system would support the proposed construction and operation of the facilities under the Proposed Action, including consumption, dust control, and emergency fire suppression. Potable water would be needed during construction and operation of the facilities in the training areas. Water is currently trucked to facilities in the training areas and this procedure would be used during construction and operation of new facilities in the training areas under the Proposed Action; therefore, no adverse effect would occur to the potable water supply from the Proposed Action.

Wastewater and Stormwater System

Construction and operation of new facilities would increase the amount of wastewater and stormwater generated in the Cantonment. New sewer mains would be installed as part of the Proposed Action. After the mains are installed, there would be sufficient capacity in the wastewater and stormwater system to handle the increased wastewater and stormwater volumes generated by the new facilities in the Cantonment (Fort Carson, 2005). Therefore, no adverse effect to the wastewater and stormwater system would occur under the Proposed Action, and no mitigation would be required.

Construction and operation of facilities in the training areas would generate wastewater. The modified-record firing range, included in the Proposed Action, includes the construction of an aerated vault latrine capable of treating all wastewater generated at the facility. Increased wastewater generation at the other new facilities in the training areas would be met by increasing the number of portable toilets. Removal, disposal, and maintenance of the vault latrines and portable toilets are provided by outside vendors. Therefore, no adverse effect to the wastewater and stormwater system would occur under the Proposed Action.

Standard stormwater management practices currently implemented at the PCMS (DECAM, 2002a) would be used to manage the quantity and quality of stormwater runoff from the Cantonment and the training areas during the construction and operation of new facilities. Therefore, no adverse effect to the wastewater and stormwater system would occur under the Proposed Action, and no mitigation would be required.

Energy Sources

Under the Proposed Action, the following energy system improvements would be made:

- The existing electrical substation transformer would be upgraded to approximately 4,500 KvA.
- The electrical distribution system would include new facilities in the Cantonment.
- The electrical distribution system would be expanded to provide service to new facilities in the training areas.

Construction and operation of the new facilities at the PCMS would not affect existing electricity sources, and sufficient electricity would be available to support construction and operation of the new facilities (Fort Carson, 2005). The new facilities generally would not include equipment or appliances, such as air conditioners, that have substantive energy requirements.

Operation of new facilities could increase the demand for energy used for heating. The Proposed Action includes the installation of natural gas lines within the Cantonment. Increased demand would not exceed the system capacity for heating oil, propane, or natural gas.

Communications

The Proposed Action includes the installation of communication facilities that would result in an improved communication system during operation of new facilities. Therefore, a beneficial effect would occur under the Proposed Action. The location of the buried telephone lines on the Cantonment is not known, and the potential exists for damage to occur to the lines during construction. To minimize the potential for adverse effects to buried telephone lines, standard engineering practices would be implemented to locate utilities prior to construction.

Solid Waste

Solid waste generation at the Cantonment and the training areas would increase with construction and operation of new facilities. Appropriate policies and practices in the existing ISWMP would continue to be implemented to address the increased generation of solid waste under the Proposed Action.

3.12 Hazardous and Toxic Substances

This section describes the affected environment and environmental consequences for the storage, use, and handling of hazardous materials and toxic substances (including petroleum-based products), the potential generation of hazardous waste (including disposal, site contamination, and cleanup) and special hazards (including the generation of medical waste) within the Cantonment and the training areas.

3.12.1 Affected Environment

Hazardous materials used at the PCMS include gasoline, diesel fuel, oil, and lubricants used during routine maintenance; pesticides; chemical agents; and explosive and pyrotechnic devices used in military training operations.

Residual hazardous materials including diesel fuel, oil, lubricants, solvents, and batteries generated during routine maintenance are recovered for reuse or recycling. Other hazardous materials such as pesticides, chemical agents, and explosive and pyrotechnic devices employed in military training operations are consumed in the use. Other hazardous materials brought to the PCMS by maneuvering units are recovered as material and taken back to their home station for further use, or classification and turn-in for reissue or proper disposal. In the event that hazardous wastes are generated at the PCMS, they will be managed under the rules and regulations as they pertain to a Conditionally Exempt Small Quantity Generator (CESQG) under the RCRA. Fort Carson's current *Hazardous Waste Management Plan* (HWMP) (DECAM, 2004k) incorrectly states that the plan applies to both Fort Carson and the PCMS. The HWMP and Fort Carson's RCRA Part B Permit apply only to Fort Carson (Downs, 2006).

The *P2 Plan*, applicable to both the PCMS and Fort Carson, establishes the Army's commitment to environmental leadership in P2 by outlining the concepts and practices necessary to reduce the use of hazardous materials and the release of pollutants. The *P2 Plan* is a tool for documenting, tracking, and managing P2 efforts in pursuit of achieving its P2 goals. The *P2 Plan* provides methods for tracking progress, researching new P2 technologies, identifying new opportunities, working with all areas at the Installation for integrated P2 designs, and tracking cost savings. The *P2 Plan* is a plan for how to accomplish P2 at the PCMS and Fort Carson – not a comprehensive report of processes. It also documents P2 opportunities and P2 initiatives that have already been accomplished (DECAM, 2004b).

A small amount of biohazardous waste or infectious waste could be generated by injuries or casualties. All biohazard waste generated at Fort Carson and PCMS is disposed of through a medical department activity (MEDDAC) contractor permitted to dispose of biohazardous or infectious waste. Any medical waste generated at PCMS is transported by certified personnel in government vehicles to Evans Army Community Hospital (EACH) at Fort Carson to be disposed of in accordance with the MEDDAC plans (Reeves, 2006), EACH Hazardous Materials/Hazardous Waste Program, MEDDAC Regulation Number 40-5-6 (Army, 2005b), and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army, 2005c).

3.12.1.1 Uses, Storage, and Handling of Hazardous Materials

Cantonment Area

The principal industrial operations involving the use of hazardous materials, including petroleum-based products, at the PCMS involve the operation and maintenance of vehicles. Larger gas, and diesel, USTs with bulk and retail dispensing mechanisms, as well as heating fuel USTs are located in the Cantonment. Smaller ASTs are located at Big Canyon, Biernachis, Sharps, and Red Rocks Ranches. The 11 USTs and 10 ASTs have a combined capacity of approximately 130,000 gallons. The Army implements the requirements of AR 200-1 to minimize the risk of storage and potential spills into the environment. A spill prevention, control and countermeasure (SPCC) plan has not been developed for the PCMS.

As required by Army policies, the PCMS emphasizes integrated pest management. Pesticides and herbicides could be required for insect and rodent control in structures and control of undesired vegetation, including noxious weeds (USACE, 2006b). Potential areas

of pesticide application include the grounds surrounding support facilities and ranges. A small inventory of DoD-approved pesticides are maintained and managed on site in accordance with the *Installation Pest Management Plan* (DECAM, 2004j).

Asbestos-containing materials and lead-based paint could be present in buildings constructed before 1978 (Fort Carson, 2006c). The Cantonment facilities were constructed after 1985 and are unlikely to contain asbestos or lead-based paint. Lead can potentially be found in chipped or cracking painted walls or in surrounding soils. Paint in liquid form can also contain hazardous lead concentrations (DECAM, 2004f).

Training Areas

Petroleum-based products are used in the training areas for the repair and maintenance of vehicles and replacement of obsolete or malfunctioning target systems, such as lifters, that contain hydraulic fluids (USAEC, 2006b). Small maintenance facilities would be expected to be used to store petroleum-based products. Spent hydraulic lifters from mobile targets are stored at the small-arms live-fire ranges.

Asbestos-containing materials and lead-based paint might be found in buildings constructed before 1978. The former ranch buildings in the training areas might contain asbestos and lead-based paint.

3.12.1.2 Hazardous Waste Disposal

Cantonment and Training Areas

All hazardous wastes potentially generated at PCMS shall be properly disposed of at an off-post, permitted hazardous waste facility.

3.12.1.3 Site Contamination and Cleanup

No solid waste management units have been identified within the PCMS.

3.12.1.4 Special Hazards

Cantonment

A small amount of biohazardous waste or infectious waste could be generated by treating injuries. All medical waste generated at Fort Carson and PCMS is disposed of through a MEDDAC contractor permitted to dispose of that type of waste. Any medical waste generated at PCMS is transported by certified personnel in government vehicles to EACH at Fort Carson to be disposed of in accordance with MEDDAC's plans (Reeves, 2006), Evans Army Community Hospital Hazardous Materials/Hazardous Waste Program, MEDDAC Regulation Number 40-5-6 (Army, 2005b), and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army, 2005c).

Training Areas

Lead is found at practice ranges where lead-containing munitions are used (DECAM, 2004f). Waste that contains more than 5.0 parts per million (ppm) leachable lead, as determined by the toxicity characteristic leaching procedure, is deemed hazardous.

Unexploded ordnance (UXO) is not expected to be present at the PCMS. Nonexplosive practice grenades are used at an existing grenade launcher range.

A small amount of medical waste could be generated by injuries or casualties. All medical waste is transported by certified personnel in government vehicles to EACH at Fort Carson to be disposed of in accordance with the MEDDAC plans (Reeves, 2006), EACH Hazardous Materials/Hazardous Waste Program, MEDDAC Regulation Number 40-5-6 (Army, 2005b), and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army, 2005c).

3.12.2 Consequences

3.12.2.1 No Action Alternative

Training

The No Action alternative would result in increased training activity at the PCMS and an increase in the use of hazardous materials. No changes would occur to storage and handling areas, potential hazardous waste disposal, or other special hazards. Under the No Action alternative, existing management plans would continue to be followed and would be updated as necessary, as described in the following sections.

Uses of Hazardous Materials

Increased training under the No Action alternative would result in an increase in the use of hazardous materials associated with the routine maintenance of vehicles and target systems in the Cantonment and the training areas. The PCMS would continue to implement AR 200-1 and the *Installation Pest Management Plan* (DECAM 2004j) to minimize potential adverse effects from transporting, storing, and handling hazardous materials. Residual material would continue to be recovered for recycle or reuse.

No SPCC plan has been prepared for the PCMS. Measures to prevent oil and petroleum spills to the environment include the development and implementation of an SPCC plan in accordance with 40 CFR 112.

Special Hazards

The increase in training would result in an increase in special hazards. Increased training under the No Action alternative would result in an increase in the use of munitions and targets at the ranges. The PCMS would continue to implement the "Ammunition Supply Point" SOP (Ki, 2006) for storage and transportation of additional munitions and targets. The use of non-explosive practice grenades would continue as currently implemented at the existing grenade-launcher range.

Increased training under the No Action alternative could result in an increase in the spread of lead wastes at the small-arms live-fire ranges. The PCMS would use projectiles that do not contain lead when it is available, as described in *Environmental Assessment: Construction and Operation of a Live Fire, Maneuver Range* (DECAM, 2005b). The use of lead-free projectiles would reduce the potential for lead deposition in soils; however, some lead is present in the primer and gunpowder, which settles on the soil. Ammunition without lead is not available for all weapons in adequate quantities. Lead-containing ammunition, therefore, would continue to be used on the range, and lead deposition in the training areas could increase. The amount of lead that would be deposited in any given area would be contingent upon its distance from targetry (less lead would be deposited farther from targets) and the degree to which the area in question is from the lines of fire (areas directly in front of targetry would receive more lead than areas to the side) (DECAM, 2005b).

Three primary processes determine the mobility of lead at shooting ranges: 1) surface-water runoff, 2) leaching to, and transport by, groundwater, and 3) the generation of fugitive dust (DECAM, 2005b). Because lead binds tightly to soil particles, the potential and extent of lead leaching into the groundwater is minimal. Likewise, the generation of fugitive dust at firing ranges would be minor because of vegetative cover and dust remediation at the firing line and downrange (DECAM, 2005b).

Surface runoff containing small lead fragments and lead that is bound to soil particles dissolved in water is the greatest concern (DECAM, 2005b). Because lead binds tightly to soil particles, the potential and extent of lead leaching into or being transported by groundwater is expected to be minor (DECAM, 2005b). In addition, the low rainfall at PCMS would minimize the leaching of lead into groundwater (DECAM, 2005b).

There is the potential that lead-contaminated soils would need to be remediated in the future. If that becomes a requirement, the PCMS would use the best available technology to accomplish this remediation to mitigate the effects to human health and the environment. *BMPs for Lead at Outdoor Shooting Ranges* (EPA, 2005) may be useful in developing such remediation practices.

Increased training activities could result in an increased number of injuries or casualties and a corresponding increase in the quantity of medical waste. Because such waste generation is rare (Reeves, 2006), no adverse effects from medical waste generation are expected under the No Action alternative. Continued implementation of the EACH Hazardous Material/Hazardous Waste Management Program, MEDDAC Regulation Number 40-5-6 (Army, 2005b), and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army, 2005c), would address any medical waste generated.

Construction and Operation

Facility construction would not be conducted under the No Action alternative. Therefore, no impacts resulting from the increased use of hazardous materials and potential subsequent generation of hazardous waste or special hazards would occur as a result of construction or operation under the No Action alternative.

3.12.2.2 Proposed Action

Training

Training impacts of the Proposed Action from the use of hazardous materials and the potential generation of hazardous waste would be of the same types described under the No Action alternative; however, the training load resulting from an increased number of units assigned to train at the PCMS would approximately double under the Proposed Action. In addition, live hand grenades would be used at the proposed hand grenade range. Use of the range would not result in unexploded ordnance. Grenades would be thrown one at a time, and if a grenade does not explode as expected, qualified personnel would safely detonate the device. Therefore, the magnitude of impacts from training under the Proposed Action would be greater than under the No Action alternative. Measures to minimize the impacts of the Proposed Action from the increased use of hazardous materials, the subsequent generation of hazardous waste, and special hazards would be accomplished by the following:

- Implement the *P2 Plan* (DECAM, 2004b), AR 200-1, and the *Installation Pest Management Plan* (DECAM, 2004j) for waste minimization, spill prevention, and to minimize any potential adverse effects from transporting, storing, and handling additional hazardous materials.
- Develop and implement an SPCC plan in accordance with 40 CFR 112 to prevent oil and petroleum spills to the environment.
- Continue to dispose of solid wastes properly at an off-post, permitted hazardous waste facility.
- Implement the "Ammunition Supply Point" SOP (Ki, 2006) for the storage and transportation of additional munitions and targets.
- Detonate all live hand grenades prior to leaving the proposed hand grenade range.
- Implement the Fort Carson *Lead Management Plan* (DECAM, 2004f) to remove, encapsulate, enclose, and manage sources of lead.
- Implement remediation practices to mitigate effects to human health and the environment from firing ranges, following practices similar to those outlined in *BMPs for Lead at Outdoor Shooting Ranges* (EPA, 2005) if lead-contaminated soils require remediation in the future.
- Implement the EACH Hazardous Material/Hazardous Waste Management Program, MEDDAC Regulation Number 40-5-6 (Army, 2005b), and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army, 2005c), to address any medical waste generated.

No HWMP has been prepared for the PCMS. The current HWMP (DECAM, 2004k) incorrectly states that the plan applies to both Fort Carson and PCMS. The HWMP and Fort Carson RCRA Part B Permit only apply to RCRA hazardous waste generated at Fort Carson (Downs, 2006). Measures to minimize the impacts of the Proposed Action from increased use of hazardous materials and potential subsequent generation of hazardous waste would include the following:

- Document the PCMS as a CESQG under RCRA, and manage PCMS potentially hazardous waste as a CESQG.
- Prepare and implement a HWMP for hazardous waste potentially generated at PCMS.

Construction and Operation

Uses of Hazardous Materials

Construction and operation of facilities under the Proposed Action would result in a substantial increase in the use of hazardous materials, including petroleum-based products in the Cantonment and the training areas. Three motor pools, a vehicle maintenance facility, and one vehicle washrack would be used for routine oil change and lubrication, vehicle washing, and refueling. One concrete pad would be constructed for military vehicle parking.

Construction and operation of facilities under the Proposed Action contribute to the potential of generating hazardous waste because some of these materials could become

wastes through certain processes, expiration, not meeting specifications, or they could become contaminated and unusable. The PCMS would continue to implement AR 200-1, *USTs and ASTs* (DECAM, 2004d), and FC 200-1 to minimize potential adverse effects from accidental leaks resulting from the storage of additional petroleum products. The PCMS would develop and implement an SPCC plan in accordance with 40 CFR 112 to prevent oil and petroleum spills to the environment. Measures to minimize the impacts of generating hazardous waste due to construction and operation of facilities associated with the Proposed Action would include the following:

- Document the PCMS as a CESQG under RCRA, and manage PCMS potentially hazardous waste as a CESQG.
- Prepare and implement a HWMP for hazardous waste potentially generated at PCMS.

Minor amounts of medical waste that may be generated during construction and operation will be transported, stored, and handled in accordance with the EACH Hazardous Material/ Hazardous Waste Management Program, MEDDAC Regulation Number 40-5-6 (Army, 2006b) and Fort Carson Management of Regulated Medical Waste, MEDDAC Regulation Number 40-5-5 (Army, 2006c) to minimize potential adverse effects.

3.13 Cumulative Effects

The CEQ regulations implementing NEPA (40 CFR Section 1508.7) define a cumulative impact for purposes of NEPA as follows:

Cumulative impact is the impact to the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

For the purposes of this EIS, significant cumulative impacts would occur if incremental impacts of the Proposed Action, added to the environmental impacts of past, present, and reasonably foreseeable future actions, would result in significant adverse effects to regional resources.

As discussed in Sections 3.13.1 and 3.13.2, the Army considered a wide range of past, present, and reasonably foreseeable future actions for the PCMS cumulative analysis by contacting local area planners and state and federal agencies to identify other projects in the region that could contribute to cumulative environmental impacts. The Army considered other actions regardless of whether the actions are similar in nature to the Proposed Action or outside the jurisdiction of the Army.

After coordinating with the agencies and entities noted above, it was determined that past and present actions are relevant to this analysis. Reasonably foreseeable actions, however, either do not exist in the area of potential influence for the PCMS cumulative analysis or are not at a stage of planning consideration that would allow for meaningful cumulative analyses. For example, there is little development in the vicinity of the PCMS, and little (if

any) development on lands outside the PCMS is planned. The effects of the Army's proposed use of the PCMS are analyzed in Sections 3.2 through 3.12.

On the basis of the CEQ regulations, this section presents the past actions in terms of the historical development that has occurred in the vicinity of the PCMS. The present actions are those that are permitted. In consideration of actions to include in the cumulative impact assessments in this EIS, reasonably foreseeable future actions are those that:

- Could affect environmental resources similar to those of the PCMS; and
- Have a permit application for operations pending before an agency with permit authority.

Each of these components of the cumulative analysis is discussed in this section.

3.13.1 Past Actions

The area surrounding the PCMS is and has historically been devoted primarily to agricultural uses, particularly ranches, large grazing operations, and undeveloped lands. U.S. 350, which follows a portion of the historic Santa Fe Trail and runs along the western edge of the PCMS, connects the two largest cities near the PCMS (La Junta and Trinidad). The limited development of the area has disturbed natural areas and affected biological resources, cultural resources, soils, and water resources to some extent. Cultural and paleontological resources are present throughout the area and at the PCMS. Past agricultural practices might have disturbed these resources. Some of these resources are present on federal lands, such as the Comanche National Grassland, and are protected from disturbance. Historical grazing might also have affected wildlife, vegetation, soils, and water resources. The PCMS was developed by the Army in the mid-1980s. The land, which previously supported large grazing operations and several residences, was purchased in 1983, and military training operations began at the site in 1985. Cumulative impacts, therefore, from the Proposed Action in combination with other past actions would not occur.

3.13.2 Present and Planned Future Actions

According to Las Animas County (Lucero, 2006) there are no permitted or anticipated projects in the vicinity of the PCMS because water and sewer infrastructure is not available. The potential exists for future wind-power projects in Las Animas County but no specific development plans are under consideration. According to the Otero County Engineering Department (Baker, 2006), no large-scale projects have been approved within Otero County. The only planned development consists of approved projects for 14 individual homes located throughout the county.

The PCMS is a military training facility and has been used for training exercises, on average, approximately 4 months per year. Use of the PCMS in recent years, however, has been less because of overseas deployments of military personnel in Iraq and Afghanistan. Future use of the PCMS is projected to increase, as noted in this EIS. All planned future actions at the PCMS are considered as part of this EIS. No capital improvements or changes to training activities have reached a stage at which they may be properly categorized as reasonably foreseeable, other than those associated with transformation. Some actions, such as changes in weapons systems or repositioning of equipment at the PCMS, could occur in the future

but are not considered reasonably foreseeable at this time. As discussed in Section 1.3.2, further environmental evaluation under NEPA would be conducted for future actions that have the potential to affect the environment.

The effects of transformation activities on the Fort Carson military installation are being addressed in the *Fort Carson Transformation FEIS*. Although the Proposed Action for Fort Carson is an action that is currently being evaluated in accordance with NEPA, it is located distant from the PCMS and the incremental social, economic, and environmental resources impacts attributable to Fort Carson are not anticipated to affect the resources assessed in this EIS.

3.13.2.1 Potential Future Expansion of the PCMS

As noted in Sections 1.3.3 and 2.1.3, land acquisition for potential expansion is a future action that could occur, but the determination of if, how, when, and where it could occur is contingent on numerous studies, processes, and public discussion that are likely to require several years of consideration.

For the purposes of the *PCMS Transformation FEIS* cumulative analysis, the potential expansion action is at such a preliminary stage that is, a proposed action has not been developed, an NOI to prepare an EIS has not been published in the *Federal Register*, and an EIS has not been initiated) that effective cumulative analysis of such an action is not reasonable or feasible. Because a proposed action has not yet been defined, it would be preliminary to speculate on what the impacts of potential expansion would be or how they might contribute to cumulative impacts when combined with the transformation Proposed Action. The Army will prepare a separate EIS for expansion and will initiate that NEPA review when a proposed action defining expansion is completed. Environmental review and possible future implementation of a potential expansion alternative may be a long-term process. Because of the numerous steps and approvals that are required to implement a major land acquisition, the action is still speculative even though an EIS is planned.

As the EIS that evaluates potential expansion is developed, the transformation activities at the PCMS will be evaluated as “other actions” in that EIS relevant to assessing cumulative impacts. Section 1.3.2 of this *PCMS Transformation FEIS* specifically acknowledges “this EIS may be used as a basis on which to tier subsequent environmental documentation for currently unforeseen future actions proposed in the mission.” The *PCMS Transformation FEIS* will be relied upon to provide impact analyses for the cumulative analysis in the separate expansion EIS because the *PCMS Transformation FEIS* provides analysis allowing for effective consideration of cumulative impacts as part of the expansion EIS.

3.13.2.2 Potential Future Stationing of Stryker Brigade at Fort Carson and Training at the PCMS

Fort Carson is being considered as one of five possible alternative locations for the future stationing of the SBCT. These various locations are being assessed in the *Draft Supplemental Environmental Impact Statement for the Permanent Stationing of the 5th Stryker Brigade Combat Team (SBCT)*. If the Army makes the decision in the ROD for that SEIS to station the SBCT at Fort Carson, the SBCT would train at the PCMS. It is unknown at this stage in the analysis whether Fort Carson is a likely or unlikely candidate for that SBCT or, if the SBCT did come to Fort Carson, that it would be an additional stationing action or if an existing BCT

stationed at Fort Carson would be sent elsewhere. Because of the lack of available information on such a possible future action, the SBCT stationing at Fort Carson is not considered a reasonably foreseeable action, and the cumulative impacts of the unknown Stryker location and PCMS transformation are not considered in this FEIS. If a decision is made to station the SBCT at Fort Carson, a site-specific analysis of the impacts of that stationing decision would be conducted at a future date, including an analysis of the training at the PCMS. The site-specific NEPA analysis for the SBCT stationing action(s) would consider the cumulative effects of the PCMS transformation action (as part of the baseline) in combination with the SBCT action(s).

3.13.2.3 Transformation Action at Fort Carson

The effects of transformation activities on the Fort Carson military installation are being addressed in the *Fort Carson Transformation EIS*. The proposed transformation of Fort Carson is an action that is currently being evaluated in accordance with NEPA and, therefore, is a reasonably foreseeable action by the Army. On the basis of the 150 mi distance of Fort Carson from the PCMS, the impacts of the Fort Carson transformation would not result in incremental impacts that would combine in space and time with the impacts of the PCMS transformation action, and no significantly cumulative impacts would result. In addition, the social, economic, and environmental resources affected by the Fort Carson transformation action are different from those affected by the PCMS transformation action.

3.14 Mitigation Summary

Adverse environmental impacts from the Proposed Action can be avoided or minimized by the following:

- Implementation of design features;
- Not training all military units to standard;
- Implementing BMPs;
- Using standard construction practices;
- Implementing measures described in this EIS;
- Adhering to existing management plans, programs, policies, and procedures; and
- Adhering to federal, state, and local regulations.

These measures are discussed in the individual resource area analyses throughout Section 3.0 and are summarized below in Table 3-24.

TABLE 3-24
Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
Land Use, Plans, and Policies		
Increased training could degrade training lands and affect the long-term availability of training lands for military use.	Same as the No Action alternative, but the magnitude would be greater because of increased frequency of training actions.	Continue the use of the Army's land management and environmental programs to provide for sustainable land management.
Increased training activities would reduce the availability of training areas for hunting.	Same as the No Action alternative.	No mitigation is required because other publicly accessible hunting grounds are available in southeast Colorado and

TABLE 3-24
 Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
Noise increases outside the installation boundaries from training activities could preclude locating residences or other sensitive receptors in these areas in the future.	Same as the No Action alternative.	additional methods can be used to maintain hunting as a viable management tool. Follow Army Regulation (AR) 200-1 and the <i>Installation Environmental Noise Management Plan</i> (USACE, 2006a) to monitor noise.
Air Quality		
Air emissions would be below established air quality thresholds. Current procedures for prescribed burning would continue to be implemented.	Increased training under the Proposed Action would increase convoy traffic on existing paved roads between Fort Carson and the PCMS. Potential impact to air quality from additional training activities would result from increased traffic on dirt roads and trails. Existing prescribed burning would continue.	No mitigation is required because emissions from the increase in training would not exceed threshold values. Prescribed burning would continue to follow Colorado Air Quality Control Commission's Regulation No. 9 and the annual prescribed burn plan.
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Construction activities could result in impacts to air quality because of wind-blown dust created by construction equipment, exhaust emissions from construction equipment, and the increased number of vehicle trips by construction workers.	Disturbed areas over 25 acres or areas that have been disturbed 6 months or longer are subject to site-specific state permits, which implement best management practices (BMPs). Visibility impacts from construction would not exceed thresholds.
Additional combustion equipment would be neither installed nor operated.	Operations emissions would be generated by using additional combustion equipment.	No mitigation is required because construction at the PCMS would not alter the PCMS' classification as a minor source. Operation of new stationary sources would not exceed regulatory thresholds; therefore, operation of the proposed facilities would not require permitting pursuant to prevention of significant deterioration regulations.
Noise		
Increased training would not result in a perceptible increase in noise from increased convoy traffic.	Increased convoy movements would not result in a perceptible increased traffic noise.	No mitigation is required because impacts would be imperceptible.
Increased training would result in a negligible increase in noise from increased training activities.	Training activity at the proposed hand grenade range could increase noise levels outside the installation.	No mitigation is required because no known noise-sensitive receptors (for example, residences, schools) are located in the noise-affected areas outside the PCMS boundaries (i.e., noise contours are well outside any residences).
Noise increases off post could discourage future development.	Same as the No Action alternative, but the magnitude could be greater because of increased frequency of training actions.	Follow AR 200-1 and the <i>Installation Environmental Noise Management Plan</i> to evaluate noise.
No increase in existing noise levels from construction.	Increase in noise levels from building construction and road maintenance would be temporary, and they would occur within the PCMS boundary.	No mitigation is required because noise associated with construction would not extend off site.

TABLE 3-24

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
Geology and Soils		
<p>Increased training under the No Action alternative could result in, direct impacts to soils, such as compaction resulting from repeated vehicle passes and bivouacking, ruts resulting from tank pivot turns (turns from a stopped position), hull and turret defilades, and tank traps. These impacts result in soils that are susceptible to erosion by water and wind.</p> <p>Training on wet soils could increase rutting.</p> <p>Increased wind and water erosion in areas where vegetative cover is compromised.</p>	<p>Same as the No Action alternative, but the magnitude could be greater because of increased frequency of training actions.</p> <p>Use of live hand grenades (only permitted on 150m x 150m [492 ft x 492 ft] hand grenade range) could cause localized soil disturbance that could increase erosion.</p>	<p>Continue to implement erosion control projects, BMPs, maneuver damage repair, and reclamation projects for areas damaged by training activities. If these programs are insufficient to mitigate adverse impacts, additional mitigation measures could be implemented.</p>
<p>Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.</p>	<p>Construction and demolition would temporarily increase the potential for erosion from ground disturbance.</p>	<p>Continue to implement existing programs and regulations to minimize the potential for soil erosion during construction and demolition activities.</p> <p>Minimize areas of disturbance during construction.</p> <p>Landscaping and reseeded upon construction would follow applicable standards for the Cantonment and the training areas.</p>
Water Resources		
<p>Increased erosion from increased training activities, including mechanized maneuvers, crossing dry drainages, and training in wet conditions, could result in increased erosion and subsequent sedimentation of surface waters.</p>	<p>Same as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p>	<p>Continue to implement erosion control projects, BMPs, maneuver damage repair, and reclamation projects for areas damaged by training activities. If these programs are insufficient to mitigate adverse impacts, additional mitigation measures could be implemented.</p>
<p>Increased use of fuels and solvents during training increases the chances for accidental spills and releases into the environment that could adversely affect surface water or groundwater resources.</p>	<p>Same as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p>	<p>Continue to implement all applicable hazards management plans and training to address leaks or spills of hazardous materials.</p>
<p>Personnel and equipment could be affected by floodwaters when training in flood-prone areas, especially during flash flooding.</p>	<p>Same as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p>	<p>Continue to implement training procedures that direct troops to relocate from flood-prone areas when conditions are favorable for sudden storms and flash flooding.</p>

TABLE 3-24
 Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Ground disturbance from construction and demolition activities could result in erosion or sediment transport to surface waters. Spills of fuels, solvents, or other hazardous materials used during construction could adversely affect water resources.	Continue to implement existing BMPs, follow permitting requirements, and adhere to the Directorate of Environmental Compliance and Management's water resources management program. Continue to implement all applicable hazards management plans to address leaks or spills of hazardous materials. Develop and implement a stormwater pollution prevention plan for each construction project larger than 1 acre to avoid or minimize the potential for impacts attributable to stormwater runoff during construction.
Construction of the Proposed Action facilities would not occur, therefore, no impacts would result.	Dewatering could be required during construction and could result in minimal impacts to surface waters.	Implement dewatering in accordance with the requirements of the Clean Water Act.
Construction of the Proposed Action facilities would not occur; therefore, no impacts would result.	Because floodplains have not been mapped for the PCMS, new facilities in the training areas could be located in areas subject to flooding conditions.	Locate new facilities in the training areas outside of known flood-prone areas, including areas immediately adjacent to arroyos.

Biological Resources

Soil compaction from mechanized vehicles and foot traffic, and damage from ammunition impacts related to small-arms firing could result in soil and vegetation disturbances; disturbance to migratory birds, raptors, or other wildlife, and their habitats; and a potential increase in noxious weed infestations.	For training, impacts to vegetation, wildlife, and sensitive species would be similar to the No Action alternative, but the magnitude of impacts could be greater because of increased training frequency.	Continue prescribed burning to create buffer areas to provide additional protection from wildfires. Continue weed prevention and control. Avoid nesting birds by restricting mowing of road shoulders and prescribed burns to the extent possible during the nesting season. Continue surveys of power lines to minimize bird electrocutions and other infrastructure for potential structural failures that may harm birds, and make necessary repairs efficiently. Continue practice of identifying golden eagle nest sites annually, establishing 1,640-foot (500-meter) buffers around each nest site, and restricting training in buffer zones from April through June.
Accidental wildfires could result from mechanized and live-fire military training.		
Dismounted military training could flush or startle small mammals, ground nesting birds, and reptiles.		

TABLE 3-24

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
The Proposed Action construction would not occur, therefore, no impacts to biological resources would occur.	For construction, activities in the Cantonment and training areas would cause temporary ground disturbance and result in permanent loss of small areas of native vegetation.	Areas of vegetation disturbed by construction activities would be reclaimed and revegetated with native or other suitable vegetation, as appropriate.
Cultural Resources		
Construction of the Proposed Action facilities would not occur, and no impacts would result.	Construction activity in the Cantonment would have no effect on known cultural or prehistoric resources.	No mitigation required for use of areas inventoried for cultural resources that contain no National Register-eligible historic properties.
	Construction activity in the training areas that have not been surveyed could adversely affect cultural resources.	Any activities with the potential to adversely affect cultural resources will be evaluated and resolved under the Section 106 effect determination and mitigation processes.
All training activities could result in adverse impacts to cultural resources. The extent of the impact is contingent on two factors, the type of training and the landform on which the training will take place.	For training, same as the No Action alternative but potential for impacts could be greater because of increased frequency of training activities.	Areas that contain known National Register-eligible historic properties or that have not yet been surveyed will be used for dismantled training only until the proposed use area has been evaluated to determine that cultural resources can be protected against adverse impacts. If impacts cannot be avoided, further consultation with the Colorado State Historic Preservation Office, Advisory Council on Historic Preservation, and/or Native American Tribes, if applicable, regarding mitigation would occur prior to ground-disturbing activities.
Potential for inadvertent impact to previously unidentified cultural materials and/or human remains uncovered in the course of training or construction activities.	Same as the No Action alternative but potential could be greater because of increased frequency of training activities.	The "Inadvertent Discovery of Archaeological Resources or Burials" standard operating procedure (SOP) and "Native American Graves Protection and Repatriation Act" SOP will be applied and enforced.
Socioeconomics		
No change to socioeconomic conditions.	No change to socioeconomic conditions as a result of increased training activities or operations.	No mitigation is required because socioeconomic conditions would not change.
The Proposed Action construction activity would not occur.	Temporary economic benefits to the region of influence associated with construction expenditures and employment. Temporary influx of construction workers from outside the region of influence.	No mitigation is required because socioeconomic impacts would be beneficial.
No adverse impacts to low-income and minority communities.	No adverse impacts to low-income and minority communities.	No mitigation is required because socioeconomic conditions would not change.

TABLE 3-24
 Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
Transportation		
<p>Increased traffic on regional roadways from training deployments to the PCMS.</p> <p>Impacts to regional traffic or rail transportation would be negligible.</p> <p>No impacts to aviation would occur.</p>	<p>Increased traffic on regional roadways from training deployments to the PCMS. Some of the increased traffic would be on regional roadways operating at or near capacity.</p> <p>No impacts to aviation would occur.</p>	<p>Schedule all PCMS-related traffic movements to occur during off-peak periods on roadways operating near capacity.</p> <p>Stagger convoy vehicles into groups of no more than 24 vehicles each, spaced at least 15 minutes apart.</p> <p>Schedule all roadway and rail convoy movements through the Installation Transportation Officer at least 60 days in advance of the training rotation.</p> <p>Coordinate with state and federal officials for the addition of passing lanes on U.S. 160 and U.S. 350 as recommended in the <i>2006 PCMS Traffic Study</i>.</p>
<p>Minor additional use of the rail line connecting Fort Carson and the PCMS.</p>	<p>Increased frequency of rail shipments of up to 100 days per year.</p>	<p>All rail shipments would be scheduled through the Installation Transportation Officer at least 60 days in advance of the training rotation to allow adequate coordination with the rail lines.</p>
<p>The Proposed Action construction activity would not occur and no impacts would result.</p>	<p>Temporary increase in traffic from construction. Temporary road closures on the PCMS could occur.</p>	<p>Schedule construction activities so that they would not interfere with training. Use traffic control procedures, such as detours, when appropriate.</p>
Utilities		
<p>Increased training activities could result in an increase in potable water demand above the current system design for 5,000 personnel per day.</p>	<p>Similar training impacts as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p>	<p>Truck additional potable water to the PCMS if more than 5,000 personnel are present in the Cantonment and training areas.</p>
<p>Deteriorated water supply and distribution lines could result in adverse effects to water supply.</p>	<p>Repair and upgrade of the distribution pipeline system would result in beneficial effect to the potable water system.</p>	<p>Implement planned upgrades of water lines.</p>
<p>Increased training activities could result in increased generation of wastewater that could exceed the capacity of existing septic systems.</p>	<p>Similar training impacts as the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p> <p>Includes installation of new sewer mains to provide sufficient collection capacity for increased wastewater and storm water volume.</p>	<p>Arrange for septic systems to be serviced at a greater frequency and contract for additional portable toilets.</p> <p>No mitigation is required because the recently completed treatment/oxidation pond upgrade provides sufficient wastewater treatment capacity.</p>

TABLE 3-24

Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
Increased frequency of training would result in increased power demand.	Increased frequency of training would result in increased power and gas demand. Similar training impacts as the No Action alternative, but the magnitude could be greater because of increased frequency of training actions.	No mitigation is required because electricity demand on the Cantonment would be met by the available electrical supply; demand in the training areas would be met with continued use of batteries and portable generators. Installation of power distribution lines under the Proposed Action to provide electricity to training facilities located on the west side of the training areas and installation of natural gas lines, new electrical distribution, and transformer upgrade for the Cantonment to support increased demand for energy.
Increased training could increase the quantity of heating oil and propane used.	Similar training impacts as the No Action alternative, but magnitude could be greater because of increased frequency of training actions.	Available supply of heating oil or propane is adequate to meet increased demand. No mitigation is required.
Existing training communication needs would continue to be unmet.	Installation of communication facilities would result in an improved communication system for training activities. Because the PCMS would have an improved ability to carry out its training mission, this would be a beneficial effect.	No mitigation is required because the impacts to the communication system at the PCMS would be beneficial.
Increased training could increase solid waste generation at the Cantonment and the training areas.	Similar training impacts as the No Action alternative, but magnitude could be greater because of increased frequency of training actions.	Continue to implement appropriate policies and practices in the existing <i>Integrated Solid Waste Management Plan</i> to address increased solid waste generation.
The Proposed Action construction activity would not occur, and no impacts would result.	Impacts could occur to underground utilities at unknown locations during ground-disturbing activities associated with construction.	Implement standard engineering practices to locate utilities precisely prior to construction to avoid inadvertent utility damage.
Hazardous and Toxic Substances		
A hazardous waste management plan (HWMP) has not been required for the PCMS. Increased training activities would result in an increase in the use of hazardous materials associated with routine vehicle and equipment maintenance, specifically fuels, batteries, lubricants, and pesticides.	Similar types of training impacts as with the No Action alternative, but magnitude could be greater because of increased frequency of training actions and the addition of facilities (for example, vehicle maintenance and hazardous material pharmacy).	Document the PCMS as a Conditionally Exempt Small Quantity Generator under the Resource Conservation and Recovery Act (RCRA). Prepare and implement a HWMP for hazardous waste potentially generated at PCMS. Continue to implement the <i>Integrated Pest Management Plan</i> for transporting, storing, and handling additional pesticides. Wastes would continue to be properly disposed of at an off-post, permitted hazardous waste facility.

TABLE 3-24
 Summary of Environmental Impacts and Mitigation Measures
PCMS Transformation EIS, PCMS, Colorado

Impacts of No Action Alternatives	Impacts of Proposed Action	Standard Practice/Mitigation
<p>An SPCC plan has not been developed for the PCMS.</p> <p>Increased training would result in an increase in the use of munitions at the ranges.</p> <p>Increased training could result in an increase of lead wastes at the small-arms live-fire ranges.</p> <p>There is the potential that lead-contaminated soils would need to be remediated in the future.</p>	<p>An SPCC plan has not been developed for the PCMS.</p> <p>Similar types of training impacts as with the No Action alternative, but the magnitude could be greater because of the increased frequency of training actions.</p> <p>Additionally, live grenades could be used on the proposed hand grenade range.</p>	<p>Prepare and implement an SPCC plan to prevent oil and petroleum spills in compliance with 40 CFR 112.</p> <p>Continue to implement the "Ammunition Supply Point" SOP for storage and transportation of additional munitions and targets.</p> <p>Detonate all live grenades prior to leaving the proposed hand grenade range.</p> <p>Remediate lead-contaminated soils to mitigate effects to human health and the environment.</p>
<p>The Proposed Action construction activities would not occur and no impacts would result.</p>	<p>Implementation would result in an increase in the use of petroleum-based products.</p> <p>Increased generation of medical waste from one new medical facility and storage of hazardous materials at one new hazardous materials pharmacy.</p>	<p>Continue to implement the <i>Underground Storage Tanks and Aboveground Storage Tanks</i>, and FC 200-1 for accidental leaks and the storage of additional petroleum products.</p> <p>Document the PCMS as a Conditionally Exempt Small Quantity Generator under the RCRA.</p> <p>Prepare and implement a HWMP for hazardous waste potentially generated at the PCMS.</p> <p>Wastes would continue to be properly disposed of at an off-post, permitted hazardous waste facility.</p>
<p>Due to the increased numbers of Soldiers training at the PCMS, additional medical waste could be generated.</p>	<p>Similar types of training impacts as with the No Action alternative, but the magnitude would be greater because of the increased frequency of training actions.</p>	<p>Continue to implement the Evans Army Community Hospital Hazardous Material/Hazardous Waste Management Program and Fort Carson Management of Regulated Medical Waste to address any medical waste generated.</p>

3.15 Unavoidable Adverse Environmental Impacts

Most potential adverse impacts identified in this EIS either would be negligible, less than established standards, or could be avoided through adherence to BMPs and existing Army regulations during construction and the conduct of training exercises. Some unavoidable adverse impacts, however, could result from implementation of the Proposed Action. These impacts are described in this section and detailed in Table ES-1 in the Executive Summary and Table 3-24.

- The opportunity for hunting at the PCMS would be reduced because additional training would limit existing recreational hunting. Other publicly accessible hunting areas are, however, available in southeastern Colorado.

- Facility construction activities, including land clearing and moving of personnel and equipment in the construction staging area(s), would disturb as much as 25 acres. In the cantonment area, vegetated areas would be permanently converted to impervious surface, and stormwater runoff would increase.
- Nearly all of the vegetative areas and terrestrial habitats on the PCMS could be disturbed during training exercises. The disturbance would be more substantial in the maneuver training areas, which comprise approximately 184,000 acres at the PCMS. The Garrison Commander has the authority to modify the training schedule and would adjust training with input from ITAM and DECAM as training approaches its sustainable threshold. Because training exercises vary and cannot be projected precisely, this EIS assumes that the entire area could be disturbed. Most disturbed areas would be repaired. The repairs, which are implemented under the ITAM program and the installation Watershed Management Team, may include projects such as hardened stream crossings and erosion control dams that also would affect wildlife habitat. In addition, existing BMPs and management plans are designed to avoid or minimize such impacts (see Section 3.7).
- Wildlife would be affected by loss of habitat, increased human and vehicular activity in the training areas, increased traffic throughout the maneuver training areas, and noise. Less mobile and burrowing species (for example, amphibians, some reptiles, small mammals, and young animals that are confined to nests or dens) could be killed during training exercises directly from vehicle collisions, from vegetation clearing, or from site preparation activities for construction. Existing BMPs and management plans discussed in Section 3.7 are designed to avoid or minimize such potential impacts.
- Increased training activities have the potential to affect previously unidentified archaeological and paleontological resources. Monitoring during training exercises would further reduce the potential to adversely affect cultural materials, and the PCMS would continue to implement its "Inadvertent Discovery of Archaeological Resources" SOP to minimize adverse effects to historic properties. The potential for adverse impacts to paleontological resources is low because most training exercises would occur in locations where these resources are not known or likely to exist.
- Air quality would be affected during construction and increased training activities as a result of increased stationary source and off-road vehicle emissions. When added to background air concentrations, however, the concentration levels of these pollutants would be below the applicable have not been found.
- Movement of tracked and wheeled vehicles, digging to support engineering or concealment activities, and use of land for bivouac sites adversely affect soils and make them more prone to wind and water erosion. Although the ITAM program is in place to identify and fund the repair of maneuver damage, increased use of the land for training could result in some unavoidable damage to the training lands.

3.16 Irreversible or Irretrievable Commitment of Resources

Irreversible or irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources would have on future generations.

Irreversible effects primarily result from the use or destruction of a specific resource (for example, energy from hydrocarbons and minerals) that cannot be replaced within a reasonable period of time. Irretrievable resource commitments involve the loss in value of an affected resource (for example, extinction of threatened or endangered species).

Land and natural resources (for example, flora, fauna, water) would be used by the Army with a short-term goal of sustainable land use and a long-term goal of avoidance of irreversibility. Although natural resources would be affected during construction and training activities, the irreversible or irretrievable loss of common, widely distributed resources is not anticipated. Where natural resources, such as sensitive plant or animal species are present in limited numbers or occur in specialized habitats, however, it is possible that they could be eliminated from the PCMS, and their loss would be irreversible or irretrievable.

The PCMS contains numerous important cultural resources throughout its training lands. Known resources are protected and would be unlikely to be harmed during training; however, inadvertent harm to previously undiscovered resources could occur. Monitoring programs reduce this risk, but any loss of important cultural resources would be irreversible. All known cultural resources exist outside the proposed construction area; therefore, no loss of cultural resources would be expected as a result of construction activities.

The increased training and operations would temporarily require increases in use of electricity, hydrocarbon fuels, and water. Construction of facilities would require the use of construction materials, such as concrete and steel; although the materials could be recycled, some permanent loss of energy would be expected in the manufacture and recycling processes.

3.17 Short-Term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

The implementation of design features; BMPs; standard construction practices; other measures described in this EIS; adherence to existing management plans and programs; and federal, state, and local regulations that would be incorporated into the Army's Proposed Action is aimed at the sustainability of the PCMS mission. Sustaining the mission and function of the installation would enhance the long-term productivity of the PCMS as a military training facility. With increased training activity, short-term uses of the environment would become more frequent and intensive. However, the Army's need to maintain the long-term productivity of its training lands for continued military use also provides protection to land-based resources such as soils, water, vegetation, and wildlife. Additionally, Army regulations protect sensitive environmental resources such as cultural resources, wetlands, and floodplains from avoidable damage.

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Notes:

GIS = Geographic Information System

IMA NWRO = Installation Management Agency, Northwest Region

8.0 Acronyms and Abbreviations

°F	Fahrenheit
µg/m ³	micrograms per cubic meter
2-2 ID	2nd Brigade Combat Team, 2nd Infantry Division
3-4 ID	3rd Brigade Combat Team 4th Infantry Division
3rd ACR	3rd Armored Cavalry Regiment
10 SFG	10th Special Forces Group
43 ASG	43rd Area Support Group
AC	Active Component
ADNL	A-weighted day-night noise level
ADT	average daily traffic
AMF	Army Modular Force
APCD	Air Pollution Control Division
AQCC	Air Quality Control Commission
AQRV	air quality related value
AR	Army Regulation
AST	aboveground storage tank(s)
Army	U.S. Army
BCT	Brigade Combat Team
BMP	best management practice
BRAC	Base Realignment and Closure
CA	Comprehensive Agreement
CAA	Clean Air Act
CAL	combat assault landing strip
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality

CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	Colorado Geological Survey
CIG	Colorado Interstate Gas
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
dB	decibel
dba	decibels (acoustic)
DECAM	Directorate of Environmental Compliance and Management
DEIS	Draft Environmental Impact Statement
DoD	Department of Defense
DPW	Directorate of Public Works
DPTM	Directorate of Plans, Training, and Mobilization
EACH	Evans Army Community Hospital
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FORSCOM	U.S. Army Forces Command
FY	fiscal year
G-3	Operations, Planning and Training
GIS	Geographical Information System
HBCT	Heavy Brigade Combat Team
HQ	headquarters
HQDA	Headquarters Department of the Army
HWMP	hazardous waste management plan
I-25	Interstate 25
IBCT	Infantry Brigade Combat Team

ICRMP	Integrated Cultural Resources Management Plan
IGPBS	Integrated Global Presence and Basing Strategy
INRMP	Integrated Natural Resource Management Plan
ISCST3	Industrial Source Complex Short Term Model
ITAM	Integrated Training Area Management
km	kilometers
KvA	kilovolt ampere
LUPZ	Land Use Planning Zone
MDC	maneuver damage control
mg/L	milligrams per liter
mi	mile(s)
MILES	Multiple Integrated Laser Engagement System
mm	millimeter
mph	miles per hour
msl	mean sea level
MSR	military supply route
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NOA	Notice of Availability
NOE	nap of the earth
NO _x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTC	National Training Center
NZ	Noise Zone

OSD	Office of Secretary of Defense
P2	Pollution Prevention (Plan)
PCMS	Pinon Canyon Maneuver Site
PM	particulate matter
ppm	parts per million
PSD	prevention of significant deterioration
PTE	potential to emit
RC	Reserve Component
REC	Record of Environmental Consideration
ROD	Record of Decision
ROI	region of influence
RTV	rational threshold value
SAR	Species at Risk
SBCT	Stryker Brigade Combat Team
SEIS	Supplemental Environmental Impact Statement
SFG	Special Forces Group
SH	State Highway
SHPO	State Historic Preservation Office
SIL	significant impact level
SO ₂	sulfur dioxide
SOP	standard operating procedure
SPCC	Spill Prevention, Control and Countermeasures
SUAS	Small Unmanned Aerial System
SWPPP	Stormwater Pollution Prevention Plan
TC	Training Circular
TCP	traditional cultural property
TMDL	total maximum daily load
TOW	Tube-launched, optically tracked, wire-guided
tpy	tons per year
TUA	Tactical Unmanned Aerial System

U.S. 160	U.S. Highway 160
U.S. 350	U.S. Highway 350
UAS	Unmanned Aerial Systems
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USD (AT&L)	Under Secretary of Defense (Acquisition, Technology and Logistics)
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank(s)
VISCREEN	Visibility Screening Model
VOC	volatile organic compound
WQCC	Water Quality Control Commission

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APPENDIX A

Fort Carson Regulations and Management Plans Relevant to the PCMS

Fort Carson Regulations and Management Plans Relevant to the PCMS

Fort Carson and the Pinon Canyon Maneuver Site (PCMS) operate under several management plans that are specific to the installations, which provide guidance on operations, construction and demolition activities, waste management, the environment, and installation resources. Many of the management plans pertinent to the Proposed Action are required by Army Regulation 200-1, Environmental Quality: Environmental Protection and Enhancement. Regulations and management plans pertinent to the Proposed Action are discussed below.

1.0 Regulations and Policies

Fort Carson Regulation 200-1, Environmental Quality: Environmental Protection and Enhancement (December 1999)

This regulation prescribes policies and procedures, and assigns responsibilities for the conservation, protection, and enhancement of the environment at Fort Carson, the PCMS, and supported facilities. The regulation provides an overview of the Fort Carson Environmental Program and discusses specific management policies relating to water resources, air quality, solid waste management, hazardous and toxic materials, noise pollution, historic preservation, natural resources, energy conservation, and other environmental resources.

Fort Carson Regulation 350-4, Training: Pinon Canyon Maneuver Site (January 2004)

This regulation prescribes procedures and responsibilities used to support training activities at the PCMS. Information includes scheduling, logistics, and environmental management of training rotations at the PCMS.

Fort Carson Regulation 350-9, Training: Integrated Training Area Management (ITAM) (August 2001)

This regulation prescribes responsibilities, management requirements, and general guidance to implement Fort Carson's Integrated Training Area Management (ITAM) program. The ITAM program focuses on aligning training activities with sustainable land management methods.

Fort Carson Regulation 350-10, Training: Maneuver Damage Control (MDC) Program (May 2004)

This regulation assists commanders in evaluating the value of training against the cost and possible environmental effects of maneuver damage by providing information on maneuver damage control. The regulation provides guidance on education and prevention of maneuver damage; reporting, correction, and repair of damage; consideration of inclement weather training issues; and areas of training restrictions.

Fort Carson Regulation 385-63, Firing Ammunition for Training, Target Practice, Administration and Control of Ranges and Training Areas (2006)

This regulation prescribes Fort Carson range operating procedures, safety policies and responsibilities for firing ammunition, lasers, guided missiles, rockets, and usage of the military training areas of Fort Carson and the PCMS.

Fort Carson Regulation 200-6, Wildlife Management (December 1999)

This regulation governs hunting and fishing on the PCMS. Colorado Division of Wildlife state regulations (and associated permits and fees) also apply to hunting and fishing privileges at the PCMS.

Army Regulation 420-90, Fire and Emergency Services (April 2005)

This regulation prescribes Army policies and responsibilities covering all fire fighting (for example, structural, aircraft, and wildland), emergency dispatching services, by civilians or military, fire prevention (including technical services), hazardous materials (HAZMAT); Chemical, Biological, Radiological, Nuclear and High-yield Explosives (CBRNE) response, Weapons of Mass Destruction (WMD); Global War on Terrorism (GWOT); emergency medical services (EMS); rescue services, disaster preparedness, and ancillary services.

Army Regulation 200-3, Land, Forest, and Wildlife Management (March 2000)

This regulation sets forth policy, procedures, and responsibilities for the conservation, management, and restoration of land and the natural resources thereon consistent with the military mission and in consonance with national policies. The scope includes the conservation, management, and utilization of the soils, vegetation, water resources, croplands, rangelands, forests, and fish and wildlife species.

Army Regulation 200-4, Cultural Resources Management (October 1998)

This regulation prescribes Army policies, procedures, and responsibilities for meeting cultural resources compliance and management requirements. The scope of this regulation includes the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act (AIRFA), Executive Order (EO) 13007, Native American Graves Protection and Repatriation Act (NAGPRA), Archeological Resources Protection Act (ARPA), 36 CFR 79, and other requirements and policies affecting cultural resources management. These policies are designed to ensure that Army installations make informed decisions regarding the cultural resources under their control in compliance with public laws, in support of the military mission, and consistent with sound principles of cultural resource management.

Army Regulation 200-1, Environmental Quality: Environmental Protection and Enhancement (February 1997)

This regulation covers environmental protection and enhancement. The regulation provides an overview of the Army Environmental Program and discusses specific management policies relating to water resources, air quality, solid waste management, hazardous and toxic materials, noise pollution, historic preservation, natural resources, energy conservation, and other environmental resources.

Army Regulation 350-19, The Army Sustainable Range Program (August 2005)

This regulation assigns responsibilities and provides policy and guidance for managing and operating Army ranges and training lands to support their long-term viability and utility to meet the national defense mission; planning, programming, funding, and executing the core programs comprising the Army's Sustainable Range Program, the Range and Training Land Program, and the Integrated Training Area Management Program; integrating program functions to support sustainable ranges; assessing range sustainability; and managing the automated and manual systems that support sustainable ranges.

2.0 Management Plans

2.1 Plans Pertaining to Construction and Demolition

Fort Carson Asbestos Management Plan (November 2004)

The Fort Carson Asbestos Management Plan sets forth activities and procedures designed to minimize exposure to airborne asbestos fibers, particularly in regards to renovation, demolition, and maintenance activities. The plan focuses on workers and outside contractors who perform building renovation and maintenance, with the objective of protecting these workers as well as the premises and other occupants of the premises. This plan provides procedures to be followed when asbestos fibers are accidentally released. Specific work plans for asbestos abatement must be approved by the appropriate Fort Carson personnel and, in some cases, by regulatory agencies.

Fort Carson Fugitive Dust Control Plan (June 2004)

The Fort Carson Fugitive Dust Control Plan lists recommended measures to control fugitive dust resulting from construction, land development activities, and from demolition, dismantling, and renovation activities.

2.2 Plans Pertaining to Operations

Fort Carson Integrated Natural Resources Management Plan (2002)

The Fort Carson Integrated Natural Resources Management Plan is a guide for the management of natural resources at Fort Carson and the PCMS. Objectives of this plan are to manage natural resources on the installation and ensure environmental stewardship of public lands entrusted to the care of the Army, ensure compliance with relevant laws and regulations, and integrate resource management. This plan includes general policies

regarding the conservation and protection of existing resources and the management of land resources in support of the military mission.

The plan provides for an inventory and description of the natural resource base at Fort Carson, including land management units, hunting areas, bivouac and training areas, and physiographic and land management zones. Natural Resource Management Program objectives and implementing management and monitoring programs are discussed for flora, fauna, threatened and endangered species, sensitive habitats, and related resources. An important element within this plan is a program for the monitoring, conservation, and protection of land resources to support the military training mission at Fort Carson and the PCMS on a sustained basis. Included within the Land Management Program are training area conservation programs, such as the Integrated Training Area Management Program, soil and watershed management, rangeland management, prescribed burning/wildfire control programs, and a Landscape Management Program.

Fort Carson Integrated Cultural Resources Management Plan (ICRMP) (2002)

The ICRMP provides guidance and procedures for the identification, evaluation, and protection of cultural resources while causing the least disturbance to the military mission. The plan details preservation and mitigation plans for specific archaeological and historic architectural resources at Fort Carson and the PCMS. The plan also defines ongoing processes for identifying and evaluating cultural resources on the installations and describes specific projects for cultural resources management.

Master Planning Strategy, Smart Growth Principles (May 2005).

The Master Planning Strategy Smart Growth Principles outlines the ten principles to evaluate facility siting layouts and infrastructure development decisions at Fort Carson. The principles assist decisionmakers in understanding the various positive and negative impacts on future facility opportunities.

The ten smart growth principles include the following: (1) promote military cohesiveness and efficiency in training; (2) minimize development of open spaces; (3) improve walkability of installation neighborhoods; (4) site facilities to promote mass transit opportunities; (5) site facilities based on analysis of interrelationships among users of adjacent facilities; (6) create high-density, mixed-use areas; (7) site facilities to leverage existing utility infrastructure and future renewable energy opportunities; (8) low-impact development; (9) encourage stakeholder collaboration in development decisions; and (10) use full-life cycle cost analysis instead of first cost criteria in making development decisions.

Guidance on implementation of each principle and associated criteria to guide facility siting each project is described in the plan.

NOTE: This plan is applied at PCMS as is reasonable and applicable.

Fort Carson Pollution Prevention Plan (November 2004)

The Fort Carson Pollution Prevention Plan (P2) provides a comprehensive approach to waste and resource management that seeks to reduce the impact that an operation or activity has on the environment by reducing or eliminating the production of wastes, by using energy and raw materials more efficiently, and by promoting sustainable practices.

The plan provides recommendations for green procurement, sustainable construction practices, a centralized hazardous materials control center, best management practices for vehicle maintenance, energy conservation, and materials substitutions, among others.

Fort Carson and PCMS Record of Environmental Consideration for Prescribed Burning (March 2006)

The proposed action is to conduct prescribed fire activities at Fort Carson and at the PCMS during Spring and Fall 2006 to reduce fuel loading, improve habitat, and prevent the escape of wildfires from the installation boundaries. The Record of Environmental Consideration determined that the proposed action is adequately covered in existing Environmental Assessments: Integrated Natural Resources Management Plan, 2002-2006, and Construction of a Firebreak at the PCMS, Colorado, 29 August 2002. The proposed action qualifies for Categorical Exclusion No. d(4), Appendix B, to Part 651, 29 March 2002 Federal Register, Final Rule on AR 200-2, and no extraordinary circumstances exist as defined in Subpart D, Section 651.29. The proposed action also requires Mitigative Measures, Requirements, and/or Conditions.

Fort Carson and PCMS Planning Document for Open Burning, Prescribed Fire and Permitting (March 2003)

The planning document is submitted to meet the requirements of the Colorado Air Quality Control Commission Regulation No. 9 (Open Burning, Prescribed Fire and Permitting). Pursuant to that regulation, the document summarizes Fort Carson's use of prescribed fire as a land management tool and its integrated planning process related to fuel management.

Fort Carson and PCMS Clean Air Act Preparedness and Prevention Best Management Practices (November 2005)

The Best Management Practices described in the document address the requirements of the General Duty Clause (GDC) of the Clean Air Act Prevention of Accidental Releases, Section 112(r)(1), as they relate to Fort Carson and PCMS. Per the regulation, owners and operators of stationary sources are required to produce risk management plans that identify on-site hazards and describe the appropriate steps used to prevent and minimize the effects of an accidental release involving an extremely hazardous substance. The document evaluates release scenarios, and discusses standards and practices that Fort Carson uses to minimize the potential for chemical releases, which satisfy the requirements of the GDC.

Fort Carson Fire and Emergency Services Prescribed Fire Plan (2006)

The document contains the descriptions and plans for the prescribed burning of the four Prescribed Fire Permit Areas of Fort Carson and PCMS recommended by the Colorado Department of Public Health and Environment. The primary purpose of these prescribed fire projects is to facilitate military personnel with planned training opportunities, while reducing the possibility of an uncontrolled wildland fire escaping the Installations' boundaries.

Fort Carson PCB Management Plan (November 2004)

The primary purpose of the Fort Carson (PCB) Management Plan is to provide handling and control procedures for polychlorinated biphenyls (PCBs) and a contingency plan for PCB spills. The plan includes the following requirements:

- During inspections, all transformers and light ballast fixtures are assumed to contain PCB waste unless otherwise marked;
- All personnel handling PCB waste will wear the proper personal protective equipment and comply with the Fort Carson Health and Safety Plan;
- PCB waste is properly packaged, labeled, weighed, catalogued, and stored within a hazardous waste storage facility under the supervision of DECAM;
- Material safety data sheets are prepared and laboratory samples are analyzed (if the contents are unknown or mixed) to ensure that safe handling procedures and accurate waste classification are met; and
- All containers holding PCB must be in good condition and checked for leaks every 30 days.

Fort Carson Radon Management Plan (November 2004)

The Fort Carson Radon Management Plan documents results of surveys at Fort Carson and the PCMS to determine the extent of radon exposure in buildings on the installations. The plan identifies survey locations with high potential for mitigation and recommends time frames for retesting or mitigation at these sites.

Installation Pest Management Plan (2001)

The Installation Pest Management Plan describes Fort Carson pest management requirements and describes the administrative, safety, and environmental requirements for surveillance and control of pests. The Pest Management Program utilizes Department of Defense-certified pest control personnel to control pests. Principles of Integrated Pest Management practices are stressed in the plan, which consists of judicious use of both chemical and non-chemical control techniques to achieve effective pest control with minimal environmental contamination.

Army Regulation 200-1, Chapter 13, Underground Storage Tanks (USTs) and Aboveground Storage Tanks (ASTs) (November 2004)

The UST and AST chapter includes information on the storage of petroleum products and used oil practices implemented to minimize the risk of storage and potential spills into the environment. The report outlines the responsibilities of personnel involved with USTs and ASTs; the procedures involved in materials storage; UST and AST operations, maintenance, and record keeping requirements; and troubleshooting of facility repairs.

Ammunition Supply Point Standard Operating Procedure (January 2006)

This manual prescribes basic ammunition management procedures pertinent to ammunition and explosive support.

2.3 Plans Pertaining to Waste Management

Fort Carson Installation Recycling Plan (November 2004)

The Fort Carson Installation Recycling Plan sets forth the components of the Qualified Recycling Program that the installation is required to follow to meet federal, state, and Army regulations pertaining to recycling and environmental management. The plan provides direction on collecting and segregating waste materials intended for recycling and reuse. Recycling efforts are required for construction and demolition activities.

Integrated Solid Waste Management Plan (November 2004)

The Integrated Solid Waste Management Plan describes the waste management program, procedures, and requirements for solid waste generated at Fort Carson. The plan identifies various types of wastes being generated and their current disposition. It also identifies source reduction and pollution prevention programs and projects implemented at Fort Carson. The plan provides guidelines for construction and demolition waste management and requires construction and demolition waste management plans for different types of waste.

2.4 Plans Pertaining to Erosion Management

Reclamation Planning (2002)

Reclamation planning sustains training resources and offsets adverse effects associated with military training on soils by identifying improvements needed to reclaim rested areas and includes planning for the duration of rested and deferred areas. Reclamation planning includes identifying locations and justification for erosion control structures, check dams, and road and trail reclamation; reseeding disturbed areas; cost-benefit analysis; and project evaluations and monitoring data.

3.0 Permits

Fort Carson obtains project-specific permits for various operations and construction. Some operational permits are applicable to general operations at the installation and are described below.

Clean Water Act Section 404 Regional Permit No. 2002-00707 (December 2002)

This regional permit authorizes Fort Carson to conduct erosion control activities onpost and at the PCMS that may result in minimal individual and cumulative impacts to wetlands from dredge and fill activities. Typical erosion control measures include erosion control impoundments, stock watering impoundments, banksloping of erosion courses, check dams, rock armor, hardened crossings, culverts, bridges, erosion control terraces, water diversions, water turnouts, and other erosion control activities approved by the U.S. Army Corps of Engineer.

State of Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division – Construction Permit (April 2000)

The construction permit granted by the CDPHE allows for the use of smoke munitions and the generation of obscurant smoke in conjunction with the training of military personnel at the PCMS. All participants in the training must follow applicable training manuals and guidance regarding fog oil and other military smokes and obscurant. The permit mandates a smoke buffer that is entirely contained within the PCMS and limits the amounts of smoke munitions used and obscurant smoke that may be generated within a given time period. The Commander in charge of any training is responsible for ensuring that no drift of smoke from fog oil generation or other obscurant use occurs across the PCMS boundary.

APPENDIX B

Construction Projects at the PCMS

Appendix B
List of Proposed Projects at the PCMS

Project Name	Project Number	Location	Brief Scope Description	Building Area (SF)	Paved Area (SF)	Construction Disturbance (SF)	Addition to Existing Facility?	Demolition (SF)	Air Permit?	Construction Start	Construction End	Notes
Cantonment												
Infrastructure Upgrades	63719	Cantonment	Includes natural gas supply, potable water distribution system, sanitary sewer collection system, 6.3 miles of security fencing, five access control points.	0	0		YES	NO		Mar-08	Mar-09	
Medevac Helipad and Medical/Dental Clinic	63720	Cantonment	Medical and dental health clinic with examination and treatment rooms, pharmacy, medical lab, radiology, administrative support office, storage. Medevac helipad will also be constructed.	12,112	5,600	560	NO	NO		Mar-08	Mar-09	
Brigade Support Complex	63721	Cantonment	Includes 16 billeting facilities, 2 dining facilities, 2 double Battalion Headquarters facilities, and 1 Brigade Headquarters facility, outdoor recreation facilities	685,898	0	0	NO	NO		Mar-08	Mar-09	All roads, parking, and walks are permeable surface (gravel).
Expansion of Logistics Storage		Cantonment	Co-located storage buildings will increase by 9,000 sf (to a total of 12,000 sf)				YES	NO				Class I through IV co-located storage buildings.

Project Name	Project Number	Location	Brief Scope Description	Building Area (SF)	Paved Area (SF)	Construction Disturbance (SF)	Addition to Existing Facility?	Demolition (SF)	Air Permit?	Construction Start	Construction End	Notes
Hazardous Materials Pharmacy		Cantonment	Co-located w/Logistics storage				YES	NO				
After Action Review Facility	59660	Cantonment	Building with offices and classroom type of facilities	60 ft x 120 ft	0	60 ft x 120 ft (gravel)	NO	NO		Mar-07	Mar-08	
Concrete Pads for Command and Control Training Vehicles		Cantonment				9,000	NO	NO				
Clamshell Buildings	2006-089b-4283	Cantonment	Two 175 ft x 100 ft sprung shelters		No paving		NO	NO				Self-help project.
Steel Buildings	2006-088b-4283	Cantonment	Two 200 ft x 30 ft steel buildings		No paving		NO	NO				Self-help project. Located within Brigade Support Complex.
MILES Warehouse		Cantonment		5,000			NO	NO				Noted as Equipment Storage Warehouse at public scoping meeting.

Project Name	Project Number	Location	Brief Scope Description	Building Area (SF)	Paved Area (SF)	Construction Disturbance (SF)	Addition to Existing Facility?	Demolition (SF)	Air Permit?	Construction Start	Construction End	Notes
Railroad Logistics Transportation Facility		Cantonment	Rail yard facility	4,000								
Vehicle Maintenance Shop		Cantonment	Equipment support facility	84,000								
Motor Pools (3)	65617	Cantonment	Construct three motor pools to support vehicle storage and light maintenance; covered area on gravel; units will be required to use drip pans.	Fenced area: 300 ft x 300 ft each motor pool		Gravel	NO	NO		Mar-09	Mar-10	Noted as Unit Motor Pool at public scoping meeting.
Vehicle Wash Rack		Cantonment	Co-located with motor pools (one wash rack per motor pool within same area)	100 ft x 100 ft uncovered paved pad			NO	NO				Cold water (units bring in portable steam cleaners or heaters if they are needed); wastewater treated by oil-water separator.
Cantonment TOTAL												
Range												
NBC Chamber		Range		10 ft x 30 ft	No paving		NO	NO				Noted as Personal Protective Equipment Facility at public scoping meeting.
Live Hand Grenade Range		Range	Army standard live fire design		150 ft x 150 ft (no paving)		NO	NO				

Project Name	Project Number	Location	Brief Scope Description	Building Area (SF)	Paved Area (SF)	Construction Disturbance (SF)	Addition to Existing Facility?	Demolition (SF)	Air Permit?	Construction Start	Construction End	Notes
Road Construction/Upgrades		Range					NO	NO				
Modified Record Fire Range	58128	Range	MRF range, instruction building, ammunition breakdown building, operations/storage building, and other support facilities. Demolish 1,600 sf existing building.	3,155	No paving		NO	YES		Mar-07	May-08	
Communications Huts		Range	Communications towers; four huts sized 16 ft long x 10 ft wide x 10 ft high	640			NO	NO				
Basic Load Ammunition Holding Area	65612	Range	Storage pads, protective berms, security lighting, admin building, and fence	1,000 ft x 200 ft for earthen berms; within that: 50 ft x 100 ft admin building; surrounding that: 250 ft buffer zone			NO	NO		Mar-11	Mar-12	Storage of ammunition: Class 1.1 HE (danger: blast); 1.2 Fragmentation Grenades (danger: fragmentation); 1.3 signal flares/pyrotechnics (danger: five); 1.4 small arms (danger: low).
Range TOTAL												

Notes:
a. Paved Area (SY) includes all site paved areas (impervious surface) except for sidewalks.
b. Paved Area (SF) includes sidewalks (impervious surface) only.

APPENDIX C

Air Quality Supporting Documentation

Prepared by
URS

Under Contract to
CH2M HILL

for

U.S. Army, Fort Carson, Colorado



ATTACHMENT C.1

PSD Applicability Analysis

PSD APPLICABILITY ANALYSIS

for

Pinon Canyon Maneuver Site
Model, Colorado

Prepared for
Fort Carson, Colorado
The Directorate of Environmental
Compliance and Management

September 2006

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Appendices

Appendix A	The PCMS Potential to Emit Calculations
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List of Acronyms

AFCEE	Air Force Center for Environmental Excellence
AMF	Army Modular Force
BACT	Best Available Control Technology
BRAC	Base Realignment and Closure
CFR	Code of Federal Regulations
CO	Carbon monoxide
CY	calendar year
DECAM	Fort Carson Directorate of Environmental Compliance and Management
EPA	United States Environmental Protection Agency
Fort Carson	Fort Carson, Colorado
IGPBS	Integrated Global Presence and Basing Strategy
MMBtu/hr	million British thermal units per hour
MSRs	main supply routes
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NO _x	nitrogen oxides
NSPS	New Source Performance Standards
Pb	Lead
PCMS	Pinon Canyon Maneuver Site
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic diameter less than 10 micrometers
PSD	prevention of significant deterioration
PTE	potential to emit
SIC	Standard Industrial Classification
SO _x	sulfur oxides
tpy	tons per year
VOC	volatile organic compound

Executive Summary

New major stationary sources of air emissions or major modifications to existing stationary sources are required to obtain Prevention of Significant Deterioration (PSD) preconstruction permits. A source that is subject to PSD permitting must demonstrate through dispersion modeling that no significant deterioration of ambient air quality will occur. Additionally, the applicant must control emissions using the Best Available Control Technology (BACT).

This document demonstrates that the proposed Transformation activities at Pinon Canyon Maneuver Site (PCMS) will not be subject to the PSD permitting requirements under New Source Review (NSR) regulations based on the following findings:

- The PCMS is currently classified as a true minor stationary source because it has the potential to emit (PTE) less than 250 tpy of all criteria pollutants, as shown in Table ES-1.
- The increase in emissions due to Transformation activities is less than the applicable major modification threshold for all criteria pollutants, as shown in Table ES-2.

Table ES-1. Current PTE at the PCMS

Emission Unit	PM (tpy)	PM₁₀ (tpy)	VOC (tpy)	NO_x (tpy)	CO (tpy)	SO₂ (tpy)	Lead (Pb) (tpy)
Existing Boilers	0.21	0.11	0.03	2.06	0.51	7.31	Negligible
Existing Furnaces	0.05	0.04	0.04	1.18	0.19	0.78	Negligible
Existing Hot Water Heaters	0.22	0.12	0.04	2.38	0.57	7.79	Negligible
Existing MOGAS Storage Tanks and Refueling	---	---	4.07	---	---	---	Negligible
Existing Other Storage Tanks	---	---	2.25E-02	---	---	---	Negligible
Fog Oil and Graphite ^a	57.79	57.79	57.79	---	---	---	Negligible
Facility-wide PTE	58.27	58.07	62.01	5.62	1.27	15.87	Negligible
Major Source Threshold	250	250	250	250	250	250	250

^a Graphite is not currently included in permit 96LA1082, but may be added as an alternative to fog oil. Overall permit limits will not increase.

Table ES-2. PTE Increase from Proposed Stationary Sources at the PCMS

Potential Point Source Emissions (tpy)	PM (tpy)	PM₁₀ (tpy)	VOC (tpy)	NO_x (tpy)	CO (tpy)	SO₂ (tpy)
Proposed Natural Gas-Fired Sources	3.62	3.62	2.62	47.66	40.03	0.29
Major Modification Threshold	250	250	250	250	250	250

1.0 Background

Due to activities associated with Base Realignment and Closure (BRAC), Integrated Global Presence and Basing Strategy (IGPBS), and Army Modular Force (AMF) (all referred to as Transformation activities), the number of military personnel training at the PCMS and, consequently, the number of facilities required to support them, will increase over the next five years. The Transformation activities will result in an increase in the emissions of criteria air pollutants due to the following activities:

- Installation of new emission sources within the administrative cantonment area of the PCMS:
 - Boilers
 - Miscellaneous external combustion equipment
- Increased emissions of fugitive particulate matter due to:
 - Increase in military vehicular traffic on unpaved tank trails, main supply routes (MSRs), and other areas used for training maneuvers
 - Increase in the number of military vehicles traveling in convoys between Fort Carson, Colorado (Fort Carson) and the PCMS

New major stationary sources or major modifications to existing stationary sources are required to obtain Prevention of Significant Deterioration (PSD) preconstruction permits. A source that is subject to PSD permitting must demonstrate through dispersion modeling that no significant deterioration of ambient air quality will occur. Additionally, the applicant must control emissions using the Best Available Control Technology (BACT). This document demonstrates that the proposed modifications at the PCMS will not be subject to the PSD permitting requirements under New Source Review (NSR) regulations.

2.0 Location Description

The PCMS provides valuable training land to U.S. Armed Forces to practice tank maneuver skills and operations on a year-round basis, if needed. Much of the activity of the PCMS has been directly related to supporting large area maneuver training for the 3rd Armored Cavalry Regiment, 3rd Brigade Combat Team, and 10th Special Forces Group stationed at Fort Carson. Their primary mission is to train, mobilize, and sustain combat-ready, multi-component integrated forces.

The PCMS is located in Las Animas County in southeastern Colorado, 155 miles southeast of Fort Carson. This training site encompasses approximately 235,000 acres (about 31 miles east to west and 21 miles north to south), lying between US Highway 350 on the west and the Purgatoire River on the east. It is about 30 miles northeast of Trinidad. The cantonment area, consisting of austere administrative facilities, is in the northwestern portion of the site. Limited full-time Department of the Army Civilian and contractor personnel are currently assigned to the PCMS.

The PCMS is located in an attainment area for all criteria pollutants. No federal Mandatory Class I designated areas or sensitive Class II areas are within 100 kilometers (62 miles) of the facility.

The PCMS is subject to Construction Permit No. 96LA1082 for the use of military smoke munitions and obscurants and Construction Permit No. 04LA0772 for gasoline storage and dispensing from one 20,000 gallon underground storage tank. (APCD 2000, 2004).

3.0 PSD Program Description

New major stationary sources or major modifications to existing stationary sources are required to obtain PSD preconstruction permits. The PSD permitting process requires the applicant to demonstrate no significant deterioration of ambient air quality in an attainment area. The following are elements and associated information necessary for determining PSD applicability of a new source (Air Force Center for Environmental Excellence [AFCEE], 2000):

- Define the source by determining all related activities under the same 2-digit Standard Industrial Classification (SIC) code that are controlled by the same owner or operator and located on contiguous or adjacent properties, including all support facilities.
- Define the applicability thresholds for the major stationary source.
- Define the source's potential to emit (PTE) by determining the sum of emissions for each pollutant from each emission unit. This calculation includes fugitive emissions from the 28 source categories listed in Table 3-1 and sources subject to New Source Performance Standards (NSPS) or National Emission Standards for Hazardous Air Pollutants (NESHAP) as of August 7, 1980.
- Assess local area attainment status by determining whether the area is in an attainment or unclassifiable region for at least one criteria pollutant. PSD applies only in attainment or unclassifiable regions.
- Determine the pollutants that may be subject to PSD review. Each attainment pollutant and other regulated pollutants emitted in significant quantities (as defined in 40 CFR 52.21(b)(23)(i)) are included.
- Compare the source's PTE to the appropriate major source thresholds. The source is a major source if the emissions of any pollutant exceed applicable threshold regardless of the area designation (i.e. attainment, non-attainment, or non-criteria pollutants). If a source is classified as one of the 28 regulated source categories (Table 3-1) and its emissions exceed 100 tons per year (tpy), then the source is designated a major source. If the facility is not classified as one of the 28 regulated source categories and if its emissions exceed 250-tpy, then the facility is a major source (AFCEE 2000).

Table 3-1. PSD Source Categories with 100 TPY Major Source Thresholds

1. Coal cleaning plants (with thermal dryers)	15. Coke oven batteries
2. Kraft pulp mills	16. Sulfur recovery plants
3. Portland cement plants	17. Carbon black plants (furnace process)
4. Primary zinc smelters	18. Primary lead smelters
5. Iron and steel mills	19. Fuel conversion plants
6. Primary aluminum ore reduction plants	20. Sintering plants
7. Primary copper smelters	21. Secondary metal production plants
8. Municipal incinerators capable of charging more than 250 tons of refuse per day	22. Chemical process plants
9. Hydrofluoric acid plants	23. Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input
10. Sulfuric acid plants	24. Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels
11. Nitric acid plants	25. Taconite ore processing plants
12. Petroleum refineries	26. Glass fiber processing plants
13. Lime plants	27. Charcoal production plants
14. Phosphate rock processing plants	28. Fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input

Major modifications are subject to the PSD review only if:

- The existing source that is modified is a major source and the net emissions increase resulting from the modification is significant or
- The modification is made at a minor source, and that change by itself qualifies as a new major source.

4.0 PSD Applicability

4.1 Current PSD Status

The first step in determining PSD applicability at the PCMS is to determine whether the facility is classified as a major stationary source. This determination is based on the facility's PTE, which is defined as follows.

“Potential to emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.” [40 *Code of Federal Regulations* (CFR)52.21(b)(4)].

Several source categories at the PCMS were not included when calculating PTE, based on United States Environmental Protection Agency (EPA) guidance:

- Mobile sources and non-road engines were excluded based on EPA guidance, which states, “Non-road engines are a category of units/equipment that, under the Clean Air Act Section 302(z), are excluded from the definition of “stationary source,” and, hence, are exempt from stationary source permitting requirements.” (EPA 2001).
- Fugitive emission sources were excluded based on EPA guidance, which states “if the primary activity of a stationary source falls within a source category that is not listed, then as a general matter, fugitive emissions from the emissions units at the source are not included in determining whether the source is a major stationary source. However, if the source also contains emission units which do fall within a listed source category (or categories), then you include fugitive emissions from these listed emissions units to determine if the source is a major stationary source.” (EPA 2003).

The sources included in the PTE calculation are listed in Appendix A, Table A-1.

The current PTE for each source and the assumptions used to calculate it are provided in Appendix A, Table A-2. Additional detail on PTE calculations is provided in the PCMS Transformation Air Emission Inventory.

The PCMS is not one of the listed source categories in Table 3-1. Therefore, it is subject to regulation as a major stationary source only if its PTE exceeds a major source threshold of 250 tpy per 40 CFR 52.21(b)(1)(i)(b)).

As shown in Table 4-1, the PCMS is classified currently as a true minor stationary source because it has the potential to emit less than 250 tpy of any criteria pollutant.

Table 4-1. The PCMS Actual Emissions and Current PTE

Pollutant	Calendar Year (CY) 2005 Actual Emissions (tpy)	Current PTE (tpy)
Nitrogen Oxides (NO _x)	0.21	5.62
Sulfur Oxides (SO _x)	0.59	15.87
Carbon Monoxide (CO)	0.05	1.27
Volatile Organic Compounds (VOCs)	16.30	62.01
Particulate Matter (PM)	15.26	58.27
Particulate matter with an aerodynamic diameter less than 10 micrometers (PM ₁₀)	15.25	58.07

4.2 Applicability of PSD to Proposed Modification

As discussed in Section 4.1, the PCMS is currently classified as a true minor stationary source. Therefore, it is subject to the PSD review requirements of 40 CFR 52.21 and the Colorado Air Quality Control Commission’s Regulation No. 3 if the modification by itself qualifies as a new major source. The following thresholds will apply to the proposed modifications.

Table 4-2. Major Modification Thresholds Applicable to Proposed Sources at the PCMS

Potential Point Source	PM₁₀ (tpy)	NO_x (tpy)	CO (tpy)	SO_x (tpy)	VOC (tpy)	Lead (Pb) (tpy)
Major Source Modification Threshold Applicable to the PCMS	250	250	250	250	250	N/A

The proposed modifications at the PCMS that require applicability review are the natural gas-fired boilers and natural gas-fired miscellaneous external combustion sources required to support approximately 1,136,145 square feet of new buildings. The total estimated heat input rate of the new boilers is approximately 56.8 million British thermal units per hour (MMBtu/hr), and the total estimated heat input rate of the miscellaneous external combustion sources is 52.0 MMBtu/hr.

The PTE for proposed and existing stationary sources (Tables 4-3 and 4-4) was calculated based on AP-42 emission factors (EPA 2005). Assumptions used to calculate the proposed PTE are provided in Appendix A, Table A-3, and detailed emission calculations are provided in the Transformation Air Emission Inventory for the PCMS (Fort Carson Directorate of Environmental Compliance and Management [DECAM] 2006). The data shows that the PCMS proposed modifications would not be subject to PSD review as the emissions from those proposed sources will be below the major modification threshold. Additionally, the PCMS will remain a true minor source under the PSD program because total facility-wide, stationary, point source emissions, including emissions from both the proposed new and existing sources, will remain below the 250-tpy-threshold level.

Table 4-3. PTE Increase from Proposed Stationary Sources at the PCMS

Potential Point Source Emissions	PM ₁₀ (tpy)	NO _x (tpy)	CO (tpy)	SO _x (tpy)	VOC (tpy)	Lead (Pb) (tpy)
Proposed Natural Gas-Fired Sources	3.62	47.66	40.03	0.29	2.62	Negligible
Major Modification Threshold	250	250	250	250	250	N/A

Table 4-4. Proposed Facility-wide, Stationary Point Source PTE

Potential Point Source Emissions	PM ₁₀ (tpy)	NO _x (tpy)	CO (tpy)	SO _x (tpy)	VOC (tpy)	Lead (Pb) (tpy)
Proposed Natural Gas-Fired Sources	3.62	47.66	40.03	0.29	2.62	Negligible
Existing Boilers	0.11	2.06	0.51	7.31	0.03	Negligible
Existing Furnaces	0.04	1.18	0.19	0.78	0.04	Negligible
Existing Hot Water Heaters	0.12	2.38	0.57	7.79	0.04	Negligible
Existing MOGAS Storage Tanks and Refueling	---	---	---	---	4.07	Negligible
Existing Other Storage Tanks	---	---	---	---	0.02	Negligible
Fog Oil and Graphite ^a	57.79	---	---	---	57.79	Negligible
Proposed Facility-wide PTE (tpy)	61.69	53.27	41.30	16.16	64.63	Negligible
Major Source Applicability Threshold (tpy)	250	250	250	250	250	N/A

^a Graphite is not currently included in permit 96LA1082, but may be added as an alternative to fog oil. Overall, permit limits will not increase.

5.0 References

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EPA, 2005. *Compilation of Air Pollutant Emission Factors (AP-42)*, Fifth Edition, Volume I, Supplements A, B, C, D, E, F, Updates 2001, 2002, 2003, 2004 & 2005.

DECAM, 2006, *Transformation Air Emission Inventory for the PCMS*. September 2006.

Appendix A – Pinon Canyon Maneuver Site Potential to Emit Calculations

Table A-1 Sources Included in the PTE Calculation

Emission Unit	Stationary? ^a	Point Source? ^b	Include in PSD Analysis?
Proposed Natural Gas-Fired Sources	Y	Y	YES
Existing Boilers	Y	Y	YES
Existing Furnaces	Y	Y	YES
Existing Hot Water Heaters	Y	Y	YES
Existing MOGAS Storage Tanks and Refueling	Y	Y	YES
Existing Other Storage Tanks	Y	Y	YES
Military Smoke Munitions	Y	N	NO
Fog Oil and Graphite ^c	Y	Y	YES
Prescribed Burning	Y	N	NO
Maneuvers	Y	N	NO

^a Only stationary sources are included in PSD analysis per EPA Guidance (EPA 2001).

^b Only point sources are included in PSD analysis per EPA Guidance (EPA 2003).

^c Graphite is not currently included in permit 96LA1082, but may be added as an alternative to fog oil. Overall permit limits will not increase.

Appendix A – Pinon Canyon Maneuver Site Potential to Emit Calculations

Table A-2 Method of Determining Current PTE for Each Source

Emission Unit	PM (tpy)	PM ₁₀ (tpy)	VOC (tpy)	NO _x (tpy)	CO (tpy)	SO ₂ (tpy)	Method of Determining PTE
Existing Boilers	0.21	0.11	0.03	2.06	0.51	7.31	8,760 hours of operation
Existing Furnaces	0.05	0.04	0.04	1.18	0.19	0.78	8,760 hours of operation
Existing Hot Water Heaters	0.22	0.12	0.04	2.38	0.57	7.79	8,760 hours of operation
Existing MOGAS Storage Tanks and Refueling	---	---	4.07	---	---	---	Current permit limit (04LA0772) for 20,000 gallon storage tank. Actual emissions multiplied by a growth factor of 2.0 for other storage tanks.
Existing Other Storage Tanks	---	---	2.25E-02	---	---	---	24 turnovers per year
Fog Oil and Graphite ^a	57.79	57.79	57.79	---	---	---	Current permit limit (96LA1082)
Facility-wide Total	58.27	58.07	62.01	5.62	1.27	15.87	

^a Graphite is not currently included in permit 96LA1082, but may be added as an alternative to fog oil. Overall permit limits will not increase.

Appendix A – Pinon Canyon Maneuver Site Potential to Emit Calculations

Table A-3 Method of Determining Proposed PTE for Each Source

Emission Unit	PM (tpy)	PM ₁₀ (tpy)	VOC (tpy)	NO _x (tpy)	CO (tpy)	SO ₂ (tpy)	Method of Determining PTE
Proposed Natural Gas-Fired Sources	3.62	3.62	2.62	47.66	40.03	0.29	8,760 hours of operation
Existing Boilers	0.21	0.11	0.03	2.06	0.51	7.31	8,760 hours of operation
Existing Furnaces	0.05	0.04	0.04	1.18	0.19	0.78	8,760 hours of operation
Existing Hot Water Heaters	0.22	0.12	0.04	2.38	0.57	7.79	8,760 hours of operation
Existing MOGAS Storage Tanks and Refueling	---	---	4.07	---	---	---	Current permit limit (04LA0772) for 20,000 gallon storage tank. Actual emissions multiplied by a growth factor of 2.0 for other storage tanks.
Existing Other Storage Tanks	---	---	2.25E-02	---	---	---	24 turnovers per year
Fog Oil and Graphite ^a	57.79	57.79	57.79	---	---	---	Current permit limit (96LA1082) for total material consumption
Facility-wide Total	61.90	61.69	64.63	53.27	41.30	16.16	

^a Graphite is not currently included in permit 96LA1082, but may be added as an alternative to fog oil. Overall permit limits will not increase.

Prepared by
URS

Under Contract to
CH2M HILL

for

U.S. Army, Fort Carson, Colorado



ATTACHMENT C.2

**Draft Final Air Quality Analysis Modeling Report
for the PCMS**

DRAFT FINAL AIR QUALITY ANALYSIS MODELING REPORT

for the

Pinon Canyon Maneuver Site
Model, Colorado

Prepared for
Fort Carson, Colorado
The Directorate of Environmental
Compliance and Management

September 2006

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List of Acronyms

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
A_0	Total area
AAQS	Ambient air quality standards
AERMOD	American Meteorological Society/EPA Regulatory Model
AMF	Army Modular Force
APCD	Air Pollution Control Division
AQRV	Air Quality Related Value
ARM	Ambient Ratio Method
ASOS	Automated Surface Observing System
BRAC	Base Realignment and Closure
CO	Carbon monoxide
DAT	Deposition Analysis Threshold
DPW	Directorate of Public Works
DECAM	Fort Carson Directorate of Environmental Compliance and Management
DEM	Digital Elevation Model
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
Fort Carson	Fort Carson, Colorado
g/s	Grams per second
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
HAP	Hazardous Air Pollutant
IGPBS	Integrated Global Presence and Basing Strategy
ISCST3	EPA Industrial Source Complex Short Term Model, Version 3
IWAQM	Interagency Workgroup on Air Quality Modeling
K	Kelvin
kg/ha/yr	kilogram per hectare per year
km	kilometer
km^2	square kilometers
lb/hr	pound per hour
m	meter
m/s	meters per second
MMBtu/hr	million British thermal units per hour
MSRs	main supply routes

NAD27	North American Datum of 1927
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NPS	National Park Service
NWS	National Weather Service
PCMS	Pinon Canyon Maneuver Site
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic diameter less than 10 micrometers
ppm	parts per million
PSD	prevention of significant deterioration
PTE	potential to emit
SIL	Significant Impact Levels
SO ₂	sulfur dioxide
SO _x	sulfur oxides
tpy	tons per year
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
CALPUFF	EPA CALPUFF Model
VOC	volatile organic compound
WBAN	Weather Bureau Army Navy

Executive Summary

Air dispersion modeling was done to assess the impact of proposed Transformation activities at the Pinon Canyon Maneuver Site (PCMS) on ambient air quality and air quality related values (AQRVs). The modeling was done along with and in support of the PCMS Transformation Environmental Impact Statement (EIS).

The near field off-post impacts were determined using the Industrial Source Complex Short Term (ISCST3) model. The source categories consisted of external combustion and fugitive particulate sources. External combustion sources were modeled from a single stack using the stack characteristics for a 2.526 Million British thermal units per hour (MMBtu/hr) boiler (Weil-McClain 1995). Fugitive particulate emissions, mainly from main supply routes (MSRs) and trails used during maneuvers, were considered to be emitted from six areas at the PCMS. Modeling results indicated that emissions of all criteria pollutants from the proposed Transformation activities were below the significant impact levels (SILs) for carbon monoxide (CO) and sulfur dioxide (SO₂), but above the SILs for nitrogen dioxide (NO₂), which exceeded the annual SIL by 1.09 micrograms per cubic meter (µg/m³), and particulate matter (PM₁₀), which exceeded the annual SIL by 1.25 µg/m³ and the 24-hour SIL by 61.82 µg/m³. The NO₂ modeled concentration combined with the ambient background concentration was a maximum of 53.57 µg/m³, which does not exceed the National or Colorado Ambient Air Quality Standard (AAQS). The annual and 24-hour PM₁₀ modeled concentrations combined with the ambient background concentration were a maximum of 11.25 µg/m³ and 121.82 µg/m³, respectively. These PM₁₀ results do not exceed the National or Colorado AAQS. Therefore, ambient air quality impacts are not significant.

As requested by the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD), a CALPUFF screening analysis was conducted using CALPUFF and ISCST3 input meteorological data. The CALPUFF-screening modeling was used to determine the impacts at Great Sand Dunes National Park and Preserve and the Florissant Fossil Beds National Monument in Colorado and the Wheeler Peak Wilderness in New Mexico. The CALPUFF results were compared to visibility criteria of 5% reduction and nitrogen and sulfur deposition criteria of 0.005 kilogram per hectare per year (kg/ha/yr). Additionally, the impact of criteria pollutants were compared to the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Class I Significant Impact Levels. Modeling showed the visibility and deposition impacts did not exceed these thresholds, indicating insignificant impacts on visibility.

Emissions from vehicle convoys traveling from Fort Carson, Colorado (Fort Carson) to the PCMS were addressed qualitatively. Emissions from convoys will be temporary, spread out over a long distance, and will occur on existing public roads where emissions from personally owned vehicles already occur. Therefore, the incremental emissions increase from this particular source is insignificant. The finding of source insignificance was supported by particulate matter with an aerodynamic diameter less than 10 micrometers (PM₁₀) monitoring data from three sites along or near the route between Fort Carson and the PCMS, which showed PM₁₀ 24-hour maximum concentrations of 84 µg/m³, 135 µg/m³, and 78 µg/m³ (EPA 2006). These concentrations are below the National and Colorado AAQS of 150 µg/m³. These monitored values reflect existing levels of roadway travel that exceed the

planned convoy usage. Therefore any temporary incremental emission activity from the increased convoy transits should not affect the current monitored compliance levels.

1.0 Background

Due to activities associated with Base Realignment and Closure (BRAC), Integrated Global Presence and Basing Strategy (IGPBS), and Army Modular Force (AMF), the number of military personnel training at the PCMS and, consequently, the number of facilities required to support them, will increase over the next five years. For purposes of preparing the EIS, these projects have been grouped together and are referred to collectively as Transformation activities.

The Transformation activities will result in an increase in the emissions of criteria air pollutants due to the following activities:

- Installation of new emission sources within the administrative cantonment area of the PCMS:
 - Boilers
 - Miscellaneous external combustion equipment
- Increased emissions of fugitive particulate matter due to:
 - Increase in military vehicular traffic on unpaved tank trails, MSRs, and other areas used for training maneuvers
 - Increase in the number of military vehicles traveling in convoys between Fort Carson and the PCMS

A dispersion modeling protocol for the project was submitted to the Colorado Department of Public Health and Environment, Air Pollution Control Division (APCD) in August 2006 (Fort Carson, Directorate of Environmental Compliance and Management [DECAM] 2006a). Comments received from CDPHE and the US EPA that were pertinent to the modeling were included. The modeling was conducted to assess the Transformation activity emission impact on visibility and local ambient air quality in accordance with this protocol.

The PCMS is regulated as a true minor source of emissions under both the Title V Operating Permit and Prevention of Significant Deterioration (PSD) programs because it has the potential to emit (PTE) less than the following: 100 tons per year (tpy) of any criteria pollutant, 10 tpy of a single Hazardous Air Pollutant (HAP), 25 tpy of all HAPs combined. The PCMS will remain a true minor source of emissions after the proposed modifications; the combined emission increases from all of the proposed projects are below major source thresholds and does not trigger PSD review. The PCMS's PSD status is discussed further in the PSD Applicability Analysis for the PCMS, Model, Colorado (DECAM 2006b). The PCMS does not plan to increase the use of military smoke and obscurants above the current (since 1998) permitted total material consumption limit of 115,591 pounds per year (APCD 2000).

2.0 Location Description

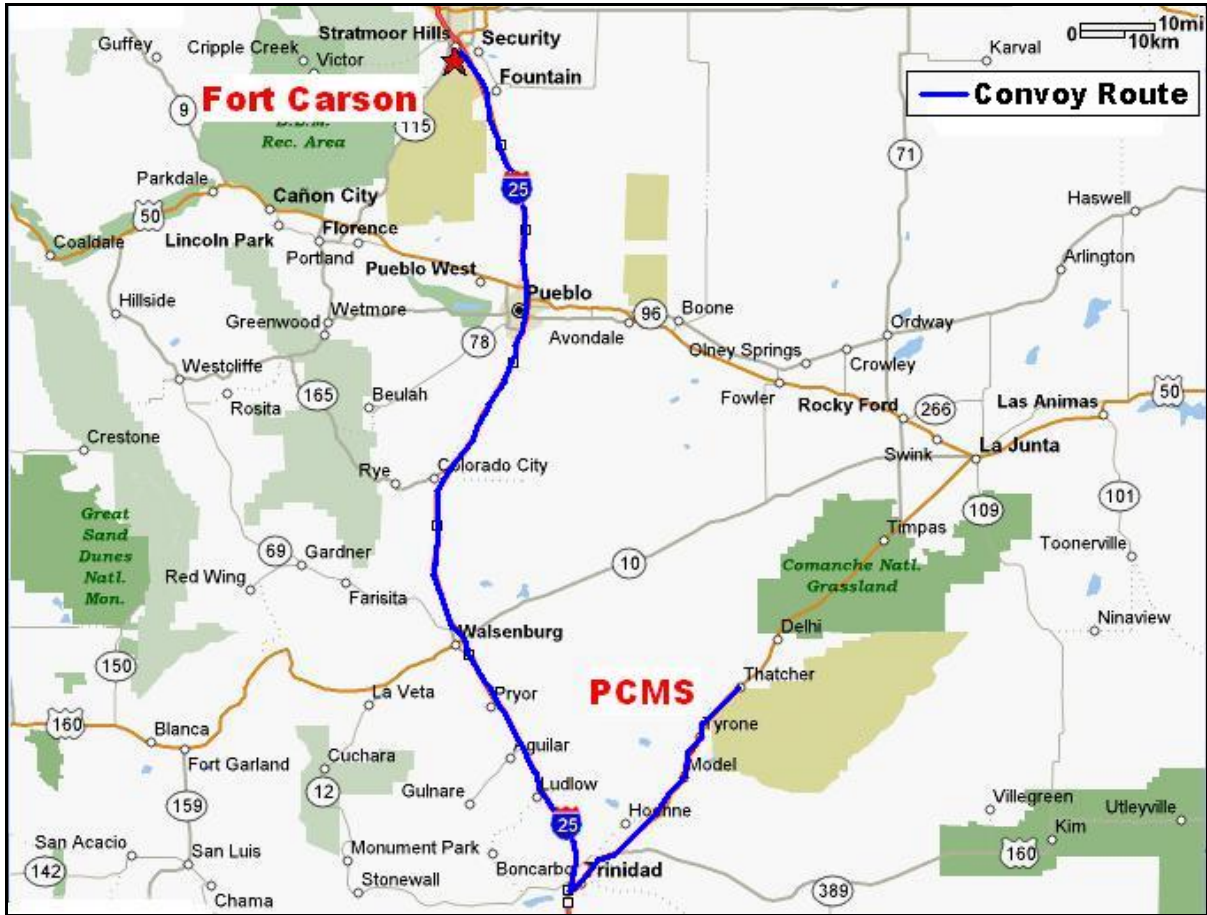
The PCMS is an approximately 235,000-acre maneuver training area dedicated to training units stationed at or otherwise under the responsibility of Fort Carson. The PCMS is located in southeastern Colorado in Las Animas County, approximately 155 miles southeast of Fort Carson. The PCMS is bounded by U.S. 350 to the west, Purgatoire River Canyon to the east, Van Bremer Arroyo to the south, and Otero County to the north. Nearby cities and towns include Trinidad and Model to the southwest, and Timpas and La Junta to the northeast.

The cantonment area comprises approximately 1,660 acres of the PCMS. This area provides limited, austere Soldier and installation support facilities. Military training is restricted in this area. Limited full-time Department of the Army civilian and contracted personnel are currently assigned to the PCMS. The PCMS is located in an attainment area for all criteria pollutants. The location of the PCMS is shown in Figure 2-1.

The PCMS is subject to Construction Permit No. 96LA1082 for the use of military smoke munitions and obscurants and Construction Permit No. 04LA0772 for gasoline storage and dispensing from one 20,000 gallon underground storage tank (APCD 2000, 2004).

In certain areas of the nation, especially in the designated PSD Class I areas such as national parks and wilderness areas, government regulations have been implemented to protect their natural beauty and resources. Sources of air pollution can cause visible plumes if emissions of particulate matter (PM) and nitrogen oxides (NO_x) are large enough. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background. Therefore, the U.S. Environmental Protection Agency affords special visibility protection to prevent such plume visual impacts to observers within Class I areas. Traditionally, visibility impact analyses have been conducted for the Class I areas within 100 kilometers (km) of the source. However, no federal mandatory Class I designated areas or sensitive Class II areas are located within 100 km (62 miles) of the facility. Since there are no such areas within 100 km, the visibility impact analysis will be conservatively conducted for those areas located within 200 km (124 miles), including Great Sand Dunes National Park Preserve (Class I area), Wheeler Peak Wilderness (Class I area), and Florissant Fossil Beds National Monument (sensitive Class II area). Florissant Fossil Beds has been designated by the State of Colorado to have the same sulfur dioxide increment as a federal Class I area (APCD 1998).

Figure 2-1. The PCMS Location and Convoy Route from Fort Carson to the PCMS



3.0 Source Description

Table 3-1 describes the proposed emission inventory used in the modeling analysis. The natural gas-fired sources' emissions were modeled as one representative stationary point source in the cantonment area on the western boundary (Figure 3-1). Fugitive particulate emissions from MSR, trails, and other areas used during maneuvers were modeled as six separate area sources downrange (Figure 3-2). Air quality impact from military convoys between the Fort Carson and the PCMS were qualitatively analyzed and determined to be insignificant (see Section 3.2).

Table 3-1. Emission Increase from Stationary Sources at the PCMS

Pollutant	Proposed Natural Gas-Fired External Combustion Sources Emissions (tpy)	Maneuver Emissions (tpy)	Proposed Convoys ^a (tpy)
Modeling Source Type	Point source	Area source	N/A
Nitrogen Oxides (NO _x)	47.66	N/A ^b	N/A ^b
Sulfur Oxides (SO _x)	0.29	N/A ^b	N/A ^b
Carbon Monoxide (CO)	40.03	N/A ^b	N/A ^b
Volatile Organic Compounds (VOCs)	2.62	N/A ^b	N/A ^b
Particulate matter with an aerodynamic diameter less than 10 micrometers (PM ₁₀)	3.62	627.41	16.71

^a Convoys are between Fort Carson and the PCMS.

^b Only emissions from stationary sources (i.e. fugitive dust) will be modeled.

3.1 Stationary Point Sources

The proposed modifications will result in emission increases of criteria pollutants, primarily NO_x and CO, from natural gas-fired external combustion sources. The natural gas-fired sources include boilers and miscellaneous external combustion sources required to support 1,136,145 square feet of new buildings (DECAM 2006b). The total estimated heat input rate of the new boilers is 56.8 million British thermal units per hour (MMBtu/hr), and the total estimated heat input rate of the miscellaneous external combustion sources is 52.0 MMBtu/hr (DECAM 2006b). The emission increase from external combustion sources is shown in Table 3-1.

Nearly all proposed combustion stationary point sources are located in the cantonment area. To simplify the modeling analysis and ensure a conservative assessment, all emission increases from combustion sources were assumed to be emitted from a single boiler emission source located in the cantonment area. Its location was selected to predict the worst-case impact of the project sources at the PCMS (i.e. the representative source was located based on use of the largest likely emission source location and closest distance to the ambient air receptor boundary or fence line). The proposed location of the single boiler emission source (point source) is shown in Figure 3-1. The ambient air receptor boundary/fence line is shown in Figure 3-2.

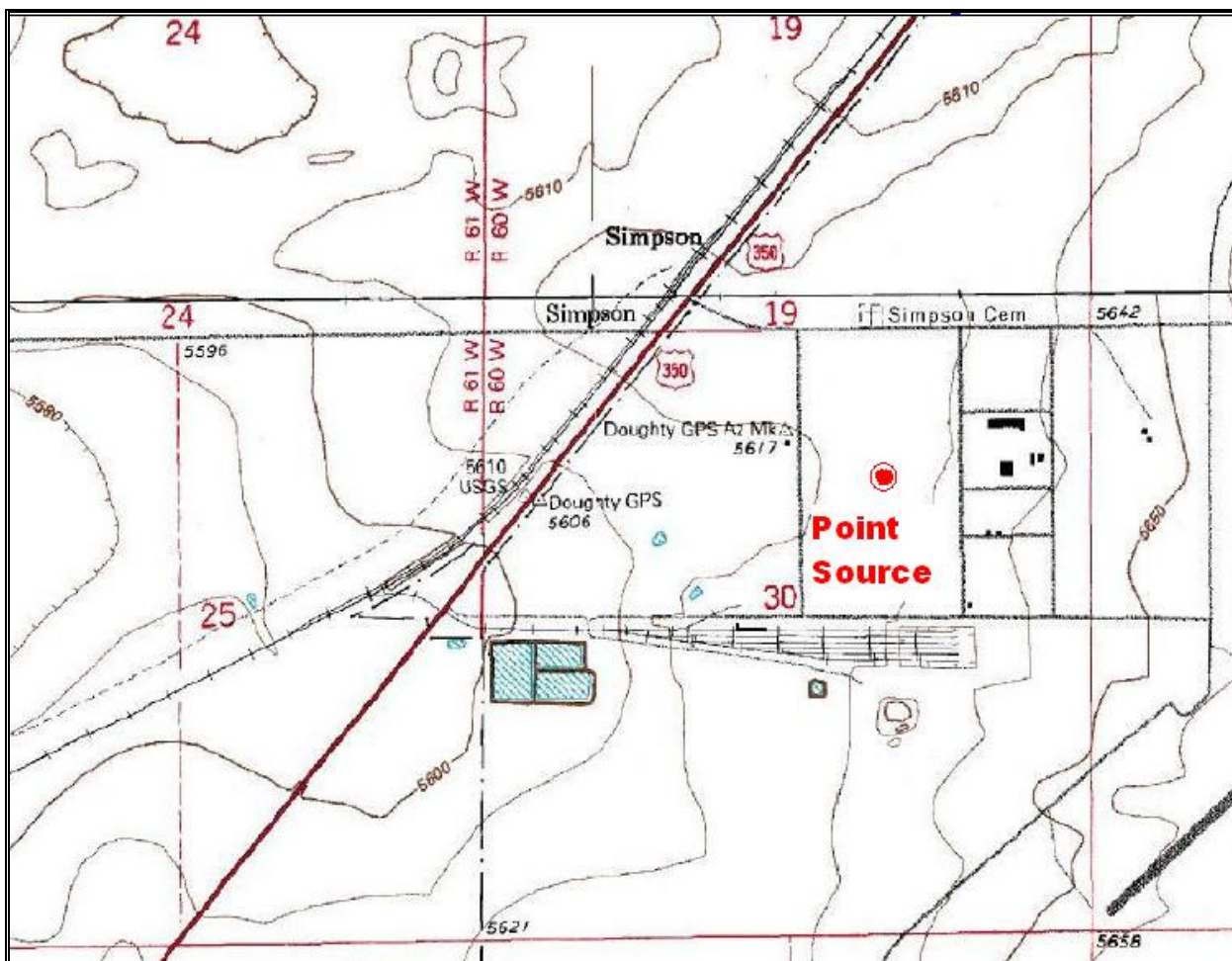
A typical exhaust stack parameterization was used, based on a Weil-McLain boiler with a heat input rate of 2.526 MMBtu/hr (Weil-McLain 1995). This exhaust stack parameterization is considered typical for these sources. The stack parameters of the representative source are shown in Table 3-2.

Table 3-2. Stationary Source Parameters

Parameter	Value	Units
Source ID	POINT	
Height	6.096	meters (m)
Exhaust Temperature	477.59	Kelvin (K)
Stack Diameter ^a	0.3556	m
Velocity ^a	5.7	meters per second (m/s)
Universal Transverse Mercator (UTM) North American Datum of 1927 (NAD27) Easting	574422.	m
UTM NAD27 Northing	4150003.	m
Base Elevation	1715.1	m

^a Based on a Weil-McLain Model 94 boiler with a heat input rate of 2.526 MMBtu/hr (Weil-McLain 1995)

**Figure 3-1. Representative Point Source in Cantonment Area
(Topo Map)**



3.2 Fugitive Area Source

The proposed modifications will result in emission increases from fugitive particulate sources. The fugitive particulate sources include dust from vehicle travel during maneuvers and convoys.

There are two types of brigades that will potentially train at the PCMS: light brigades, which contain wheeled vehicles only, and heavy brigades, which contain both wheeled and tracked vehicles. Fugitive particulate emissions from maneuvers were determined on an hourly basis for both a light brigade and heavy brigade-training event. The light brigade-training event was found to result in worst-case emissions because light brigade vehicles travel more miles during a training event than heavy brigade vehicles (DECAM 2006c). Emissions from maneuvers, tank trails and MSRs will occur throughout the PCMS. For modeling purposes, the maneuver activities were assumed to be concentrated in six areas of nine square kilometers (9 km²) each. The area sources were distributed over those portions of the PCMS that have no restrictions on vehicle travel. The locations of the area sources are shown in Figure 3-2, and hourly emission rates are shown in Table 3-3. Area source parameters are shown in Table 3-4. Emissions from the light brigade were assumed to occur over a 21-day training exercise, and emissions were assumed to occur for 24 hours per day during the training exercise. Fugitive particulate emissions were assumed to be uncontrolled (i.e. no dust suppressants or watering).

Table 3-3. Hourly Emissions from Maneuvers

Brigade Type	PM ₁₀ Emissions (lb/hr)	PM ₁₀ Emissions (g/s)
Light	547	68.9749

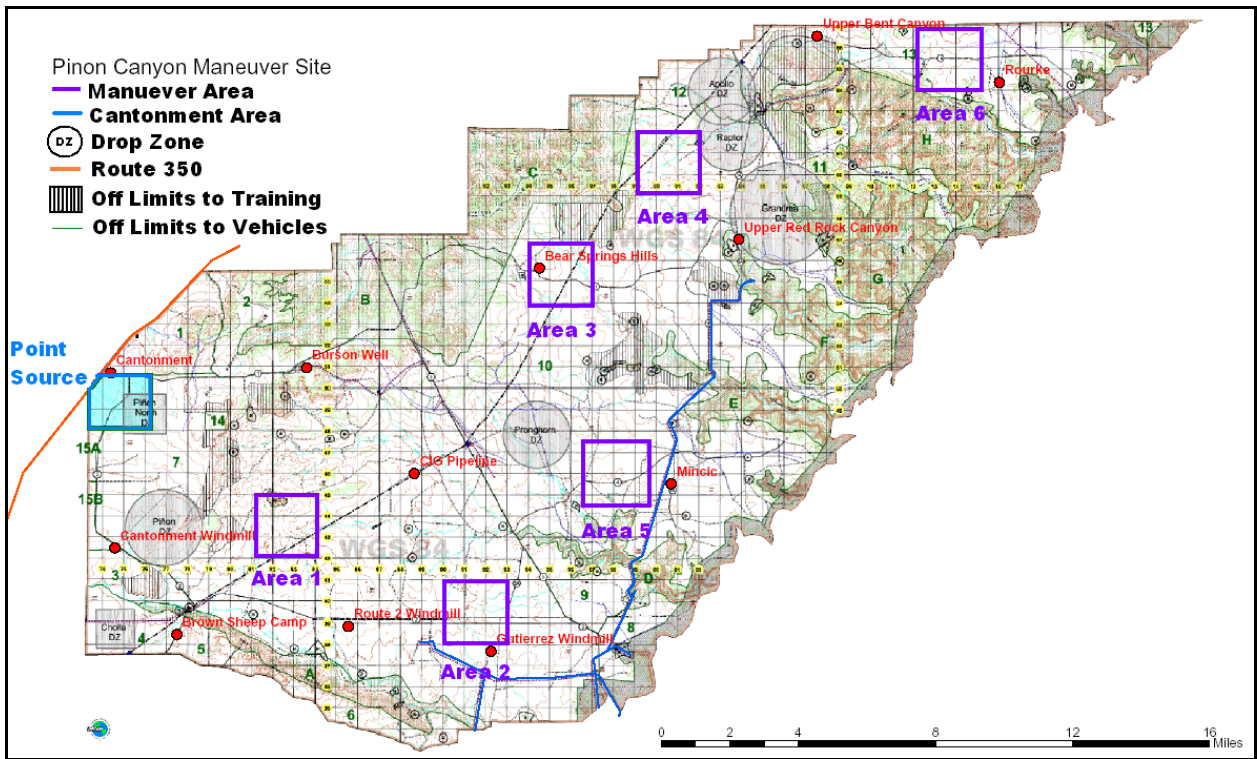
Table 3-4. Area Source Parameters

Parameter	Lower Left Corner UTM NAD27 Easting (m)	Lower Left Corner UTM NAD27 Northing (m)	Source Base Elevation (m)	Release Height (m)	Easterly Length (m)	Northerly Length (m)	Long Term PM ₁₀ modeling Emission Rate (g/s)	Long Term PM ₁₀ modeling Emission Rate (g/s-km ²)	Short Term PM ₁₀ Modeling Emission Rate (g/s)	Short Term PM ₁₀ Modeling Emission Rate (g/s-km ²)
Area 1	580740.	4145112.	1689.3	2	3000	3000	3.0255	0.33616	11.4958	1.2773
Area 2	590844	4137536	1573.1	2	3000	3000	3.0255	0.33616	11.4958	1.2773
Area 3	593955.53	4154000	1576.3	2	3000	3000	3.0255	0.33616	11.4958	1.2773
Area 4	599029	4159083	1591.9.	2	3000	3000	3.0255	0.33616	11.4958	1.2773
Area 5	596197	4144589	1521.6	2	3000	3000	3.0255	0.33616	11.4958	1.2773
Area 6	613080	4163662	1424.3	2	3000	3000	3.0255	0.33616	11.4958	1.2773
Total							18.1528		68.9749	

Fugitive dust emissions from convoys between Fort Carson and the PCMS will occur over a 155-mile stretch of paved public highways. The worst-case impacts will occur when the largest convoys (full brigades) travel from Fort Carson to the PCMS for training. Full brigade convoys will include approximately 1,000 vehicles, which would likely travel to the PCMS over a two to three day period, broken down into groups of between twenty and 45 vehicles (Fort Carson 2006b). Only wheeled vehicles are in convoys; tracked vehicles (tanks) are sent via rail. Full brigade convoys will occur up to four times per year (two light brigades, two heavy brigades) (Fort Carson 2006b). The convoy route from Fort Carson to the PCMS is shown in Figure 2-1. Emission calculations for paved roads show that total PM₁₀ emissions from full brigade convoys will be relatively low (between 3.4 tons per light brigade convoy and 6.6 tons per heavy brigade convoy) (DECAM 2006b). Further, the emissions will be temporary, spread out over a long distance, and will occur on existing public roads where emissions from personally owned vehicles already occur. Therefore, the incremental emissions increase from this particular source is insignificant and was not included in the modeling analysis.

Monitoring data supports the suggestion of source insignificance. There are three PM₁₀ monitoring sites along or near the route from Fort Carson to the PCMS: 3730 Meadowlands Colorado Springs, CO (Station 1), 101 W. Costilla - Rbd, Colorado Springs, CO (Station 2), and 211 D Street, Pueblo, CO (Station 3). The 24-hour maximum concentrations of PM₁₀ from 2001 through 2005 from these three monitoring stations were obtained from the EPA AirData site (EPA 2006). The 24-hour maximum concentrations of PM₁₀ from stations 1, 2, and 3 are 84 µg/m³, 135 µg/m³, and 78 µg/m³, respectively. None of the maximum monitored values exceed the National Ambient Air Quality Standard for 24-hour average PM₁₀, 150 µg/m³. Station 2, which shows the highest PM₁₀ value, is located in the downtown Colorado Springs near Interstate Highway 25, north of the convoy route. These monitored values reflect existing levels of roadway travel that exceed the planned convoy usage. The convey traffic increase represents no more than one percent of total traffic and ten percent of heavy vehicle traffic on the portions of road near the air monitors (Directorate of Public Works [DPW0 2006]). Therefore any temporary incremental emission activity from the increased convoy transits should not affect the current monitored compliance levels. This further supports the finding that the activity will not be significant. Therefore, the emissions from the convoys were not included in the modeling analysis. Documentation of emission calculation methodology and supporting information are provided in the Transformation Air Emission Inventory for the PCMS (DECAM 2006c).

Figure 3-2. Representative Point and Areas Sources at the PCMS



4.0 Dispersion Modeling Analysis

A level air quality modeling analysis was conducted to assess the impact of emissions from point and area sources associated with the Transformation activities (described in Section 3.0) on the Class II areas surrounding the PCMS. The latest version of EPA ISCST3 dispersion model was used. The air quality dispersion model options, land use classification, receptor network, meteorological data, and model results are described in this section.

The calculated ambient air quality modeled impacts were compared with the Class II EPA SILs and National/Colorado AAQS.

4.1 Dispersion Model Selection

Air quality impacts to the Class II areas surrounding the PCMS were determined using the latest version of the EPA's ISCST3 dispersion model. While ISCST3 is in the process of being replaced by the AERMOD model, ISCST3 is still appropriate for this air quality modeling analysis.

4.1.1 Model Options

The ISCST3 model was run with regulatory default options, which are:

- Buoyancy-induced dispersion
- No gradual plume rise
- Default wind profile exponents
- Default vertical potential temperature gradients

Building downwash was not considered for this air quality analysis since the point source is representing multiple sources located at multiple buildings with unknown dimensions. The option for modeling elevated terrain was selected.

For the modeling run with meteorological data at Colorado Springs Airport, default ISCST3 options were used. For the modeling run with meteorological data at Rio Grande Portland Cement, the MSGPRO (allow missing met data) option was used and the anemometer height was set at 30 meters as recommended by APCD (APCD 2006a).

4.1.2 Rural/Urban Classification

The ISCST3 model includes both rural and urban algorithm options. These options affect the wind speed profile, dispersion rates, and mixing-height formula used in calculating ground-level pollutant concentrations. A protocol was developed by the EPA to classify an area as either rural or urban for dispersion modeling purposes. The classification is based on average heat flux, land use, or population density within a three-km (1.9 miles) radius from the modeled facility, with land use being the most definitive criterion (EPA 2003). The urban/rural classification scheme based on land use is as follows:

The land use within the total area (A_0), circumscribed by a 3-km circle about the source, is classified using the meteorological land use-typing scheme proposed by Auer (1978). The classification scheme requires that more than 50% of the area, A_0 , be from the following land use types in order to be considered urban for dispersion modeling purposes: heavy industrial; light-moderate industrial; commercial; single-family compact residential; and multi-family compact residential. Otherwise, the use of rural dispersion coefficients is appropriate.

The PCMS has little, if any, heavy industrial, light-moderate industrial, commercial, single-family compact residential, or multi-family compact residential land within 3 km. Based on EPA's definition, the PCMS is considered a rural area and therefore, the rural option was used.

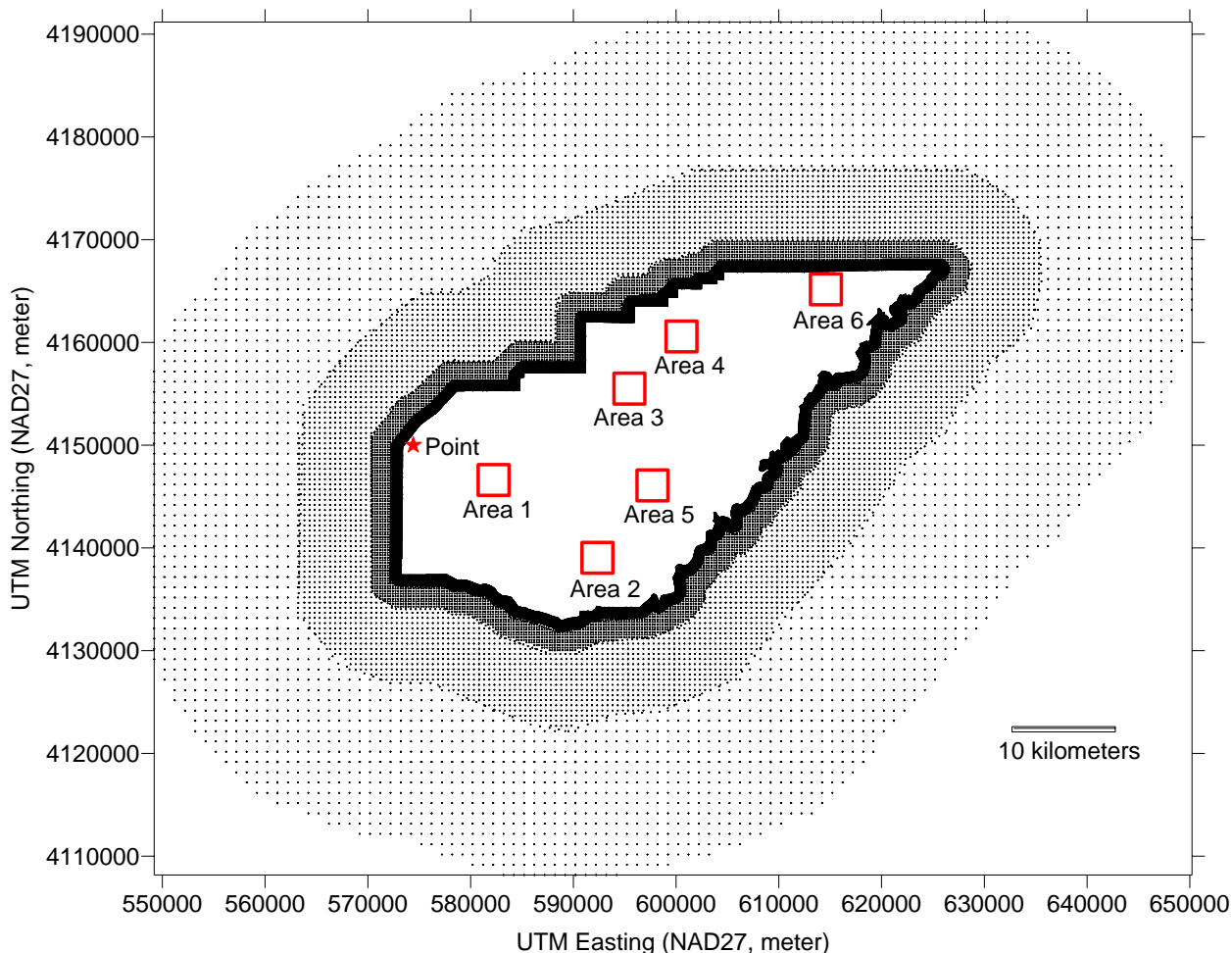
4.2 Receptor Grid

A receptor grid, or network, defines the locations of predicted air concentrations that are used to assess compliance with the relevant standards or guidelines. The following comprehensive fine and coarse receptor network was used for this analysis:

- 50-meter (m) spaced receptors along the project property boundary
- 100-m spaced receptors out to 1 km from the property boundary
- 250-m spaced receptors from beyond 1 km to 3 km from the property boundary
- 500-m spaced receptors from beyond 3 km to 10 km from the property boundary
- 1,000-m spaced receptors from beyond 10 km to 25 km from the property boundary

This network used Cartesian (X, Y) receptors with UTM NAD27 coordinates. Base elevation of all the receptors were found using terrain elevations interpolated from U.S. Geological Survey (USGS) 7.5 minute Digital Elevation Model (DEM) data. The receptor grid is shown in Figure 4-1.

Figure 4-1. Modeling Receptor Grids



4.3 Meteorological Data Processing

USGS routinely collects a limited amount of meteorological data to support operations and ambient monitoring at the PCMS. The data are collected at various locations at the PCMS and have been used in the past to qualitatively determine potential offsite plume transport, especially from smoke obscurant training.

While the data remain a good resource for the PCMS, it is not collected in a manner consistent with the needs of EPA guidance (i.e., Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005, Feb 2000) for regulatory modeling analyses. That is, the data have not been demonstrated to have been collected, audited, and archived in a manner consistent with the requirements of the EPA guidance, nor reviewed by an outside agency.

Therefore, a five-year, pre-Automated Surface Observing System (ASOS) meteorological data set (1986-1990) was used for this analysis, based on surface data from the Colorado Springs Airport (Weather Bureau Army Navy [WBAN] 93037). Upper air data were also needed to estimate hourly mixing heights, which are required inputs to the ISCST3 dispersion model. The most suitable National Weather Service (NWS) station to the project site that

routinely performs upper air soundings was the Denver Stapleton International Airport NWS (WBAN 23062). A five-year, pre-ASOS meteorological data set (1986-1990) and one-year, Rio Grande Portland Cement (from 5/7/1998 to 5/7/1999) were used for this analysis.

In order to be consistent with CDPHE's modeling standard, the five years of ISCST3 input meteorology was obtained from CDPHE. This meteorological data was used for both ISCST3 and CALPUFF-screening models.

Windroses from several stations were compared to assess what station was most representative of the meteorological conditions at the PCMS. The windrose of Colorado Springs Airport surface meteorological data was compared with the windrose of the PCMS Mincic Ranch monitoring station's available data (1983-1986). Since the Pueblo Memorial Airport meteorological station is closer to the PCMS, the windrose of its monitoring station during the same time period was also compared to the Mincic Ranch monitoring data.

Data from both the Mincic Ranch and Colorado Springs Airport monitoring stations showed strong north-south wind direction, while the windrose from the Pueblo Memorial Airport showed stronger west-east wind direction. Therefore, the Colorado Springs Airport meteorological data was decided to be more appropriate for this modeling analysis.

In addition, as APCD requested, a separate modeling analysis was generated using one year of ISC-ready meteorological data from a meteorological tower south of Pueblo, Colorado (UTM zone 13, easting 530480 m, northing 4219610 m). The tower was installed and operated by Rio Grande Portland Cement to support a major source PSD permit application in the late 1990s. The data range is from 7 May 1998 to 7 May 1999. As recommended by APCD, the anemometer height for the Rio Grande met tower was set to 30 meters, and the MSGPRO (missing data) option in ISCST3 was used (APCD 2006a).

The windrose of Colorado Springs Airport surface meteorological data and the windrose of Rio Grande Portland Cement are shown in Figures 4-2 and 4-3.

Figure 4-2. Windrose of Colorado Springs Airport Meteorological Station

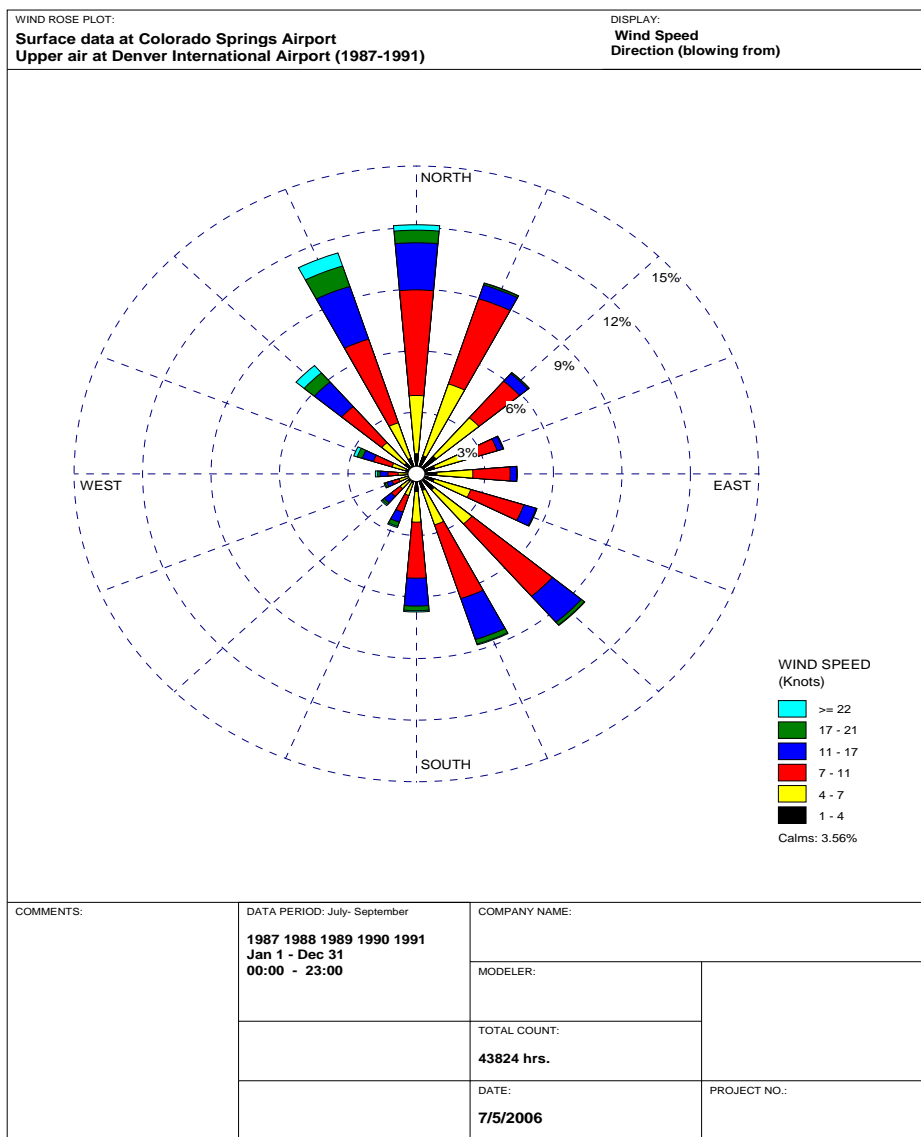
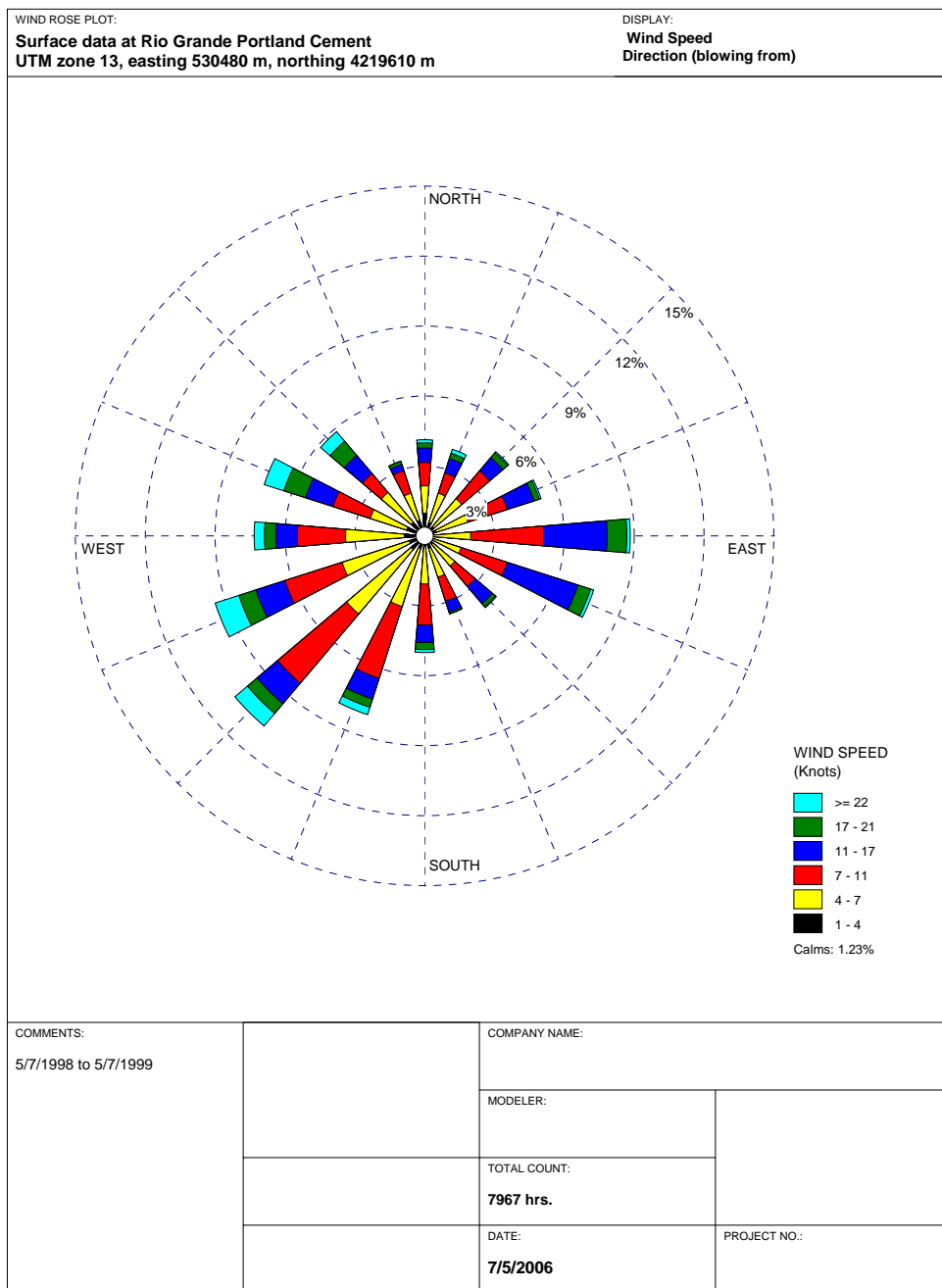


Figure 4-3. Windrose of Rio Grande Portland Cement Meteorological Station



WRPLOT View - Lakes Environmental Software

4.4 Dispersion Modeling Results

The results of the SIL analysis with 5-year of Colorado Springs Airport meteorological data are shown in Table 5-1. PSD increment consumption does not apply because the proposed action is not a PSD major source or major modification; the PM₁₀ emission increase from stationary sources is 3.62 tpy. The results of the SIL analysis with 1-year of Rio Grade Portland Cement meteorological data are shown In Table 5-2. Modeled NO_x impact was converted to NO₂ impact using the EPA Ambient Ratio Method (ARM) default factor of 0.75. The modeling result with 5-year of Colorado Springs Airport meteorological data indicates that modeling impacts are below the SILs for CO and SO₂, but not for NO₂ and PM₁₀. The annual NO₂ concentration exceeds the SIL by 1.09 µg/m³. The maximum annual NO₂ concentration occurred near the point source cantonment area. Since modeling was conducted conservatively (placing all stationary sources at the nearest location to the fence line) the annual NO₂ concentration tends to be over-predicted.

The background concentration of NO₂ was obtained from the AirData website for the monitor closest to the project site (EPA 2006), and the monitor is located in the City of Denver, Denver County (monitor no. 0803100024260201) (EPA 2006). The 2005 annual average monitored concentration of 51.82 µg/m³ (0.0276 parts per million [ppm]) was used for background annual NO₂ concentration. Annual background concentration (51.82 µg/m³) was added to the maximum annual NO₂ concentration and the total concentration was compared with National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS) of 50 µg/m³. The total concentration (modeled NO_x impact plus background concentration) is in compliance with the AAQS.

The modeled maximum annual PM₁₀ concentration with 5-year of Colorado Springs Airport meteorological data exceeds the SIL by 1.25 µg/m³. Therefore, the annual background concentration (9 µg/m³) was added to the maximum annual PM₁₀ concentration and the total concentration was compared with National Ambient Air Quality Standards (NAAQS) of 50 µg/m³ (APCD 2006b). The total annual PM₁₀ impact is in compliance with the AAQS. The maximum 24-hour PM₁₀ concentration of 66.82 µg/m³ exceeds the SIL. Therefore, the background 24-hour concentration (55 µg/m³) was added to the maximum annual PM₁₀ concentration and the total concentration was compared with AAQS of 150 µg/m³ (APCD 2006b). The maximum 24-hour PM₁₀ impact is in compliance with the AAQS.

Modeling results with 1-year of Rio Grade Portland Cement meteorological data indicates that emissions are below the SILs for CO and SO₂, but not for NO₂ and PM₁₀. Therefore, background concentrations of NO₂ and PM₁₀ were added to the modeled concentration, and the total concentration was compared to the AAQS. The total concentrations of NO₂ and PM₁₀ do not exceed the National or Colorado AAQS.

Table 4-1. Maximum Project Impact, Modeled with Colorado Springs Airport Meteorological Data, Compared with Class II EPA SILs and National / Colorado AAQS

Pollutant	Averaging Period	Max 1986 (µg/m ³)	Max 1987 (µg/m ³)	Max 1988(µg/m ³)	Max 1989 (µg/m ³)	Max 1990 (µg/m ³)	Maximum Predicted Concentration (µg/m ³)	EPA SIL (µg/m ³)	Background Concentration (µg/m ³)	Maximum Predicted + Background Concentration (µg/m ³)	National Primary AAQS (µg/m ³)	Colorado AAQS (µg/m ³)
CO	1-Hour	190.43	142.45	180.27	200.28	138.64	200.28	500			10,000	10,000
	8-Hour	61.40	38.12	39.15	46.46	39.97	61.40	2,000			40,000	40,000
NO ₂ ^a	Annual	1.8936	1.7441	1.7741	2.0982	1.8440	2.0982	1	51.82	53.92	100	100
PM ₁₀	Annual	1.7389	1.5816	1.6296	2.1255	2.2549	2.2549	1	9	11.25	50	50
	24-Hour	34.48	29.74	46.85	66.82	34.21	66.82	5	55	121.82	150	150
SO ₂	Annual	0.0154	0.0142	0.01439	0.0170	0.0150	0.0170	1			80	80
	3-Hour	0.5905	0.5933	0.05343	0.6022	0.6014	0.6022	5			365	365
	24-Hour	0.2351	0.1427	0.1370	0.1748	0.1805	0.2351	25			1300	700

^a EPA ARM, 0.75, was applied

Table 4-2. Maximum Project Impact, Modeled with Rio Grande Portland Cement Meteorological Data, Compared with Class II EPA SILs and National / Colorado AAQS

Pollutant	Averaging Period	1998 Maximum Predicted Concentration (µg/m³)	EPA SIL (µg/m³)	Background Concentration (µg/m³)	Maximum Predicted + Background Concentration (µg/m³)	National Primary AAQS (µg/m³)	Colorado AAQS (µg/m³)
CO	1-Hour	195.74	500			10,000	10,000
	8-Hour	59.65	2,000			40,000	40,000
NO ₂ ^a	Annual	1.4179	1	51.82	53.24	100	100
PM ₁₀	Annual	2.5888	1	9	11.59	50	50
	24-Hour	43.50	5	55	98.50	150	150
SO ₂	Annual	0.0115	1			80	80
	3-Hour	0.7208	5			365	365
	24-Hour	0.2571	25			1300	700

5.0 Class I Air Quality Related Values Impact Analysis

5.1 CALPUFF Screening Model Selection

To estimate air quality impacts at the Class I areas, the EPA-recommended CALPUFF model was used. The CALPUFF model is a puff-type model that can incorporate three-dimensionally varying wind fields, wet and dry deposition, and atmospheric gas and particle phase chemistry.

CALPUFF was run in a screening mode (Tier 2 or CALPUFF-Lite) as outlined in the EPA document *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (USEPA, 1998). This methodology is referred to as “CALPUFF-Lite” because it bypasses the need to generate a full three-dimensional wind field with CALMET. Instead, an ISCST3 single-station meteorological field is used. To conduct the CALPUFF screening analysis, the 5 years of ISCST3 input meteorological data, obtained from APCD, was used. The meteorological data is described in Section 4.3.

For the conservative modeling purpose, all emissions from stationary point sources and area sources were placed at the cantonment area point source (i.e. pseudo-source). One pseudo-point source at the cantonment area creates a cohesive plume, resulting in a more conservative modeled impact.

5.2 Model Selection and Setup

The locations of Class I areas and sensitive Class II areas within 200 km of the center of the PCMS site (UTM Zone 13 NAD27, 595km Easting, 4150km Northing) are shown in Figure 5-1. Receptor information for each wilderness area, obtained from the National Park Service’s NPS Convert Class One Areas database (provided by the NPS), was used to calculate the closest and most distant Class I area boundary from the facility (NPS 2006).

There are no Class I or sensitive Class II areas located within 100 km from the PCMS, the typical visibility impact analysis distance. However, increment and visibility analyses were conservatively performed for Class I and sensitive Class II areas located within 200 kilometers of the PCMS cantonment area, including the Great Sand Dune National Park and Preserve (Class I area, minimum distance of 143 km [89 miles] away and maximum distance of 155.68 km [97 miles] away), the Wheeler Peak Wilderness (Class I area, minimum distance of 158 km [98 miles] away and maximum distance of 178 km [111 miles] away), and the Florissant Fossil Beds National Monument (Class II area, average distance of 197 km [122 miles] away).

5.2.1 Receptor Grid

A receptor grid was created in accordance with IWAQM guidance. For each Class I area, CALPUFF-Lite runs were executed using receptor rings. The guidance suggests that receptors are spaced at one-degree intervals around each ring. The rings of receptors are then positioned so that they coincide with the distances from the source to the Class I area boundaries. Two rings of receptors or one ring of receptors are used for each Class I area depending on the relative size of the area. Rings are placed at the distance coincident with the nearest Class I area boundary, and the farthest Class I area boundary. The rings of receptors

used in this assessment are depicted in Figure 5-1. Shown are the three Class I areas and the receptor rings and receptor locations where impacts were assessed.

For Great Sand Dune National Park and Preserve and Wheeler Peak Wilderness, two rings of receptors were placed using the average base elevation of the Class I area. Florissant Fossil Beds National Monument was modeled with one ring of receptors placed at a distance coinciding with the middle of the Class II area with the average base elevation of the area. The ring receptors are described in Table 5-3.

The modeling domain was extended approximately 50 km beyond the farthest receptor to allow for puffs to pass the receptor rings then move back towards the source.

Figure 5-1. Location of Center of the PCMS and Ring Receptors within 200 km

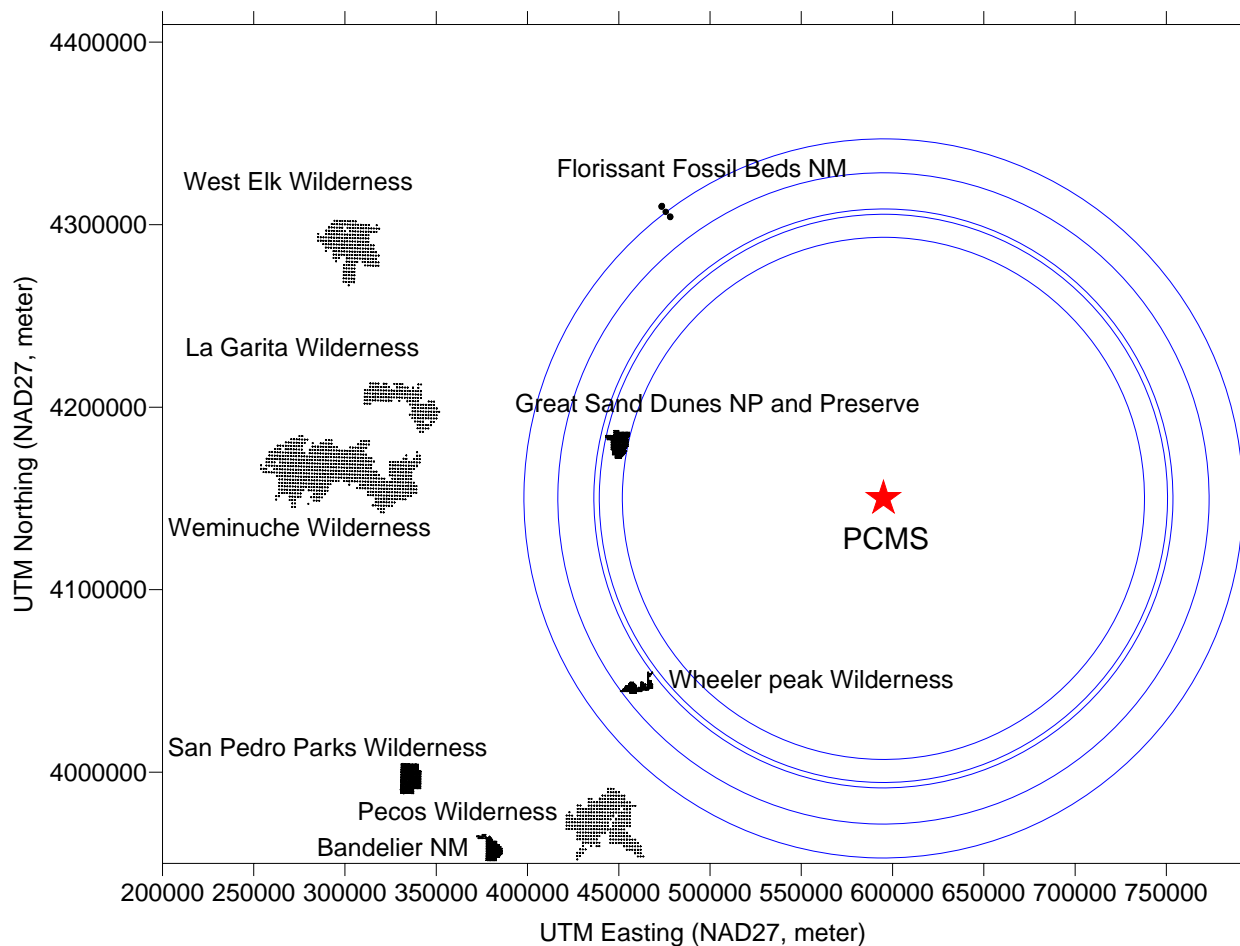


Table 5-1. Ring Receptors

Parameter	Class I Area – Great Sand Dune National Park and Preserve	Class I Area – Wheeler Peak Wilderness	Sensitive Class II Area – Florissant Fossil Beds National Monument
Min Distance (km)	143.05	158.62	197
Max Distance (km)	155.68	178.43	
Base Elevation (m)	2491.83	3310.05	2599

5.2.2 CALPUFF Modeling Inputs

The CALPUFF model inputs are shown in Table 5-4. The full chemistry option of CALPUFF was turned on (MCHEM =1, MESOPUFF II scheme), and deposition option was turned on (MWET = 1 and MDRY = 1). Maximum mixing height was set up as 5000 meters because the mixing height in Colorado is much higher than CALPUFF-default of 3000 meters during the summer time. Typical summertime overland mixing heights in the Front Range are often well in excess of 3000 meters. Summertime mixing heights in the Denver area are often at 3600 to 6000 meters above sea level. For example, a sounding for the evening of July 1, 2002 suggests the mixing height was close to 6000 meters. As guided by CDPHE, monthly ozone concentration of 60 ppb and monthly ammonia concentration of 10 ppb were used in CALPUFF.

Table 5-2. CALPUFF Modeling Inputs

CALPUFF Variable	Specified Value	Comment
IBTZ	7	Base Time Zone
ISCDAT		Using ISC-Ready Meteorological Data
MGAUSS	1	Vertical Distribution Used In The Near Field
MCTADJ	3	Terrain Adjustment Method
MCTSG	0	Subgrid-Scale Complex Terrain Flag
MSLUG	0	Near-Field Puffs Modeled As Elongated 0
MTRANS	1	Transitional Plume Rise Modeled
MTIP	1	Stack Tip Downwash
MSHEAR	0	Vertical Wind Shear Modeled Above Stack Top
MSPLIT	0	Puff Splitting Allowed
MCHEM	1	Chemical Mechanism Flag
MWET	1	Wet Removal Modeled
MDRY	1	Dry Deposition Modeled
MDISP	3	Method Used To Compute Dispersion Coefficients
MTURBVW	3	Sigma-V/Sigma-Theta, Sigma-W Measurements Used
MROUGH	0	PG Sigma-Y,Z Adjusted For Roughness
MPARTL	1	Partial Plume Penetration Of Elevated Inversion (per IWAQM)
MTINV	0	Strength Of Temperature Inversion Provided In PROFILE.DAT Extended Records
MPDF	0	PDF Used For Dispersion Under Convective Conditions
MSGTIBL	0	Sub-Grid TIBL Module Used For Shore Line
MBCON	0	Boundary Conditions (Concentration) Modeled
MFOG	0	Configure For FOG Model Output
MREG	1	Test Options Specified To See If They Conform To Regulatory Values

CALPUFF Variable	Specified Value	Comment
PMP	UTM	Map Projection
IUTMZN	13	UTM Zone (not used for LCC except to check O3 file)
UTMHEM	N	Hemisphere For UTM Projection
DATUM	NAS-C	Datum-Region For Output Coordinates
NX	2	No. X Grid Cells
NY	2	No. Y Grid Cells
NZ	1	No. Vertical Layers
DGRIDKM	200	Grid Spacing (km)
XORIGKM	395	Reference Coordinate of Southwest Corner of (1,1)- X Coordinate
YORIGKM	3950	Reference Coordinate of Southwest Corner of (1,1)- Y Coordinate
RCUTR	30	Reference Cuticle Resistance
RGR	10	Reference Ground Resistance
REACTR	8	Reference Pollutant Reactivity
NINT	9	Number Of Particle-Size Intervals Used To Evaluate Effective Particle Deposition Velocity
IVEG	1	Vegetation State In Unirrigated Areas
MOZ	0	Ozone Data Input Option
MHFTSZ	0	Switch For Using Heffter Equation For Sigma Z As Above
WSCALM	.5	Minimum Wind Speed (m/s) Allowed For Non-Calm Conditions
XMAXZI	5000m	Maximum Mixing Height (m)
XMINZI	50	Minimum Mixing Height (m)
BCKO3	60	Monthly Background Ozone Concentration (ppb)
BCKNH3	10	Monthly Background Ammonia Concentration (ppb)

5.3 CALPUFF Screening Modeling Results

Final model results of emissions from the PCMS are shown in Table 5-5. The modeled impacts of criteria pollutants are compared with Class I area Significant Impact Levels (SIL). The model-predicted 24-hour PM₁₀ concentrations suggest potential exceedances of the SIL. However, the results are based on very conservative assumptions. The model does not take into account intervening terrain (source to receptor), the model assumes a cohesive plume from collocated and concentrated sources, and the model assumes steady-state hourly conditions. Additionally, the impacts may not occur at the area of interest, and because the change in emissions are not technically a major modification subject to this type of analysis, the results provided are overly conservative and of a comparative nature only.

Notwithstanding the conservatism of the modeling analysis, visibility results, which are expressed as the number of days with extinction change of 5.0%, indicate there is no exceedance of visibility threshold on Class I areas. The total modeled nitrogen and sulfur deposition rates each was compared to the U.S. National Park Service/U.S. Fish and Wildlife Service deposition analysis thresholds (DATs) for western states. Deposition thresholds of total nitrogen (N) and total sulfur (S) are both 0.005 kg/ha/yr. The model results show that there is no exceedance of the deposition threshold.

Table 5-3. CALPUFF Modeling Results

Class I & Class II Areas	Pollutant	NOx	SOx	SOx	SOx	PM	PM	Visibility	Deposition N	Deposition S
	Modeling Period	Annual	3-hr	24-hr	Annual	24-hr	Annual	>5%	kg/ha/yr	kg/ha/yr
	Year\SIL	0.1	1	0.2	0.08	0.32	0.16		0.005	0.005
Great Sand Dune	86	3.6479E-04	3.4445E-04	7.4175E-05	7.1903E-06	5.3085E-01	1.1773E-02	0	1.67E-04	3.62E-06
	87	3.6349E-04	5.0844E-04	1.0525E-04	7.7322E-06	6.9441E-01	1.0966E-02	0	2.08E-04	4.16E-06
	88	4.0051E-04	4.8367E-0	9.3173E-05	7.5251E-06	5.8642E-01	1.1631E-02	0	1.87E-04	3.81E-06
	89	3.0814E-04	5.3248E-04	1.5969E-04	6.5162E-06	4.2443E-01	9.4599E-03	0	1.75E-04	3.74E-06
	90	3.2045E-04	6.0714E-04	1.1350E-04	7.2864E-06	9.3380E-01	1.2843E-02	0	2.21E-04	4.32E-06
Wheeler Peak	86	2.0737E-04	3.5021E-04	6.7999E-05	5.0505E-06	4.7580E-01	7.5658E-03	0	1.21E-04	2.67E-06
	87	2.1557E-04	4.2692E-04	8.8413E-05	5.5730E-06	5.6580E-01	6.9778E-03	0	1.64E-04	3.26E-06
	88	2.2088E-04	4.5176E-04	7.5080E-05	5.1789E-06	5.3005E-01	7.0772E-03	0	1.48E-04	3.05E-06
	89	1.8483E-04	4.8508E-04	1.3634E-04	4.8298E-06	3.3110E-01	6.7710E-03	0	1.45E-04	2.80E-06
	90	1.9935E-04	4.7052E-04	8.9456E-05	5.5606E-06	7.4818E-01	7.5610E-03	0	1.65E-04	3.29E-06
Florissant Fossil Beds	86	6.1574E-05	1.8397E-04	4.1025E-05	2.1252E-06	3.6862E-01	2.8383E-03	0	7.88E-05	1.39E-06
	87	1.0448E-04	2.1292E-04	4.4147E-05	2.4605E-06	3.2935E-01	2.2840E-03	0	7.70E-05	1.49E-06
	88	5.3239E-05	3.1422E-04	4.5534E-05	2.1384E-06	2.7111E-01	1.8455E-03	0	7.43E-05	1.48E-06
	89	6.1002E-05	2.5277E-04	7.9093E-05	2.2020E-06	2.9891E-01	2.3178E-03	0	7.60E-05	1.44E-06
	90	5.2674E-05	2.2493E-04	4.6988E-05	2.2708E-06	5.2024E-01	2.5628E-03	0	6.94E-05	1.32E-06

6.0 Conclusion

As indicated by the ISCST3 dispersion modeling analysis, emissions of CO and SO₂ from the proposed Transformation activities resulted in modeled concentrations below the SILs. The emissions of NO_x and PM₁₀ from the source resulted in exceedance of SILs, but total concentration (modeled concentration + background concentration) does not exceed the National and Colorado AAQS. Therefore, the proposed Transformation activities will not have a significant impact on ambient air quality near the PCMS.

The conservative CALPUFF screening modeling, showed that visibility, deposition, and most of the criteria pollutant impacts would not exceed the threshold in any Class I or sensitive Class II area, and even the conservatively modeled particulate concentrations, though potentially above short-term SILs, suggest that there will be very little to no potential impact at the modeled areas.

Additionally, conservative VISCREEN and CALPUFF screening modeling (Appendix A) showed visibility impact on scenic and important views. There was exceedance of visibility thresholds on Southern Parcel, Rourke Ranch, and Spanish Peaks views. However, the occurrence of visible plumes will be limited to active training days.

In summary, the proposed Transformation activities at the PCMS will not have a significant impact on ambient air quality or AQRVs.

7.0 References

- APCD, 1998. *Technical Review Document for Operating Permit 95OPEP110 (Fort Carson)*. 1998
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Appendix A
Visibility Study of Class II Scenic View Areas

Class II Scenic View Area

In addition to the Class I and sensitive Class II areas visibility analysis, visibility analyses of five scenic and important views were conducted. Coleen Campbell at CDPHE identified the five scenic and important views for the project: View Number 19 (Picketwire Canyonlands- Dinosaur Tracks), View Number 20 (Picketwire Canyonlands- Rourke Ranch), View Number 21 (Picketwire, Canyonlands- Southern Parcel), View Number 32 (Spanish Peaks), and View Number 98 (Picture Canyon Historic District).

As IWAQM guidance suggested, receptors were spaced at one-degree intervals around each ring. One ring was placed at the distance coincident with the center of each scenic view. The locations of the scenic views with the rings are shown in Figure A-1.

Southern Parcel is 11.35 km from the center of the PCMS, but the receptor ring is basically within the PCMS area. Rourke Ranch is 28.19 km from the center of PCMS, but the view is actually adjacent to the boundary of PCMS. The receptor ring of Rourke Ranch was placed on the PCMS or surrounded by the PCMS boundary. Dinosaur Track is 37.84 km from the center of the PCMS, but it is located approximately 5 km from the boundary of PCMS. To estimate visibility impacts at the scenic views within 50 km from the facility, the VISCREEN model was used. The VISCREEN modeling showed visibility impacts for these three views (Delta-E exceeds 2.0 and green contrast against sky or terrain exceeds 0.05). The VISCREEN modeled visibility impact results are shown in Tables A-1 through A-3. Visibility impacts will be limited to active training days.

Spanish Peaks and Picture Canyon are 90.47 km and 117.07 km from the facility, respectively. For the scenic views beyond 50km from the source, the EPA-recommended CALPUFF-Lite model was used, the same model used for the Class I and sensitive Class II air quality impact analysis.

The CALPUFF-Lite modeled visibility impact results are shown in Table A-4. Modeling indicates the Spanish Peaks View has 2 to 9 days of exceedance of the 5% threshold. The plume will only be visible during active training days. The ring receptors at Dinosaur Track and Picture Canyon were below a 5% visibility threshold.

Figure A-1. Locations of Scenic and Important Views and their Ring Receptors

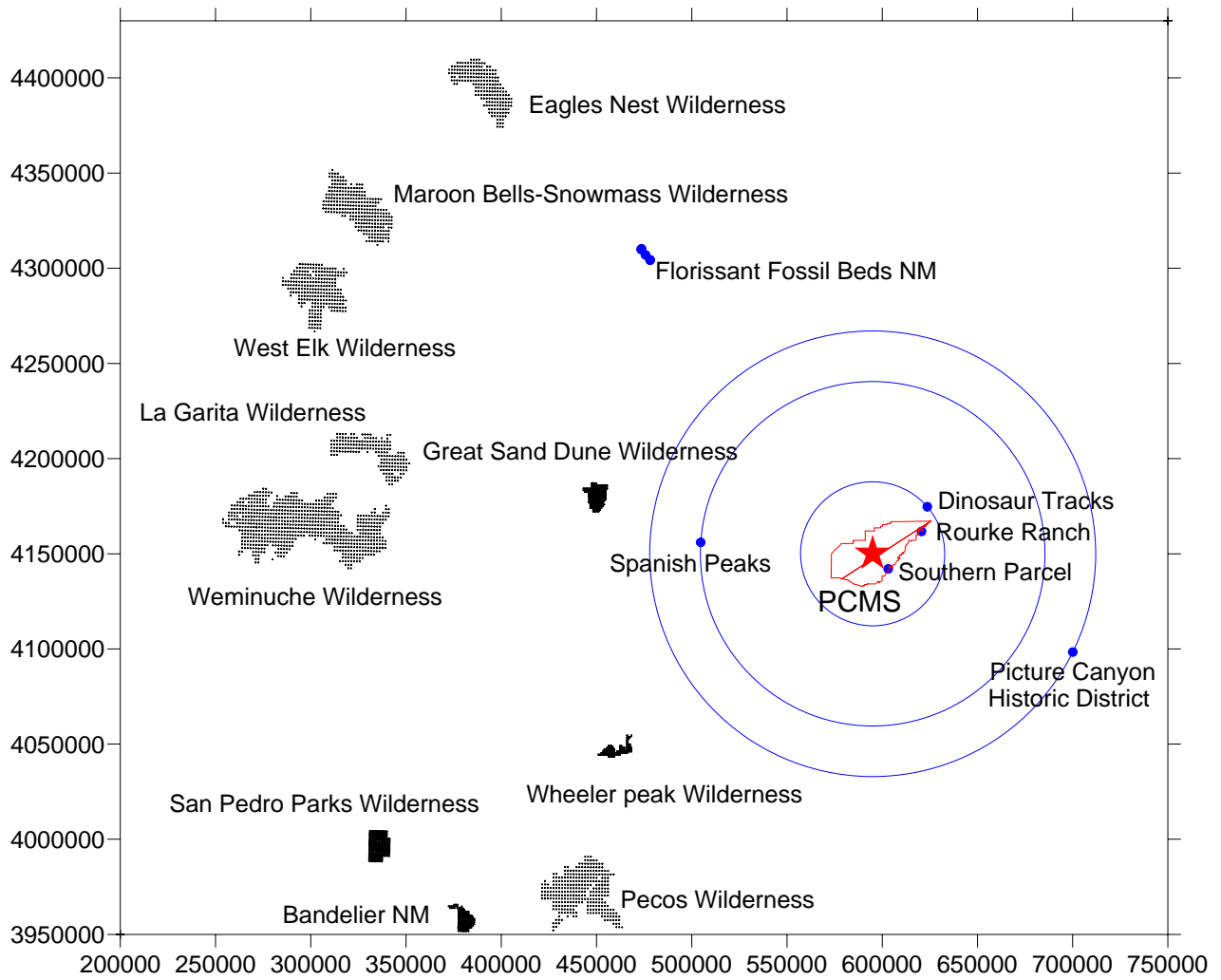


Table A-1. VISCREEN result of Southern Parcel

Background	Theta	Azi	Distance	Alpha	Plume Delta E	Plume Contrast
Sky	10	118	13	50	41.519	0.960
Sky	140	118	13	50	11.738	-0.370
Terrain	10	84	11.4	84	73.535	0.629
Terrain	140	84	11.4	84	14.712	0.158

Table A-2. VISCREEN result of Rourke Ranch

Background	Theta	Azi	Distance	Alpha	Plume Delta E	Plume Contrast
Sky	10	102	30	67	28.9	0.635
Sky	140	102	30	67	7.2	-0.245
Terrain	10	84	28.2	84	48.4	0.459
Terrain	140	84	28.2	84	7.5	0.113

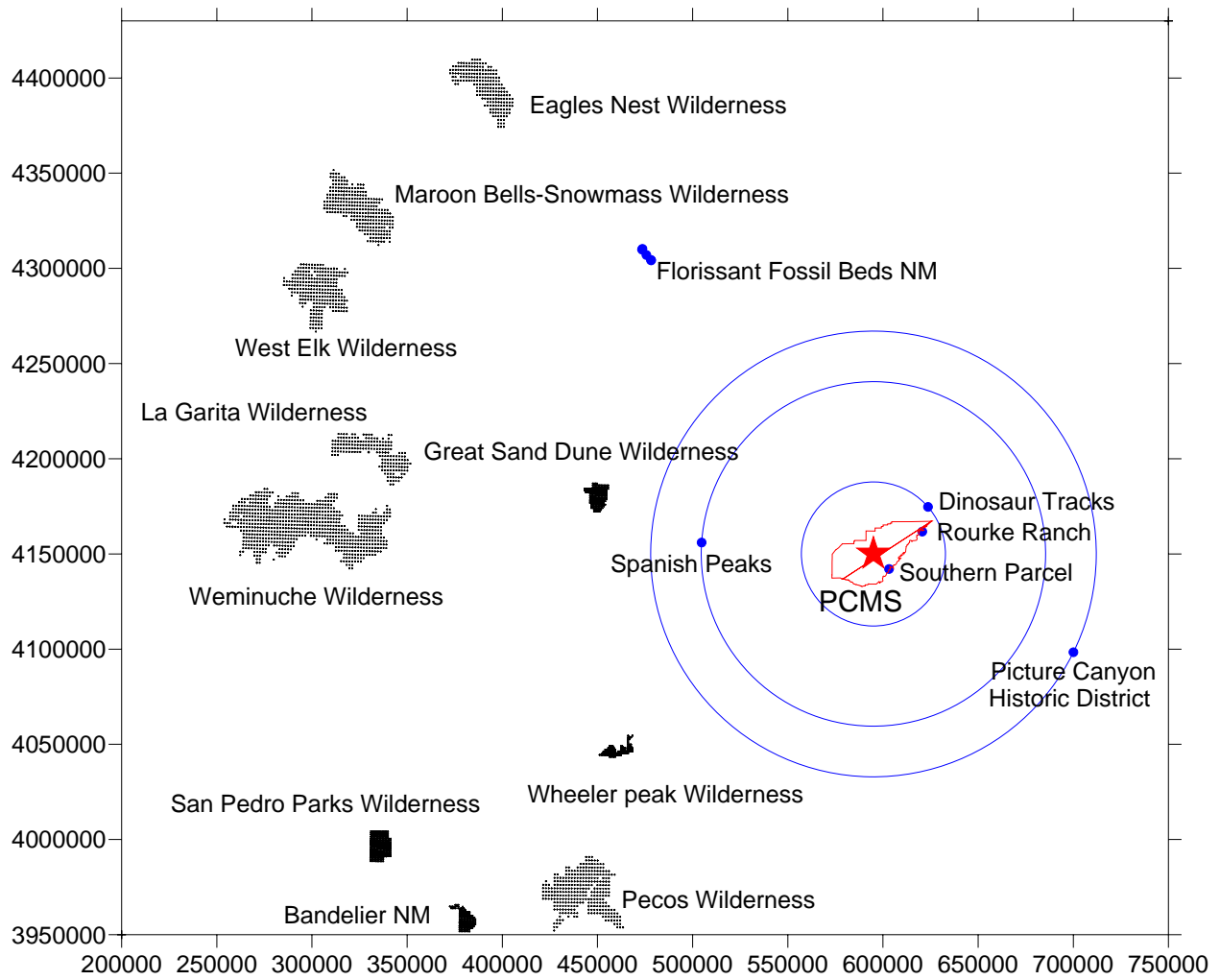
Table A-3. VISCREEN result of Dinosaur Tracks

Background	Theta	Azi	Distance	Alpha	Plume Delta E	Plume Contrast
Sky	10	93	39	76	25.5	0.552
Sky	140	93	39	76	6.2	-0.213
Terrain	10	84	37.8	84	40.4	0.397
Terrain	140	84	37.8	84	5.9	0.101

Table A-4. CAPUFF-lite result of Dinosaur Track, Spanish Peaks, and Picture Canyon

Scenic Views	Height of Ring Receptor (m)	Distance from the center of PCMS (km)	Visibility Impact (Threshold > 5%)				
			1986	1986	1986	1986	1986
Dinosaur Track	1360	37.84	0	0	0	0	0
Spanish Peaks	2057	90.47	5	7	2	2	9
Picture Canyon	1311	117.07	0	0	0	0	0

Figure A-2. Location of Scenic and Important Views and Ring Receptors



Appendix B
List of Preparers

List of Preparers

Name of Preparer	Education	Years of Experience	Technical Expertise
Kathryn Fontaine	B.S., Civil Engineering	18 years	Air Quality Specialist
Mike Putney	B.S., Natural Res. Mgmt., MEPM, Environmental Policy & Management	18 years	Air Quality Specialist
Sunghye Chang	Ph. D, Department of Civil, Architectural, Environmental Engineering	6 years	Air Quality Modeler
Stephen Barnard – Technical Review of Document	B.S., Atmospheric and Oceanic Sciences	25 years experience	Senior Scientist
Mike Kendall – Review of Document	B.A., Geography	23 years	Sr. Air Program Manager
Perry Fontana	B.S./M.S. meteorology	28 years experience	Senior Technical Reviewer

Appendix C
Persons/Agencies Consulted

INFORMATION SOURCES

Emission Unit	Information	Source	Phone No.
Boilers, Heaters, and Furnaces	Heater rating of each combustion source	Sally Atkins, DECAM; PCMS CY 2004 Emission Inventory	(719) 526-6601
	Fuel allocation for each combustion source	Sally Atkins, DECAM	(719) 526-6601
	Projected fuel use	Brad Jones, Omaha COE; Gailen Rejda, Omaha COE	(402) 221-3065
New Construction	Size and type of buildings	Janet Rodriguez, CH2MHILL	(720) 286-5232
Smoke and Obscurants	Projected increase	Lt. Colonel Robert Walker, G3/DPTM	(719) 526.9870
	Past Usage	Sally Atkins, DECAM; PCMS CY 2004 Emission Inventory; PCMS CY 2005 12-month rolling totals	(719) 526-6601
Storage Tanks	Storage Tank throughput, Fuel Type	Dale Elliott, PCMS; Tracy Graham, PCMS	(719) 846-2806 (719) 526-9072
Tank Trails	Brigade vehicle breakout, vehicle weights, and vehicle miles traveled for PCMS training.	Dan Benford, DPTM, Range Division	(719) 526-9716
Prescribed Burning	Acreage burned and fuel types	Sally Atkins, DECAM	(719) 526-6601
Tank Trails/Convoys	Vehicle Specifications	Patty Martinez, DOL	(719) 526-1159
	Pinon Canyon Maneuver Site Traffic Study	Mike Ackerman, DPW	(410) 436-6859
PCMS Convoys	Vehicle Types, distance, and convoy route.	Rick Orphan, DPW	(719) 526-9267
Emission increase	Dispersion Modeling Recommendations	Chuck Machovec, CDPHE, APCD	(303) 692-3249

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Under Contract to
Army Environmental Center

for

U.S. Army, Fort Carson, Colorado



APPENDIX D

Noise Supporting Documentation

The primary means of assessing military environmental noise is through computer modeling. Computer noise models require various operational data, such as types of operations/ weapons and number, location, and time of training. The output from the models is summarized on installation land use maps in the form of noise contours. This fact sheet presents information about the various computer models used to generate noise contour maps. *Note: Noise contours are not generated from actual noise measurements because the process would be too labor- and equipment-intensive, requiring months of monitoring at hundreds of measurement sites.*

How is noise modeled?

Calculating Average Noise Levels

Department of Defense bases/installations use computer modeling programs to determine the average daily noise for aircraft operations generated over the period of one year. Generally, moments of quiet are averaged together with moments where loud noises can be heard. The models also add a 10-decibel penalty to nighttime noise (10 pm to 7 am) to account for higher annoyance usually associated with nighttime noise events. In California, a 5-decibel penalty is also included for evening noise events (7 pm to 10 pm).

High-Energy Impulsive Noise (abrupt, short-duration noise such as from explosions and artillery)

The noise simulation program used to assess large-caliber (20-millimeter and greater) weapons is BNOISE2. It models the noise from the muzzle blast, the explosive detonation at impact, and the bow shock caused by the round going down range. The effects of terrain on sound travel (propagation) are also included. The BNOISE2 program requires operational data concerning type of weapons fired from each range or firing point, including demolitions, the number and type of rounds fired from each weapon, the location of targets for each range or firing point, the amount of propellant used to reach the target and time of day.

Aircraft Noise

Noise contours for aircraft activity at an airfield are generated using the NOISEMAP computer program. The required inputs to the program are the location of the flight tracks, aircraft altitudes, the number of each type of aircraft using each flight track and time of day.

Rotary-wing noise, including helicopters and tilt-rotors, is modeled using the Rotorcraft Noise Model (RNM) originally developed by NASA. RNM includes sound hemispheres around the aircraft based on various performance parameters and propagates noise in the rotor plane. Thus, rotary wing noise can be described fore and aft of the aircraft as well as in front of and behind the advancing blade.

The noise zones for the helicopter Nap of the Earth (NOE) routes and low-altitude flight tracks are generated using the HELOSLICE computer program. HELOSLICE is a simplified version of the NOISEMAP computer program, developed to predict the noise from operations at remote landing areas, flight tracks, and NOE routes. The required inputs to this model include the number and type of helicopter using each area or route and the altitude of the helicopter at the point of interest.

ROUTEMAP is a model that calculates the noise levels on the ground along a military training route (MTR). The inputs to the model are the altitude, power setting, speed and number of operations by aircraft type for a one-month period.

Small Arms Noise

The Small Arms Range Noise Assessment Model (SARNAM) computer program is used to generate the noise contours for small arms (up to 50-caliber) ranges weapon systems. It includes an extensive selection of weapons in the source library and can incorporate information from multiple ranges of various types.

Predicting Noise and Annoyance from Infrequent Events

Average daily noise levels can sometimes understate the severity of an infrequent, single-noise event because annoying noise peaks can be “averaged out.” So it is helpful to be able to measure specific noise levels from single events, such as artillery firings or explosive detonations. This information can be useful when predicting annoyance and potential complaints. The BNOISE2 and SARNAM computer models include the capability to predict the single-event levels. The following models are also used to predict single-event levels.

High-Energy Impulsive Noise

The single-event noise levels from impulsive activities are predicted using the SHOT computer model. The effect of topography features between the noise source and the receiver is included in the model. The inputs to this model are the explosive weight or weapon and propellant charge size, distance between the source and the receiver, burial depth or elevation height if applicable, and location and height of a barrier, berm or hill, if one exists, between the source and receiver.

PEAKEST is a computer model used to predict the peak levels from the demolition of standard engineering and named explosives. It is used when the noise levels from an explosive detonation are required for planning and siting of these activities and for National Environmental Policy Act (NEPA) documentation.

Other Aircraft Noise

MR_NMAP is a computer model used to calculate the subsonic noise impact from aircraft operations in a military operations area (MOA) and in special use airspaces. The model includes an operations input program that describes the aircraft flight operation in existing or new airspace.

PCBOOM3 is a program that computes single-event sonic boom footprints from any supersonic vehicle maneuver. The use specifies the aircraft, the maneuver, and the atmosphere. The primary output is the sonic boom footprint in terms of equal over pressure on the ground, relative to the aircraft's position.

For more information about the Army's noise management program contact:

Operational Noise Program
U.S. Army Center for Health Promotion and
Preventive Medicine
MCHB-TS- EON
Aberdeen Proving Ground, MD 21010-5403
410-436-3829
<http://chppm-www.apgea.army.mil/dehe/morenoise/>

For more information on the Navy's Noise Management Program contact:

Special Assistant for AICUZ and Encroachment
Commander Navy Installations
Naval Facilities Engineering Command
Washington Navy Yard, Washington DC 20374
202-685-9181

For more information on the Air Force's Noise Management Program contact:

AICUZ/Noise Program Manager
Bases and Units Branch
HQ USAF/ILEPB
1260 Air Force Pentagon
Washington, D.C. 20330.
703-604-5277

For more information on the Marine Corp's Noise Management Program contact:

Community and Land Use Planner for AICUZ
Headquarter Marine Corps
Washington DC, 20380-1775
703-695-8240, ext 3350

NOISE ZONES DESCRIPTIONS AND LAND USE GUIDELINES

1. Day Night Level Descriptions.

(a) The Noise Zone III consists of the area around the source of the noise in which the level is greater than 70 decibels (dB), C-weighted day-night sound level (CDNL) for large caliber weapons, greater than 104 PK15(met) for small arms and greater than 75 dB, A-weighted day-night sound level (ADNL) for aircraft activity. The noise level within Noise Zone III is considered so severe that noise-sensitive land uses should not be considered therein.

(b) The Noise Zone II consists of an area where the day-night sound level is between 62 and 70 dB CDNL for large caliber weapons; 87 and 104 PK15(met) for small arms; and 65 and 75 dB ADNL for aircraft activity. Exposure to noise within this area is considered significant, and use of land within Noise Zone II should normally be limited to activities such as industrial, manufacturing, transportation, and resource production. However, if the community determines that land in Noise Zone II areas must be used for residential purposes, then noise level reduction features of 25 to 30 decibels should be incorporated into the design and construction of the buildings.

(c) The Noise Zone I include all areas around a noise source in which the day-night sound level is less than 62 dB CDNL for large caliber weapons, less than 87 PK15(met) for small arms and 65 dB ADNL for aircraft activity. This area is usually acceptable for all types of land use activities.

(d) The Land Use Planning Zone (LUPZ) DNL noise contours, 57 dB CDNL and 60 dB ADNL, represent an annual average that separates the Noise Zone II from the Noise Zone I. Taking all operations that occur over the year and dividing by the number of training days generates the contours. But, the noise environment varies daily and seasonally because operations are not consistent through all 365 days of the year. In addition, the Federal Interagency Committee on Urban Noise document states "Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider." For residential land uses, depending on attitudes and other factors, a 57 CDNL or 60 ADNL may be considered by the public as an impact on the community environment. In order to provide a planning tool that could be used to account for days of higher than average operations and possible annoyance, the LUPZ contour is being included on the noise contour maps.

(e) See Table 1 for land use guidelines.

Table 1. Land Use Planning Guidelines.

Noise Zones	Large-Caliber Weapons (CDNL)	Aircraft Activity (ADNL)	Small Arms PK15(met)
LUPZ	57 – 62	60-65	NA
I	< 62	<65	<87
II	62 - 70	65-75	87-104
III	> 70	>75	>104

Note:

LUPZ = Land Use Planning Zone

< = less than

> = greater than

2. PK15(met) Noise Contour Description.

(a) Community annoyance due to many types of transportation and industrial noise is typically and appropriately assessed based on average noise level over a protracted time period. The DNL is the primary descriptor used for this purpose in the United States. The DNL is the time weighted energy average sound level with a 10-dB penalty added to the nighttime levels (2200 to 0700 hours). The use of average noise level over a protracted time period generally does not adequately assess community noise impact and complaint potential due to relatively infrequent blast noise events or weapon firing. For example, for a small arms range at which hundreds of rounds are fired each year, resultant peak levels (PK) can easily exceed 104 dB in regions that annual DNL values indicate to be adequately quiet for housing.

(b) To account for statistical variation in received weapons noise level due to weather, it is recommended that the PK15(met) noise level be calculated. The peak contours show the expected level that one would get on a sound level meter when a weapon was fired. Since weather conditions can cause noise levels to vary significantly from day to day (even from hour to hour) the programs calculate a range of peak levels. This range is based on weather conditions that favor or hinder sound propagation. By plotting the PK15(met) contour, events would be expected to fall within the contours 85% of the time. This gives the installation and the community a more realistic means to consider the areas impacted by training noise without putting stipulations on land that would only receive high sound levels under infrequent weather conditions that favor sound propagation. This metric represents the best available scientific quantification for assessing the complaint risk of large and small caliber weapons ranges. The complaint risk areas for PK15(met) noise contours are defined as follows:

(1) The high risk of complaint area consists of the area around the source of the noise in which PK15(met) noise contour is greater than 130 dB for large caliber weapons.

(2) The moderate risk of complaint area consists of an area where the PK15(met) noise contour is between 115 dB and 130 dB for large caliber weapons.

(3) The low risk of complaint area includes all areas around a noise source in which the PK15(met) noise contour is less than 115 dB for large caliber weapons.

(c) See Table 2 for complaint risk guidelines.

Table 2. Complaint Risk Guidelines.

Risk of Complaints	Large Caliber Weapons (20mm and greater)
	PK15(met) dB Noise Contour
Low	< 115
Moderate	115 - 130
High	> 130

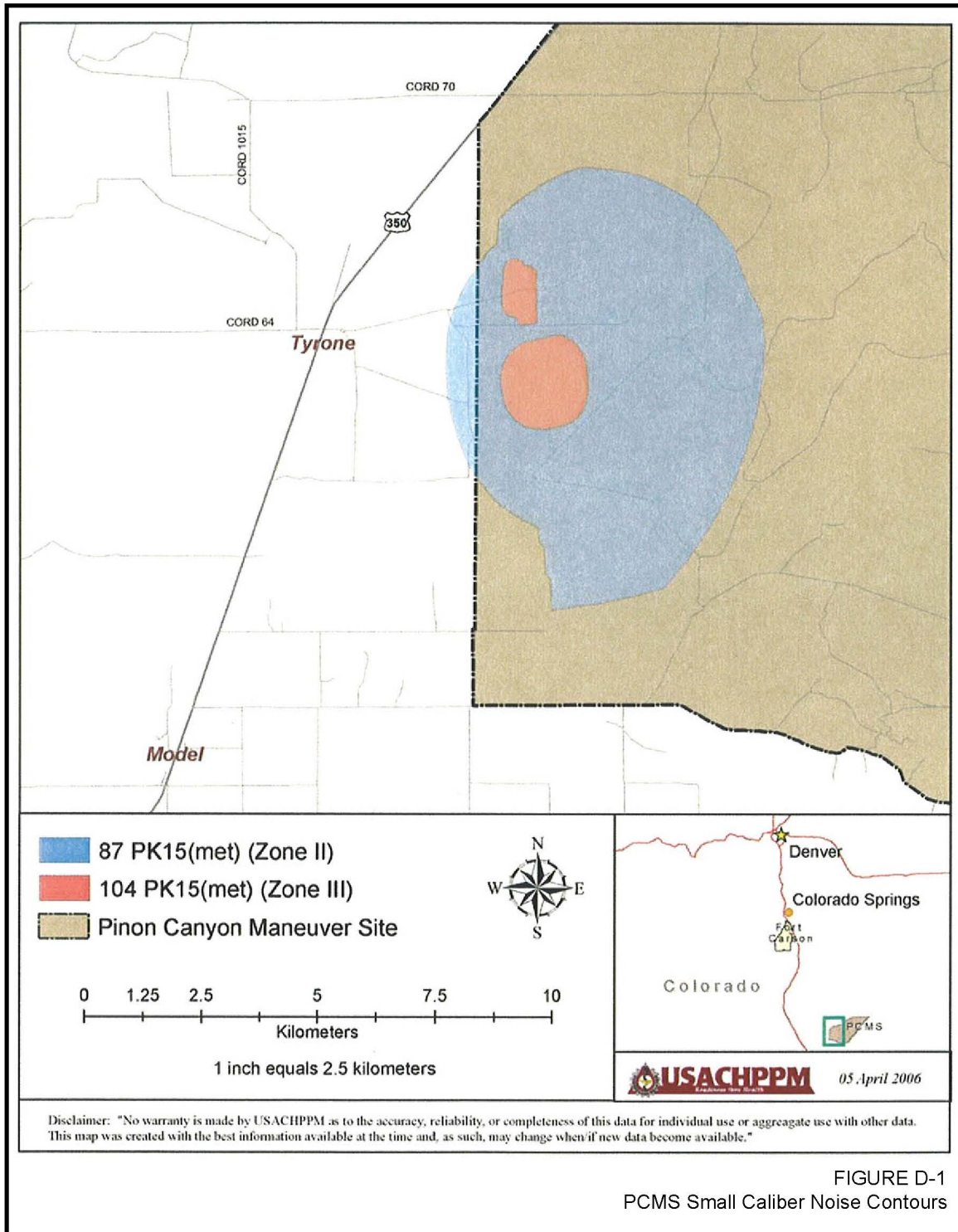


FIGURE D-1
PCMS Small Caliber Noise Contours

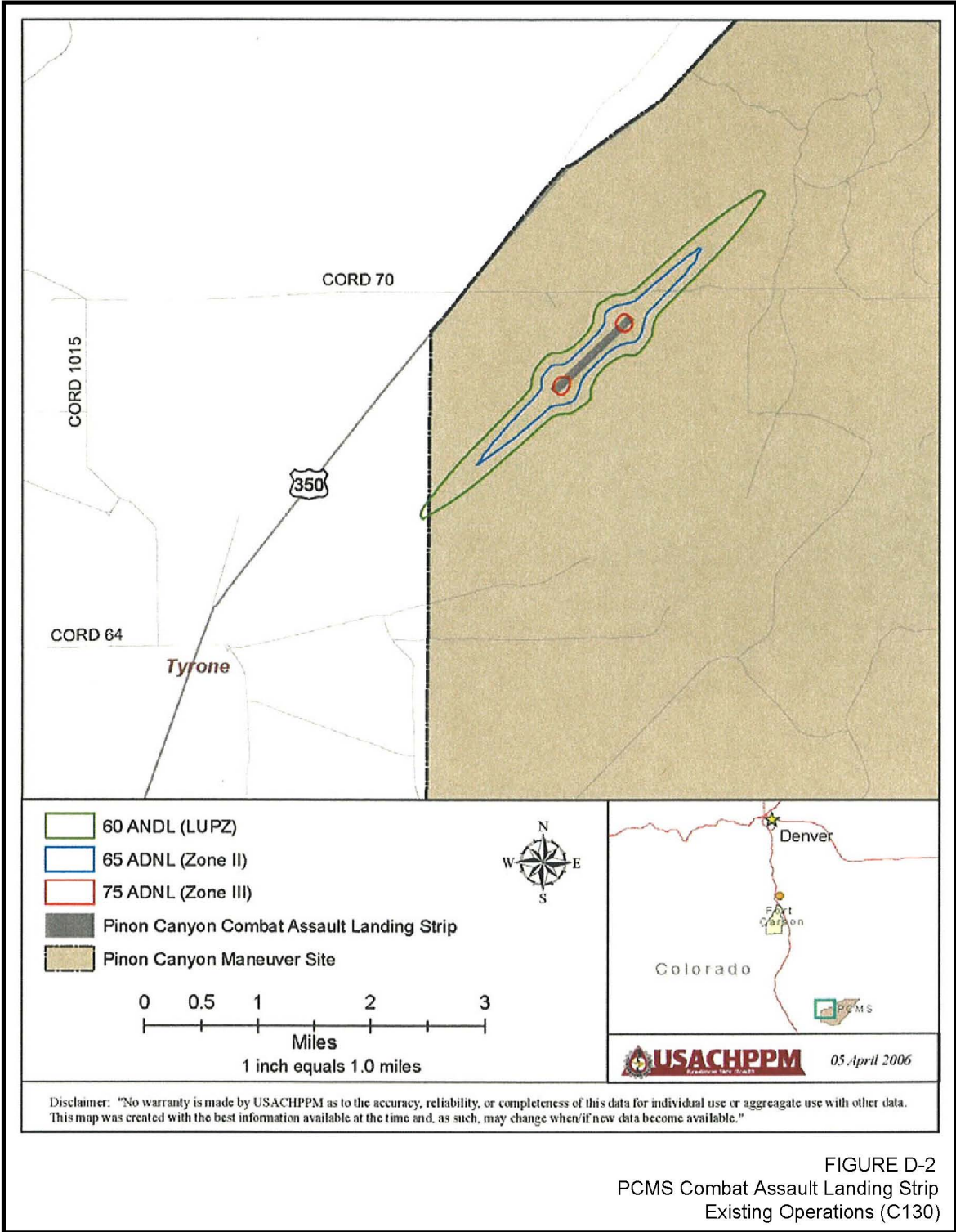


FIGURE D-2
PCMS Combat Assault Landing Strip
Existing Operations (C130)

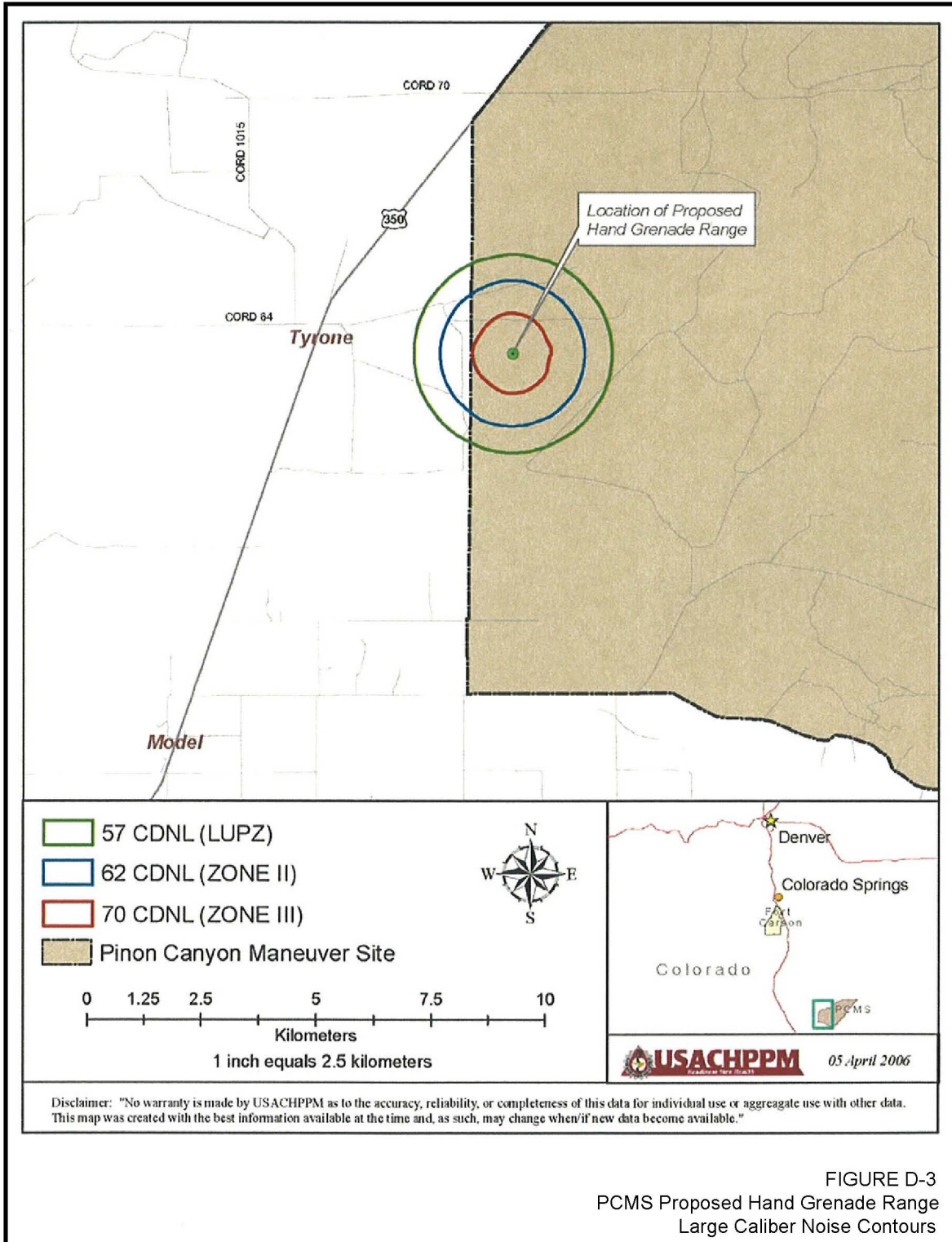


FIGURE D-3
 PCMS Proposed Hand Grenade Range
 Large Caliber Noise Contours

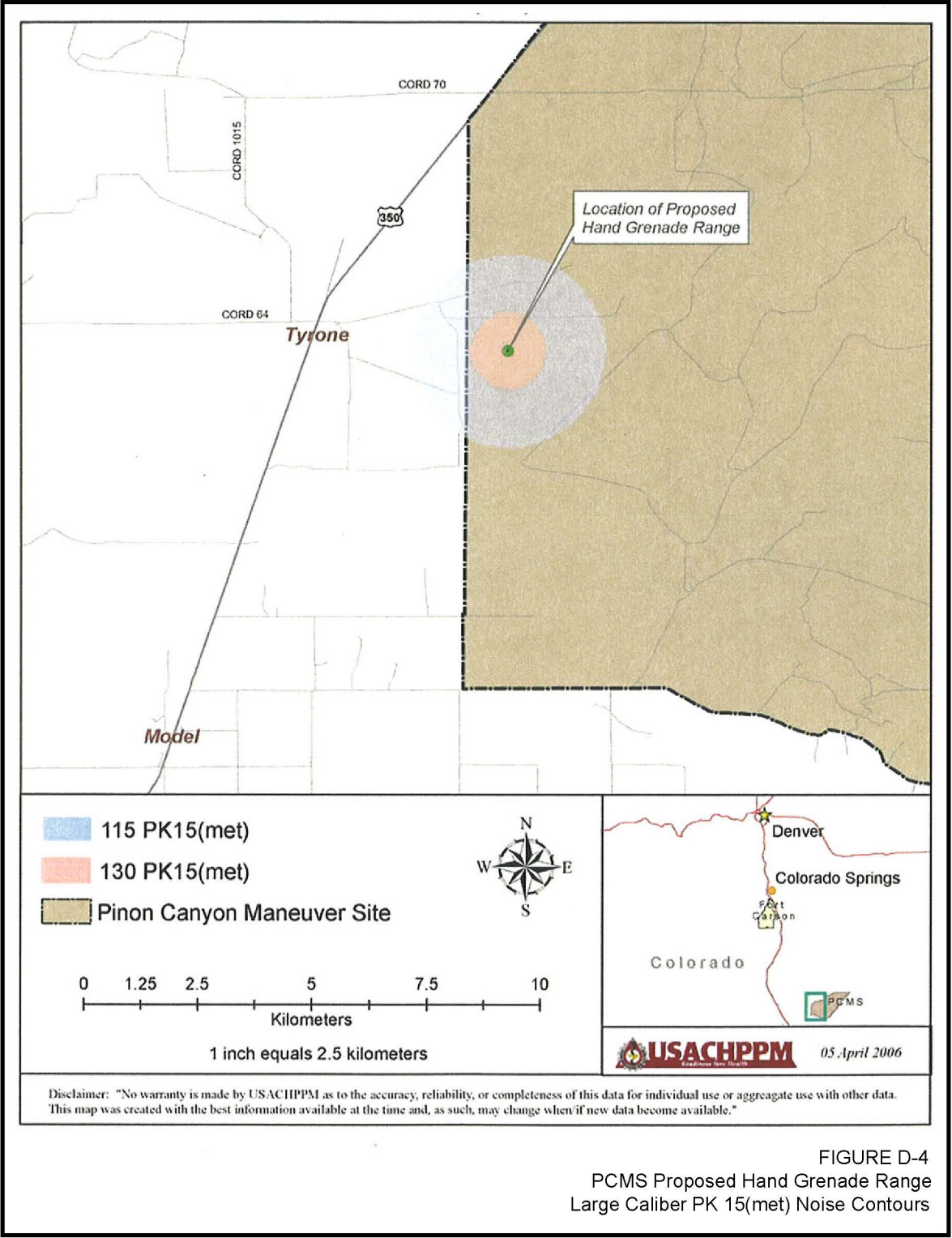


FIGURE D-4
 PCMS Proposed Hand Grenade Range
 Large Caliber PK 15(met) Noise Contours

Disclaimer: "No warranty is made by USACHPPM as to the accuracy, reliability, or completeness of this data for individual use or aggregate use with other data. This map was created with the best information available at the time and, as such, may change when/if new data become available."

APPENDIX E

Biological Resources Supporting Documentation

ATTACHMENT E.1

Plants Known to Occur at the PCMS

ATTACHMENT E.1

Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
Angiosperms (Flowering plants)					
Aceraceae (Maple family)					
<i>Acer glabrum</i>	Mountain maple	P	N	T	C
Agavaceae (Agave family)					
<i>Yucca glauca</i>	Small soapweed	P	N	F	C
Alismataceae (Water-Plantain family)					
<i>Alisma trivale</i>	Northern water plantain	N	P	F	W
<i>Alisma</i> spp. L.	Water plantain	N	P	F	W
<i>Sagittaria</i> spp. L.	Arrowhead	N	P	F	W
Alliaceae (Onion family)					
<i>Allium cernuum</i>	Wild onion	P	N	F	W
<i>Allium textile</i>	Textile onion	P	N	F	C
Alsiniaceae (Chickweed family)					
<i>Eremogone hookeri</i>	Hooker sandwort	P	N	F	W
<i>Paronychia sessiliflora</i>	Creeping nailwort	P	N	F	W
Amaranthaceae (Amaranth family)					
<i>Amaranthus blitoides</i>	Mat amaranth	A	I	F	W
Anacardiaceae (Sumac family)					
<i>Rhus aromatica</i> ssp. <i>tribolata</i>	Skunkbrush, lemonade bush	P	N	S	C
<i>Rhus aromatica</i> ssp. <i>pilosissima</i>	Lemonade bush, skunkbrush	P	N	S	C
<i>Toxicodendron rydbergii</i>	Poison Ivy	P	N	S	W
Apiaceae (Carrot family)					
<i>Conium maculatum</i> L.	Poison hemlock	B	I	F	C
<i>Cymopterus acaulis</i>	Plains spring parsley	P	N	F	C
<i>Cymopterus montanus</i>	Mountain spring parsley	P	N	F	C
<i>Heracleum sphondylium</i> L. ssp. <i>montanum</i>	Cow parsnip	P	N	F	C
<i>Lomatium orientale</i>	Northern Idaho biscuitroot	P	N	F	C
<i>Musineon divaricatum</i>	Leafy wild parsley	P	N	F	C
Apocynaceae (Dogbane family)					
<i>Apocynum cannabinum</i> L.	Indian hemp	P	N	F	W
Asclepiadaceae (Milkweed family)					
<i>Asclepias arenaria</i>	Sand milkweed	P	N	F	W
<i>Asclepias asperula</i>	Spider milkweed	P	N	F	C
<i>Asclepias engelmanniana</i>	Englemann's milkweed	P	N	F	W
<i>Asclepias incarnata</i> L.	Swamp milkweed	P	N	F	W
<i>Asclepias macrotis</i>	Plains milkweed	P	N	F	W

ATTACHMENT E.1

Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Asclepias speciosa</i>	Showy milkweed	P	N	F	C
<i>Asclepias subverticillata</i>	Poison milkweed	P	N	F	W
* <i>Asclepias uncialis</i>	Dwarf milkweed	P	N	F	C
<i>Asclepias verticillata</i>	Whorled milkweed	P	N	F	W
<i>Asclepias viridiflora</i>	Green milkweed	P	N	F	W
* <i>Sarcostemma crispum</i>	Twinevine	P	N	F	W
Asteraceae (Daisy family)					
<i>Acroptilon repens</i> L.	Russian knapweed	P	I	F	W
<i>Ambrosia psilostachya</i> var. <i>coronopifolia</i>	Western ragweed	P	N	F	W
<i>Ambrosia trifida</i> L.	Giant ragweed	A	I	F	W
<i>Antennaria howellii</i>	Howell's pussytoes	P	N	F	C
<i>Antennaria parvifolia</i>	Littleleaf pussytoes	P	N	F	C
<i>Arctium minus</i>	Common burdock	P	I	F	W
<i>Artemisia bigelovii</i>	Bigelow's sagebrush	P	N	F	W
<i>Artemisia frigida</i>	Silver sagebrush	P	N	F	W
<i>Artemisia ludoviciana</i>	Louisiana sagebrush	P	N	F	W
<i>Baccharis wrightii</i>	Wright's baccharis	P	N	F	W
<i>Brickellia brachyphylla</i>	Plumed brickellbush	P	N	F	W
<i>Brickellia californica</i>	California brickellbush	P	N	F	W
<i>Chrysothamnus nauseosus</i>	Rabbitbrush	P	N	S	W
<i>Chrysothamnus viscidiflorus</i>	Green rabbitbrush	P	N	S	W
<i>Cirsium undulatum</i>	Wavyleaf thistle	P	N	F	W
<i>Conyza canadensis</i> L.	Canadian horseweed	A	N	F	W
<i>Coreopsis tinctoria</i>	Plains coreopsis	A	N	F	W
<i>Cyclachaena xanthifolia</i>	Marsh-elder	A	N	F	C
<i>Dyssodia aurea</i>	Dogweed	A	N	F	W
<i>Erigeron divergens</i>	Spreading fleabane	P	N	F	W
<i>Erigeron pumilus</i>	Low fleabane	P	N	F	C
<i>Erigeron subtrinervis</i>	Threenerved fleabane	P	N	F	C
<i>Evax prolifera</i>	Bighead pygmy cudweed	A	N	F	C
<i>Gaillardia pinnatifida</i>	Blanket flower	P	N	F	C
<i>Grindelia squarrosa</i>	Curlycup gumweed	P	N	F	W
<i>Gutierrezia sarothrae</i>	Broom snakeweed	P	N	F	W
<i>Helianthus annuus</i> L.	Annual sunflower	A	N	F	W
<i>Helianthus petiolaris</i>	Prairie sunflower	A	N	F	W
<i>Heterotheca villosa</i>	Hairy goldaster	P	N	F	W

ATTACHMENT E.1

Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Hymenopappus filifolius</i>	Fineleaf hymenopappus	P	N	F	C
<i>Hymenopappus tenuifolius</i>	Fineleaf hymenopappus	P	N	F	C
<i>Iva axillaris</i>	Poverty weed	P	N	F	W
<i>Lactuca serriola</i> L.	Prickly lettuce	P	I	F	W
<i>Lactuca tatarica</i> L. ssp. <i>pulchella</i>	Blue lettuce	P	N	F	W
<i>Leucelene ericoides</i>	Sand aster	P	N	F	C
<i>Liatris punctata</i>	Dotted gayfeather	P	N	F	W
<i>Lygodesmia juncea</i>	Rush skeletonweed	P	N	F	W
<i>Machaeranthera pinnatifida</i>	Lacy tansyaster	P	N	F	C
<i>Machaeranthera tanacetifolia</i>	Tansyleaf aster	A	N	F	W
<i>Melampodium leucanthum</i>	Plains blackfoot daisy	P	N	F	C
<i>Nothocalis cuspidata</i>	False dandelion	P	N	F	C
<i>Oligosporus caudatus</i>	Sagewort wormwood	P	N	F	W
<i>Oligosporus dracunculus</i> L. ssp. <i>glaucus</i>	Wild tarragon	P	N	F	W
<i>Oligosporus filifolius</i>	Sand sagebrush	P	N	S	W
<i>Oonopsis foliosa</i>	Fremont goldenweed	P	N	F	W
<i>Packera neomexicana</i> ssp. <i>mutabilis</i>	New Mexico groundsel	P	N	F	C
<i>Packera pseud aurea</i>	Falsegold groundsel	P	N	F	C
<i>Packera tridenticulata</i>	Threetooth ragwort	P	N	F	C
<i>Palafoxia rosea</i> var. <i>macrolepis</i>	Rosy palafox	P	N	F	W
<i>Pectis angustifolia</i>	Narrow-leaf pectis	P	N	F	W
<i>Picradeniopsis oppositifolia</i>	Plains bahia	P	N	F	W
<i>Ratibida columnifera</i>	Prairie coneflower	P	N	F	W
<i>Ratibida tagetes</i>	Green prairie coneflower	P	N	F	W
<i>Senecio riddellii</i>	Riddell's ragwort	P	N	F	W
<i>Solidago mollis</i>	Velvety goldenrod	P	N	F	W
<i>Solidago multiradiata</i>	Mountain goldenrod	P	N	F	W
<i>Solidago petiolaris</i>	Downy goldenrod	P	N	F	W
<i>Solidago velutina</i>	Three-nerved goldenrod	P	N	F	W
<i>Stephanomeria pauciflora</i>	Desert wirelettuce	P	N	F	W
<i>Taraxacum officinale</i>	Common dandelion	P	I	F	C
<i>Tetraneuris acaulis</i>	Stemless hymenoxys	P	N	F	C
<i>Thelesperma megapotamicum</i>	Hopi-tea greenthread	P	N	F	C
<i>Thelesperma subnudum</i>	Navajo-tea greenthread	P	N	F	W
<i>Townsendia exscapa</i>	Stemless townsendia	P	N	F	C
<i>Townsendia hookeri</i>	Hooker's townsendia	P	N	F	C

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Tragopogon dubius</i> ssp. <i>major</i> (	Western salsify	P	N	F	C
<i>Virgulus ericoides</i> L.	Heath aster	P	I	F	C
<i>Virgulus falcatus</i>	Cluster aster	P	N	F	W
<i>Virgulus fendleri</i>	Fendler's aster	P	N	F	W
<i>Zinnia grandiflora</i>	Rocky Mountain zinnia	P	N	F	C
Boraginaceae (Borage family)					
<i>Cryptantha minima</i>	Little catseye	A	N	F	C
<i>Lappula marginata</i>	Margined stickseed	A	I	F	C
<i>Lappula redowskii</i> (Hornemamm)	Desert stickseed	A	N	F	C
<i>Lithospermum incisum</i>	Narrowleaf gromwell	P	N	F	C
<i>Onosmodium molle</i> var. <i>occidentale</i>	Western marbleseed	P	N	F	C
<i>Oreocarya bakeri</i>	Baker's catseye	P	N	F	C
<i>Oreocarya suffruticosa</i>	James' catseye	P	N	F	C
<i>Oreocarya thyrsoiflora</i>	Cluster catseye	P	N	F	C
Brassicaceae (Mustard family)					
<i>Arabis hirsuta</i> L.	Rockcress	A	I	F	C
<i>Camelina microcarpa</i>	Littlepod false flax	A	I	F	C
<i>Descurainia incana</i> L.	Mountain tanseymustard	P	N	F	C
<i>Descurainia incisa</i>	Tansey muxtard	P	N	F	C
<i>Descurainia pinnata</i>	Western tanseymustard	A	I	F	C
<i>Descurainia sophia</i> L.	Herb sophia	A	I	F	C
<i>Draba reptans</i>	Carolina draba	A	N	F	C
<i>Erysimum asperum</i>	Western wallflower	P	N	F	C
<i>Erysimum inconspicuum</i>	Western wallflower	P	N	F	C
<i>Lesquerella fendleri</i>	Fendler's bladderpod	P	N	F	C
<i>Lesquerella ovalifolia</i>	Bladderpad	P	N	F	C
<i>Stanleya pinnata</i>	Prince's plume	P	N	F	C
<i>Thelypodium wrightii</i> ssp. <i>oklahomensis</i>	Oklahoma thelypod	P	N	F	W
Cactaceae (Cactus family)					
<i>Coryphantha vivipara</i>	Nipple cactus	P	N	C	C
<i>Cylindropuntia imbricata</i>	Candelabra cactus	P	N	S	C
<i>Echinocereus reichenbackii</i> var. <i>perbellus</i>	Claret cup	P	N	C	C
<i>Echinocereus viridiflorus</i>	Hens-and-chickens	P	N	C	C
<i>Opuntia macrorhiza</i>	Twisted spine prickly pear	P	N	C	C
<i>Opuntia phaeacantha</i>	New Mexican prickly-pear	P	N	C	C

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Opuntia polyacantha</i>	Plains prickly-pear	P	N	C	C
Calochortaceae (Mariposa family)					
<i>Calochortus gunnisonii</i>	Sego lily, mariposa lily	P	N	F	W
Campanulaceae (Bellflower family)					
<i>Lobelia cardinalis</i> L. ssp. <i>graminea</i>	Cardinal flower	P	N	F	W
Capparidaceae (Caper family)					
<i>Cleome serrulata</i>	Rocky Mountain beeplant	A	N	F	W
<i>Polanisia dodecandra</i> L.	Roughseed clammyweed	P	N	F	C
Caprifoliaceae (Honeysuckle family)					
<i>Sambucus canadensis</i> L.	Elderberry	P	N	F	C
<i>Symphoricarpos albus</i> L.	White coralberry	P	N	F	C
<i>Symphoricarpos occidentalis</i>	Western snowberry	P	N	F	C
<i>Symphoricarpos oreophilus</i>	Mountain snowberry	P	N	F	C
Chenopodiaceae (Goosefoot family)					
<i>Atriplex argenta</i>	Tumbling saltbush	A	N	F	W
<i>Atriplex canescens</i>	Fourwing saltbush	P	N	S	C
<i>Bassia sieversiana</i>	Ironweed	A	I	F	W
<i>Chenopodium album</i> L.	Lambsquarters	A	I	F	W
<i>Chenopodium desiccatum</i>	Desert goosefoot	A	N	F	W
<i>Chenopodium incanum</i>	Mealy goosefoot	A	N	F	W
<i>Chenopodium leptophyllum</i>	Slimleaf goosefoot	A	N	F	W
<i>Krascheninnikovia lanata</i>	Common winterfat	P	N	H	C
<i>Salsola australis</i>	Russian thistle, tumbleweed	A	I	F	W
<i>Sarcobatus vermiculatus</i>	Black greasewood	P	N	S	C
Commelinaceae (Spiderwort family)					
<i>Tradescantia occidentalis</i>	Prairie spiderwort	P	N	F	C
Convolvulaceae (Morningglory family)					
<i>Convolvulus arvensis</i> L.	Creeping jenny	P	I	F	W
<i>Evolvulus nuttallianus</i>	Arizona evolvulus	P	N	F	C
<i>Ipomoea leptophylla</i>	Bush morningglory	P	N	F	C
Crossosomataceae					
<i>Forsellesia planitierum</i>	Greasebush	P	N	S	C
Cucurbitaceae (Gourd family)					
<i>Cucurbita foetidissima</i>	Buffalo gourd	P	N	V	W
Cyperaceae (Sedge family)					
<i>Carex gravida</i> var. <i>lunelliana</i>	Heavy sedge	P	N	G	C

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Carex lanuginosa</i>	Bottlebrush sedge	P	N	G	C
<i>Carex stenophylla</i> ssp. <i>eleocharis</i>	Needleleaf sedge	P	N	G	C
<i>Eleocharis palustris</i> L.	Common spikerush	P	N	G	C
<i>Mariscus filiculmis</i>	Fern flatsedge	P	N	G	W
<i>Mariscus schweinitzii</i>	Schweinitz's flatsedge	P	N	G	W
<i>Schoenoplectus lacustris</i> L. ssp. <i>acutis</i>	Tule bulrush	P	N	G	C
<i>Schoenoplectus pungens</i>	Bulrush	P	N	G	W
Elaeagnaceae (Oleaster family)					
<i>Elaeagnus angustifolia</i> L.	Russian olive	P	I	T	C
Euphorbiaceae					
<i>Alaglooma marginata</i>	Snow-on-the-mountain	A	N	F	W
<i>Chamaesyce fendleri</i>	Fendler's sandmat	P	N	F	C
<i>Chamaesyce glyptosperma</i>	Ribseed sandmat	A	N	F	C
<i>Chamaesyce lata</i>	Hoary sandmat	P	N	F	C
<i>Chamaesyce missurica</i>	Thymeleaf sandmat	A	N	F	W
<i>Chamaesyce stictospora</i>	Slimseed sandmat	A	N	F	W
<i>Croton texensis</i>	Texas croton	A	N	F	W
<i>Poinsettia dentata</i>	Toothed spurge	A	N	F	C
<i>Tithymalus spathulatus</i>	Warty spurge	A	N	F	C
<i>Tragia ramosa</i>	Noseburn	P	N	F	C
Fabaceae (Pea family)					
<i>Amorpha fruticosa</i> L. var. <i>angustifolia</i>	False indigo	P	N	S	C
* <i>Amorpha nana</i>	Dwarf wild indigo	P	N	S	C
<i>Astragalus crassiocarpus</i>	Ground plum	P	N	F	C
<i>Astragalus gracilis</i>	Slender milkvetch	P	N	F	C
<i>Astragalus missouriensis</i>	Slender milkvetch	P	N	F	C
<i>Astragalus nuttallianus</i> var. <i>micranthiformis</i>	Turkeypeas	P	N	F	C
<i>Astragalus paryii</i>	Parry's milk-vetch	P	N	F	C
<i>Astragalus puniceus</i>	Trinidad milk-vetch	P	N	F	C
<i>Astragalus racemosus</i>	Alkali poisonvetch	P	N	F	C
<i>Astragalus shortianus</i>	Short's milk-vetch	P	N	F	C
<i>Caesalpinia jamesii</i>	James' holdback	P	N	F	C
<i>Dalea aurea</i>	Golden prairie clover	P	N	F	W
<i>Dalea candida</i> var. <i>oligophylla</i>	White prairie clover	P	N	F	C
<i>Dalea enneandra</i>	Nine anther prairie clover	P	N	F	W
<i>Dalea jamesii</i>	James dalea	P	N	F	C

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Dalea purpurea</i>	Purple prairie clover	P	N	F	C
<i>Glycyrrhiza lepidota</i>	American licorice	P	N	F	C
<i>Hedysarum boreale</i>	Chainpod	P	N	F	W
<i>Hoffmanseggia drepanocarpa</i>	Sicklepod rushpea	P	N	F	C
<i>Lathyrus eucosmus</i>	Bush peavine	P	N	F	C
<i>Lupinus pusillus</i>	Rusty lupine	A/B	N	F	C
<i>Medicago sativa</i> L.	Alfalfa	P	I	F	C
<i>Melilotus albus</i>	White sweet clover	P	I	F	C
<i>Melilotus officinalis</i> L.	Yellow sweet clover	P	I	F	C
<i>Oxytropis deflexa</i> var. <i>sericea</i>	Pendulous pod	P	N	F	C
<i>Oxytropis lambertii</i>	Lambert crazyweed	P	N	F	C
<i>Pediomelum hypogaeum</i>	Indian potato	P	N	F	C
<i>Psoraleidum tenuiflorum</i>	Slimflower scurfpea	P	N	F	C
<i>Vexibia nuttalliana</i>	White loco	P	N	F	C
<i>Vicia americana</i> ssp. <i>americana</i>	American vetch	P	N	F	C
<i>Vicia americana</i> ssp. <i>minor</i>	Mat vetch	P	N	F	C
Frankeniaceae (Frankenia family)					
<i>Frankenia jamesii</i>	James frankenia	P	N	S	C
Fumariaceae (Fumitory family)					
<i>Corydalis aurea</i>	Golden smoke	A	N	F	C
<i>Corydalis curvisiliqua</i> ssp. <i>occidentalis</i>	Golden smoke	A	N	F	C
Geraniaceae (Geranium family)					
<i>Erodium cicutarium</i> L.	Filaree	A	I	F	C
Grossulariaceae (Currant or Gooseberry family)					
<i>Ribes aureum</i>	Golden currant	P	N	S	C
<i>Ribes cereum</i>	Wax currant	P	N	S	C
<i>Ribes leptanthum</i>	Trumpet gooseberry	P	N	S	C
Helleboraceae (Hellebore family)					
<i>Delphinium carolinianum</i> ssp. <i>virescens</i>	Prairie larkspur	P	N	F	C
<i>Delphinium wootonii</i>	Oregon mountain larkspur	P	N	F	C
Hydrangeaceae (Hydrangea family)					
<i>Philadelphus microphyllus</i>	Mock orange	P	N	S	C
Iridaceae (Iris family)					
<i>Sisyrinchium montanum</i>	Blue-eyed grass	P	N	G	C
Juncaceae					

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Juncus arcticus</i> ssp. <i>ater</i>	Mountain rush	P	N	G	C
<i>Juncus dudleyi</i>	Rush	P	N	G	C
<i>Juncus interior</i>	Inland rush	P	N	G	C
<i>Juncus torreyi</i>	Torrey's rush	P	N	G	W
Juncaginaceae (Arrowgrass family)					
<i>Triglochin maritima</i> L.	Seaside arrowgrass	P	I	G	C
Lamiaceae					
<i>Hedeoma drummondii</i>	False pennyroyal	P	N	F	C
<i>Marrubium vulgare</i> L.	Horehound	P	I	F	C
<i>Monarda pectinata</i>	Beebalm	P	N	F	C
<i>Salvia reflexa</i>	Lanceleaf sage	A	N	F	W
<i>Teucrium laciniatum</i>	Cutleaf germander	P	N	F	C
Liliaceae (Lily family)					
<i>Leucocrocinum montanum</i>	Sand lily	P	N	F	C
Linaceae (Flax family)					
<i>Adenolinum lewisii</i>	Wild blue flax	P	N	F	C
<i>Mesynium puberulum</i>	Plains flax	A	N	F	C
<i>Mesynium rigidum</i>	Yellow flax	A	N	F	C
Loasaceae (Loasa family)					
<i>Acrolasia albicaulis</i>	Whitestem blazingstar	A	N	F	C
<i>Mentzelia oligosperma</i>	Chickenthief	P	N	F	W
<i>Nuttallia nuda</i>	Bractless blazingstar	P	N	F	W
<i>Nuttallia rusbyi</i>	Bractless blazingstar	P	N	F	W
Malvaceae (Mallow family)					
<i>Sphaeralcea angustifolia</i> (Cavanilles) D.Don var. <i>cuspidata</i>	Narrowleaf globemallow	P	N	F	C
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	P	N	F	C
Martyniaceae (Unicorn Plant family)					
<i>Proboscidea louisianica</i>	Devil's claw	P	A	F	W
Nyctaginaceae (Four-O'Clock family)					
<i>Ambronía fragrans</i>	Sand verbena	P	N	F	C
<i>Mirabilis multiflora</i>	Colorado four-o'clock	P	N	F	C
<i>Oxybaphus hirsutus</i>	Hairy four-o'clock	P	N	F	C
<i>Oxybaphus linearis</i>	Narrow leaved four-o'clock	P	N	F	C
* <i>Oxybaphus rotundifolius</i>	Roundleaf four-o'clock	P	N	F	C
<i>Tripterocalyx micranthus</i>	Sand puff	A	N	F	C

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
Onagraceae (Evening-Primrose family)					
<i>Calylophus lavandulifolius</i>	Lavenderleaf evening primrose	P	N	F	C
<i>Gaura coccinea</i>	Scarlet gaura	P	N	F	C
<i>Gaura mollis</i>	Smallflower gaura	P	N	F	C
<i>Oenothera albicaulis</i>	Prairie evening primrose	A	N	F	C
<i>Oenothera caespitosa</i>	Tufted evening primrose	P	N	F	C
* <i>Oenothera harringtonii</i>	Arkansas valley primrose	P	N	F	C
Orobanchaceae (Broom-Rape family)					
<i>Orobanche multiflora</i>	Broomrape	P	N	F	W
Papaveraceae (Poppy family)					
<i>Argemone hispida</i>	Hedgehog pricklypoppy	P	N	F	W
Plantaginaceae (Plantain family)					
<i>Plantago patagonica</i>	Woolly plantain	A	N	F	C
Poaceae (Grass family)					
<i>Achnatherum hymenoides</i>	Indian ricegrass	P	N	G	C
<i>Achnatherum robustum</i>	Sleepygrass	P	N	G	C
<i>Achnatherum scribneri</i>	Scribner needlegrass	P	N	G	C
<i>Agropyron cristatum</i> L.	Crested wheatgrass	P	I	G	W
<i>Agropyron cristatum</i> L. ssp. <i>desertorum</i>	Crested wheatgrass	P	N	G	W
<i>Agrostis stolonifera</i> L.	Redtop bentgrass	P	I	G	W
<i>Alopecurus aequalis</i>	Short-awn foxtail	P	N	G	W
<i>Aristida purpurea</i>	Purple threeawn	P	N	G	W
<i>Andropogon gerardii</i>	Big bluestem	P	N	G	W
<i>Avena fatua</i> L.	Wild oat	A	I	G	C
<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	Silver bluestem	P	N	G	W
<i>Bouteloua curtipendula</i>	Sideoats grama	P	N	G	W
<i>Bromopsis inermis</i>	Smooth brome	P	I	G	C
<i>Bromus japonicus</i>	Japanese brome	A	I	G	C
<i>Buchloe dactyloides</i>	Buffalograss	P	N	G	W
<i>Calamagrostis stricta</i>	Reedgrass	P	N	G	W
<i>Chondrosum eriopodum</i>	Black grama	P	N	G	W
<i>Chondrosum gracile</i>	Blue grama	P	N	G	W
<i>Chondrosum hirsutum</i>	Hairy grama	P	N	G	W
<i>Chondrosum prostratum</i>	Mat grama	A	N	G	W
<i>Critesion jubatum</i> L.	Foxtail barley	P	N	G	W

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Critesion pusillum</i>	Little barley	A	N	G	C
<i>Dactylis glomerata</i> L.	Orchardgrass	P	I	G	C
<i>Echinochloa crus-galli</i> L.	Barnyardgrass	A	I	G	W
<i>Elymus canadensis</i> L.	Canada wildrye	P	N	G	W
<i>Elymus elymoides</i>	Bottlebrush squirreltail	P	N	G	C
<i>Elymus lanceolatus</i>	Streambank wheatgrass	P	N	G	W
<i>Erioneuron pilosum</i>	Hairy false tridens	P	N	G	C
<i>Hesperostipa comata</i>	Needle and thread	P	N	G	C
<i>Hilaria jamesii</i>	Galleta	P	N	G	C
<i>Koeleria macrantha</i>	Junegrass	P	N	G	C
<i>Lycurus setosus</i>	Common wolftail	P	N	G	W
<i>Monroa squarrosa</i>	False buffalograss	A	N	G	W
<i>Muhlenbergia arenacea</i>	Ear muhly	P	N	G	W
<i>Muhlenbergia arenicola</i>	Sand muhly	P	N	G	W
<i>Muhlenbergia asperifolia</i> (	Alkali muhly	P	N	G	W
<i>Muhlenbergia torreyi</i> (	Ring muhly	P	N	G	W
<i>Nassella viridula</i>	Green needlegrass	P	N	G	C
<i>Panicum capillare</i> L.	Common witchgrass	P	N	G	C
<i>Panicum obtusum</i>	Vine mesquite	A	N	G	W
<i>Pascopyrum smithii</i>	Western wheatgrass	P	N	G	C
<i>Phragmites australis</i>	Common reed	P	N	G	W
<i>Piptatherum micranthum</i>	Littleseed ricegrass	P	N	G	W
<i>Poa bigelovi</i>	Bigelow's bluegrass	A	N	G	C
<i>Poa pratensis</i> L.	Kentucky bluegrass	P	I	G	C
<i>Poa secunda</i>	Sandberg bluegrass	P	N	G	C
<i>Polypogon monspeliensis</i> L.	Rabbitfoot grass	A	I	G	C
<i>Schedonnardus paniculatus</i>	Tumblegrass	P	N	G	C
<i>Schizachyrium scoparium</i>	Little bluestem	P	N	G	W
<i>Scleropogon brevifolius</i>	Burro grass	P	N	G	W
<i>Sporobolus airoides</i>	Alkali sacaton	P	N	G	W
<i>Sporobolus cryptandrus</i>	Sand dropseed	P	N	G	W
<i>Sphenopholus obtusata</i>	Wedgegrass	P	N	G	C
<i>Tridens muticus</i> var. <i>elongatus</i>	Green tridens	P	N	G	W
<i>Vulpia octoflora</i>	Sixweeks fescue	A	N	G	C
Polemoniaceae (Phlox family)					
<i>Gilia ophthalmoides</i>	Eyed gilia	A	N	F	C
<i>Giliastrum rigidulum</i> ssp. <i>acerosum</i>	Blue bowls	P	N	F	C

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
(Bentham) Rydberg					
<i>Ipomopsis laxiflora</i>	Iron skyrocket	P	N	F	C
<i>Ipomopsis pumila</i>	Manybranched gilia	A	N	F	C
<i>Ipomopsis spicata</i>	Spike gilia	P	N	F	C
<i>Phlox longifolia</i>	Longleaf phlox	P	N	F	C
Polygonaceae (Knotweed family)					
<i>Eriogonum annuum</i>	Annual buckwheat	A	N	F	W
<i>Eriogonum effusum</i>	Spreading buckwheat	P	N	F	W
<i>Eriogonum fendlerianum</i>	Buckwheat	P	N	F	W
<i>Eriogonum gordonii</i>	Gordon's buckwheat	A	N	F	W
<i>Eriogonum jamesii</i>	James' buckwheat	P	N	F	W
<i>Eriogonum lachnogynum</i>	Woollycup buckwheat	P	N	F	W
<i>Eriogonum tenellum</i>	Matted wild buckwheat	P	N	F	W
<i>Eriogonum umbellatum</i>	Sulfur eriogonum	P	N	F	W
<i>Rumex crispus</i> L.	Curly dock	P	I	F	C
<i>Rumex stenophyllus</i>	Narrow leaf dock	P	I	F	C
Portulacaceae (Purslane family)					
<i>Portulaca oleracea</i> L.	Common purslane	A	N	F	C
<i>Portulaca halimoides</i> L.	Silkcotton purslane	A	I	F	C
Ranunculaceae					
<i>Clematis ligusticifolia</i>	Western virginsbower	P	N	F	W
Rosaceae (Rose family)					
<i>Amelanchier alnifolia</i>	Saskatoon	P	N	S	C
<i>Amelanchier utahensis</i>	Serviceberry	P	N	S	C
<i>Cerasus pensylvanica</i> L.	Pin cherry	P	N	T	C
<i>Cercocarpus montanus</i>	Mountain mahogany	P	N	S	C
<i>Drymocallis arguta</i>	Sticky cinquefoil	P	N	F	W
<i>Oreobatus deliciosus</i>	Boulder raspberry	P	N	S	C
<i>Padus virginiana</i> L. ssp. <i>melanocarpa</i>	Chokecherry	P	N	T	C
<i>Physocarpus monogynus</i>	Mountain ninebark	P	N	S	C
<i>Prunus americana</i>	American plum	P	N	T	C
<i>Rosa woodsii</i>	Wood's rose	P	N	S	C
Rutaceae (Citrus family)					
<i>Ptelea trifoliata</i> L.	Common hoptree	P	N	T	C
Salicaceae (Willow family)					
<i>Populus x acuminata</i>	Lanceleaf cottonwood	P	N	T	C

ATTACHMENT E.1

Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Populus angustifolia</i>	Narrowleaf cottonwood	P	N	T	C
<i>Populus deltoides</i> spp. <i>monolifera</i>	Plains cottonwood	P	N	T	C
<i>Populus tremuloides</i>	Quacking aspen	P	N	T	C
<i>Salix alba</i> L. var. <i>vitellina</i> L. <i>fragilis</i> L.	Hybrid Golden osier/crack willow	P	N	S	C
<i>Salix amygdaloides</i>	Peach-leaved willow	P	N	S	C
<i>Salix interior</i>	Sandbar willow	P	N	S	C
Santalaceae (Sandlewood family)					
<i>Comandra umbellata</i> L.	Bastard toadflax	P	N	F	C
Sapindaceae (Soapberry family)					
* <i>Sapindus saponaria</i> L. var. <i>drummondii</i>	Southern soapberry	P	N	S	C
Saxifragaceae					
<i>Heuchera parvifolia</i>	Little leaf alumroot	P	N	F	W
Scrophulariaceae (Figwort family)					
<i>Castilleja integra</i>	Indian paintbrush	P	N	F	W
<i>Castilleja sessiliflora</i>	Largeflowered Indian paintbrush	P	N	F	C
<i>Penstemon angustifolius</i> ssp <i>caudatus</i>	Colorado beard-tongue	P	N	F	C
<i>Penstemon auriberbis</i>	Colorado beard-tongue	P	N	F	C
<i>Penstemon barbatus</i> var. <i>torreyi</i>	Torrey's penstemon	P	N	F	W
<i>Verbascum thapsus</i> L.	Great mullein	P	I	F	C
Solanaceae (Nightshade family)					
<i>Chamaesaracha conoides</i>	Green false nightshade	P	N	F	C
<i>Chamaesaracha coronopus</i>	Green false nightshade	P	N	F	C
<i>Lycium pallidum</i> Miers	Pale woldberry	P	N	S	C
<i>Physalis hederifolia</i> var. <i>cordifolia</i>	Clammy groundcherry	P	N	F	W
<i>Physalis virginiana</i>	Virginia groundcherry	P	N	F	C
<i>Quincula lobata</i>	Chinese lantern	P	N	F	C
<i>Solanum americanum</i>	Black nightshade	A	N	F	C
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade	P	N	F	C
<i>Solanum rostratum</i>	Buffalo bur	A	N	F	C
<i>Solanum triflorum</i>	Cutleaf nightshade	A	N	F	C
Tamaricaceae (Tamarisk family)					
<i>Tamarix ramosissima</i>	Salt cedar	P	I	T	C
Typhaceae (Cattail family)					
<i>Typha angustifolia</i> L.	Narrow-leaved cattail	P	N	G	C

ATTACHMENT E.1

Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Typha latifolia</i> L.	Broad-leaved cattail	P	N	G	C
Ulmaceae (Elm family)					
<i>Celtis occidentalis</i> L.	Hackberry	P	N	T	C
<i>Celtis reticulata</i>	Netleaf hackberry	P	N	T	C
Urticaceae (Nettle family)					
<i>Parietaria pensylvanica</i>	Pennsylvania pellitory	A	N	F	C
Verbenaceae (Vervain family)					
<i>Glandularia bipinnatifida</i>	Showy vervain	P	N	F	C
<i>Phyla cuneifolia</i>	Frog fruit	P	N	F	W
<i>Verbena bracteata</i>	Prostrate vervain	P	N	F	C
Violaceae (Violet family)					
<i>Hybanthus verticillatus</i>	Nodding green violet	P	N	F	C
<i>Viola nuttallii</i>	Nuttall's violet	P	N	F	C
Vitaceae (Grape family)					
<i>Parthenocissus vitaceae</i>	Thicket creeper	P	N	F	C
<i>Vitis acerifolia</i> Rafinesque	Long's grape	P	N	F	C
Gymnosperms					
Cupressaceae (Cypress family)					
<i>Sabina monosperma</i> .	One-seeded juniper	P	N	T	C
<i>Sabina scopulorum</i>	Rocky Mountain juniper	P	N	T	C
Pinaceae (Pine family)					
<i>Pinus edulis</i>	Pinyon pine	P	N	T	C
<i>Pinus ponderosa</i> ssp. <i>scopulorum</i>	Ponderosa pine	P	N	T	C
Ferns & Fern Allies					
Athyriaceae (Ladyfern family)					
<i>Cystopteris fragilis</i> L.	Brittle fern	P	N	F	C
Aspidaceae (Shieldfern family)					
<i>Dryopteris felix-mas</i> L.	Male fern	P	N	F	C
Equisetaceae (Horsetail family)					
<i>Hippochaete laevigata</i>	Smooth horsetail	P	N	G	C
<i>Hippochaete variegata</i>	Variegated scouring rush	P	N	G	W
Selaginellaceae (Little Club-Moss family)					
<i>Selaginella densa</i>	Little club moss	P	N	F	C
<i>Selaginella mutica</i>	Little club moss	P	N	F	C
Sinopteridaceae (Lipfern family)					

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Plants Known to Occur at the PCMS

Scientific Name	Common Name	Life	Origin	Form	Season
<i>Cheilanthes feei</i>	Fee's lipfern	P	N	F	C
<i>Cheilanthes fendleri</i>	Fendler's lipfern	P	N	F	C
Viscaceae (Mistletoe family)					
<i>Arceuthobium</i> spp.	Dwarf mistletoe	P	N	F	W
Woodsiaceae (Woodsia family)					
<i>Woodsia oregano</i> ssp. <i>cathcartiana</i>	Oregon woodsia	P	N	F	W

Notes:

Life Form: A = Annual, B = Biennial, P = Perennial**Origin:** N = Native, I = Introduced**Form:** F = Forb, G = Grass, V = Vine, S = Shrub, T = Tree**Season:** W = Warm Season, C = Cool Season

ATTACHMENT E.2

Vertebrate Species Known to Occur at the PCMS

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Campostoma</i>	Central stoneroller	Osteichthyes		
<i>Catostomus commersoni</i>	White sucker	Osteichthyes		
<i>Cyprinella lutrensis</i>	Red shiner	Osteichthyes		
<i>Cyprinus carpio</i>	Common carp	Osteichthyes		
<i>Fundulus zebrinus</i>	Plains killifish	Osteichthyes		
<i>Hybopsis gracilis</i>	Flathead chub	Osteichthyes		Special concern
<i>Ictalurus melas</i>	Black bullhead	Osteichthyes		
<i>Ictalurus punctatus</i>	Channel catfish	Osteichthyes		
<i>Lepomis cyanellus</i>	Green sunfish	Osteichthyes		
<i>Notropis stamineus</i>	Sand shiner	Osteichthyes		
<i>Pimephales promelas</i>	Fathead minnow	Osteichthyes		
<i>Rhinichthys cataractae</i>	Longnose dace	Osteichthyes		
<i>Ambystoma tigrinum</i>	Tiger salamander	Amphibia		
<i>Bufo punctatus</i>	Red-spotted toad	Amphibia		
<i>Bufo woodhousii woodhousei</i>	Woodhouse's toad	Amphibia		
<i>Hyla arenicolor</i>	Canyon treefrog	Amphibia		
<i>Rana blairi</i>	Plains leopard frog	Amphibia		Special concern
<i>Rana catesbeiana</i>	Bullfrog	Amphibia		
<i>Scaphiopus bombifrons</i>	Plains spadefoot	Amphibia		
<i>Scaphiopus multiplicatus</i>	New Mexico spadefoot	Amphibia		
<i>Chelydra serpentina serpentina</i>	Snapping turtle	Reptilia		
<i>Terrapene ornata ornata</i>	Western box turtle	Reptilia		
<i>Cnemidophorus sexlineatus viridis</i>	Six-lined racerunner	Reptilia		
<i>Cnemidophorus tesselatus</i>	Colorado checkered whiptail	Reptilia		Special concern
<i>Crotaphytus collaris collaris</i>	Collared lizard	Reptilia		
<i>Eumeces obsoletus</i>	Great Plains skink	Reptilia		
<i>Holbrookia maculata maculata</i>	Lesser earless lizard	Reptilia		
<i>Phrynosoma cornutum</i>	Texas horned lizard	Reptilia		Special concern
<i>Phrynosoma douglassi</i>	Short-horned lizard	Reptilia		
<i>Sceloporus undulatus erythrocheilus</i>	Eastern fence lizard	Reptilia		
<i>Arizona elegans elegans</i>	Glossy snake	Reptilia		
<i>Coluber constrictor flaviventris</i>	Eastern yellowbelly racer	Reptilia		
<i>Crotalus viridis viridis</i>	Western rattlesnake	Reptilia		

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Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Diadophis punctatus arnyi</i>	Ring-necked snake	Reptilia		
<i>Elaphe guttata emoryi</i>	Corn snake	Reptilia		
<i>Heterodon nasicus nasicus</i>	Western hognose snake	Reptilia		
<i>Hypsiglena torquata jani</i>	Night snake	Reptilia		
<i>Lampropeltis triangulum</i>	Milk snake	Reptilia		
<i>Leptotyphlops dulcis</i>	Texas blind snake	Reptilia		Special concern
<i>Masticophis flagellum testaceus</i>	Coachwhip	Reptilia		
<i>Pituophis melanoleucus sayi</i>	Bullsnake	Reptilia		
<i>Sonora semiannulata</i>	Ground snake	Reptilia		
<i>Tantilla nigriceps nigriceps</i>	Plains blackhead snake	Reptilia		
<i>Thamnophis cyrtopsis cyrtopsis</i>	Blackneck garter snake	Reptilia		
<i>Thamnophis elegans vagrans</i>	Western terrestrial garter snake	Reptilia		
<i>Thamnophis radix haydeni</i>	Plains garter snake	Reptilia		
<i>Podilymbus podiceps</i>	Pied-billed grebe	Aves		
<i>Podiceps nigricollis</i>	Eared grebe	Aves		
<i>Pelecanus erythrorhynchos</i>	American white pelican	Aves		
<i>Phalacrocorax auritus</i>	Double-crested cormorant	Aves		
<i>Botaurus lentiginosus</i>	American bittern	Aves		
<i>Ixobrychus exilis</i>	Least bittern	Aves		
<i>Ardea herodias</i>	Great blue heron	Aves		
<i>Egretta thula</i>	Snowy egret	Aves		
<i>Butorides virescens</i>	Green heron	Aves		
<i>Nycticorax nycticorax</i>	Black-crowned night-heron	Aves		
<i>Plegadis chihi</i>	White-faced Ibis	Aves		
<i>Chen caerulescens</i>	Snow goose	Aves		
<i>Chen rossii</i>	Ross' goose	Aves		
<i>Branta canadensis</i>	Canada goose	Aves		
<i>Aix sponsa</i>	Wood duck	Aves		
<i>Anas crecca</i>	Green-winged teal	Aves		
<i>Anas platyrhynchos</i>	Mallard	Aves		
<i>Anas acuta</i>	Northern pintail	Aves		
<i>Anas discors</i>	Blue-winged teal	Aves		
<i>Anas cyanoptera</i>	Cinnamon teal	Aves		
<i>Anas clypeata</i>	Northern shoveler	Aves		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Anas strepera</i>	Gadwall	Aves		
<i>Anas americana</i>	American wigeon	Aves		
<i>Aythya valisineria</i>	Canvasback	Aves		
<i>Aythya americana</i>	Redhead	Aves		
<i>Aythya collaris</i>	Ring-necked duck	Aves		
<i>Aythya affinis</i>	Lesser scaup	Aves		
<i>Melanitta fusca</i>	White-winged scoter	Aves		
<i>Bucephala clangula</i>	Common goldeneye	Aves		
<i>Bucephala albeola</i>	Bufflehead	Aves		
<i>Oxyura jamaicensis</i>	Ruddy duck	Aves		
<i>Cathartes aura</i>	Turkey vulture	Aves		
<i>Pandion haliaetus</i>	Osprey	Aves		
<i>Ictinia mississippiensis</i>	Mississippi kite	Aves		
<i>Haliaeetus leucocephalus</i>	Bald eagle	Aves	Threatened	Threatened
<i>Circus cyaneus</i>	Northern harrier	Aves		
<i>Accipiter striatus</i>	Sharp-shinned hawk	Aves		
<i>Accipiter cooperii</i>	Cooper's hawk	Aves		
<i>Accipiter gentilis</i>	Northern goshawk	Aves		
<i>Buteo platypterus</i>	Broad-winged hawk	Aves		
<i>Buteo swainsoni</i>	Swainson's hawk	Aves		
<i>Buteo jamaicensis</i>	Red-tailed hawk	Aves		
<i>Buteo jamaicensis calurus</i>	Western red-tailed hawk	Aves		
<i>Buteo regalis</i>	Ferruginous hawk	Aves		Special concern
<i>Buteo lagopus</i>	Rough-legged hawk	Aves		
<i>Aquila chrysaetos</i>	Golden eagle	Aves		
<i>Falco sparverius</i>	American kestrel	Aves		
<i>Falco columbarius</i>	Merlin	Aves		
<i>Falco peregrinus</i>	Peregrine falcon	Aves		Special concern
<i>Falco mexicanus</i>	Prairie falcon	Aves		
<i>Meleagris gallopavo</i>	Wild turkey	Aves		
<i>Colinus virginianus</i>	Northern bobwhite	Aves		
<i>Callipepla squamata</i>	Scaled quail	Aves		
<i>Rallus limicola</i>	Virginia rail	Aves		
<i>Porzana carolina</i>	Sora	Aves		
<i>Fulica americana</i>	American coot	Aves		
<i>Grus canadensis</i>	Sandhill crane	Aves		

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Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Charadrius semipalmatus</i>	Semipalmated plover	Aves		
<i>Charadrius vociferus</i>	Killdeer	Aves		
<i>Charadrius montanus</i>	Mountain plover	Aves		Special concern
<i>Himantopus mexicanus</i>	Black-necked stilt	Aves		
<i>Recurvirostra americana</i>	American avocet	Aves		
<i>Tringa melanoleuca</i>	Greater yellowlegs	Aves		
<i>Tringa flavipes</i>	Lesser yellowlegs	Aves		
<i>Tringa solitaria</i>	Solitary sandpiper	Aves		
<i>Catoptrophorus semipalmatus</i>	Willet	Aves		
<i>Actitis macularia</i>	Spotted sandpiper	Aves		
<i>Bartramia longicauda</i>	Upland sandpiper	Aves		
<i>Numenius americanus</i>	Long-billed curlew	Aves		Special concern
<i>Calidris alba</i>	Sanderling	Aves		
<i>Calidris pusilla</i>	Semipalmated sandpiper	Aves		
<i>Calidris mauri</i>	Western sandpiper	Aves		
<i>Calidris minutilla</i>	Least sandpiper	Aves		
<i>Calidris bairdii</i>	Baird's sandpiper	Aves		
<i>Calidris melanotos</i>	Pectoral sandpiper	Aves		
<i>Limnodromus scolopaceus</i>	Long-billed dowitcher	Aves		
<i>Gallinago gallinago</i>	Common snipe	Aves		
<i>Phalaropus tricolor</i>	Wilson's phalarope	Aves		
<i>Larus pipixcan</i>	Franklin's gull	Aves		
<i>Larus delawarensis</i>	Ring-billed gull	Aves		
<i>Columba livia</i>	Rock dove	Aves		
<i>Columba fasciata</i>	Band-tailed pigeon	Aves		
<i>Zenaida asiatica</i>	White-winged dove	Aves		
<i>Zenaida macroura</i>	Mourning dove	Aves		
<i>Coccyzus erythrophthalmus</i>	Black-billed cuckoo	Aves		
<i>Coccyzus americanus</i>	Yellow-billed cuckoo	Aves		Special concern
<i>Geococcyx californianus</i>	Greater roadrunner	Aves		
<i>Tyto alba</i>	Barn owl	Aves		
<i>Otus kennicottii</i>	Western screech-owl	Aves		
<i>Bubo virginianus</i>	Great horned owl	Aves		
<i>Speotyto cunicularia</i>	Burrowing owl	Aves		Threatened
<i>Asio otus</i>	Long-eared owl	Aves		
<i>Asio flammeus</i>	Short-eared owl	Aves		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Chordeiles minor</i>	Common nighthawk	Aves		
<i>Phalaenoptilus nuttallii</i>	Common poorwill	Aves		
<i>Aeronautes saxatalis</i>	White-throated swift	Aves		
<i>Archilochus alexandri</i>	Black-chinned hummingbird	Aves		
<i>Stellula calliope</i>	Calliope hummingbird	Aves		
<i>Selasphorus platycercus</i>	Broad-tailed hummingbird	Aves		
<i>Selasphorus rufus</i>	Rufous hummingbird	Aves		
<i>Ceryle alcyon</i>	Belted kingfisher	Aves		
<i>Melanerpes lewis</i>	Lewis' woodpecker	Aves		
<i>Melanerpes erythrocephalus</i>	Red-headed woodpecker	Aves		
<i>Sphyrapicus nuchalis</i>	Red-naped sapsucker	Aves		
<i>Picoides scalaris</i>	Ladder-backed woodpecker	Aves		
<i>Picoides pubescens</i>	Downy woodpecker	Aves		
<i>Picoides villosus</i>	Hairy woodpecker	Aves		
<i>Colaptes auratus</i>	Northern flicker	Aves		
<i>Colaptes auratus auratus</i>	Yellow-shafted flicker	Aves		
<i>Colaptes auratus x cafer</i>	Red-shafted flicker	Aves		
<i>Contopus borealis</i>	Olive-sided flycatcher	Aves		
<i>Contopus sordidulus</i>	Western wood-pewee	Aves		
<i>Empidonax oberholseri</i>	Dusky flycatcher	Aves		
<i>Empidonax wrightii</i>	Gray flycatcher	Aves		
<i>Empidonax occidentalis</i>	Cordilleran flycatcher	Aves		
<i>Sayornis phoebe</i>	Eastern phoebe	Aves		
<i>Sayornis saya</i>	Say's phoebe	Aves		
<i>Myiarchus cinerascens</i>	Ash-throated flycatcher	Aves		
<i>Tyrannus vociferans</i>	Cassin's kingbird	Aves		
<i>Tyrannus verticalis</i>	Western kingbird	Aves		
<i>Tyrannus tyrannus</i>	Eastern kingbird	Aves		
<i>Tyrannus forficatus</i>	Scissor-tailed flycatcher	Aves		
<i>Eremophila alpestris</i>	Horned lark	Aves		
<i>Tachycineta bicolor</i>	Tree swallow	Aves		
<i>Tachycineta thalassina</i>	Violet-green swallow	Aves		
<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow	Aves		
<i>Riparia riparia</i>	Bank swallow	Aves		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Hirundo pyrrhonota</i>	Cliff swallow	Aves		
<i>Hirundo rustica</i>	Barn swallow	Aves		
<i>Cyanocitta stelleri</i>	Steller's jay	Aves		
<i>Cyanocitta cristata</i>	Blue jay	Aves		
<i>Aphelocoma coerulescens</i>	Western scrub jay	Aves		
<i>Gymnorhinus cyanocephalus</i>	Pinyon jay	Aves		
<i>Nucifraga columbiana</i>	Clark's nutcracker	Aves		
<i>Pica pica</i>	Black-billed magpie	Aves		
<i>Corvus brachyrhynchos</i>	American crow	Aves		
<i>Corvus cryptoleucus</i>	Chihuahuan raven	Aves		
<i>Corvus corax</i>	Common raven	Aves		
<i>Parus gambeli</i>	Mountain chickadee	Aves		
<i>Parus inornatus</i>	Plain titmouse	Aves		
<i>Psaltriparus minimus</i>	Bushtit	Aves		
<i>Sitta canadensis</i>	Red-breasted nuthatch	Aves		
<i>Sitta carolinensis</i>	White-breasted nuthatch	Aves		
<i>Sitta pygmaea</i>	Pygmy nuthatch	Aves		
<i>Certhia americana</i>	Brown creeper	Aves		
<i>Salpinctes obsoletus</i>	Rock wren	Aves		
<i>Catherpes mexicanus</i>	Canyon wren	Aves		
<i>Thryomanes bewickii</i>	Bewick's wren	Aves		
<i>Troglodytes aedon</i>	House wren	Aves		
<i>Cistothorus palustris</i>	Marsh wren	Aves		
<i>Regulus satrapa</i>	Golden-crowned kinglet	Aves		
<i>Regulus calendula</i>	Ruby-crowned kinglet	Aves		
<i>Polioptila caerulea</i>	Blue-gray gnatcatcher	Aves		
<i>Sialia mexicana</i>	Western bluebird	Aves		
<i>Sialia currucoides</i>	Mountain bluebird	Aves		
<i>Myadestes townsendi</i>	Townsend's solitaire	Aves		
<i>Catharus ustulatus</i>	Swainson's thrush	Aves		
<i>Catharus guttatus</i>	Hermit thrush	Aves		
<i>Turdus migratorius</i>	American robin	Aves		
<i>Dumetella carolinensis</i>	Gray catbird	Aves		
<i>Mimus polyglottos</i>	Northern mockingbird	Aves		
<i>Oreoscoptes montanus</i>	Sage thrasher	Aves		
<i>Toxostoma rufum</i>	Brown thrasher	Aves		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Toxostoma curvirostre</i>	Curve-billed thrasher	Aves		
<i>Anthus rubescens</i>	American pipit	Aves		
<i>Anthus spragueii</i>	Sprague's pipit	Aves		
<i>Bombycilla garrulus</i>	Bohemian waxwing	Aves		
<i>Bombycilla cedrorum</i>	Cedar waxwing	Aves		
<i>Lanius excubitor</i>	Northern shrike	Aves		
<i>Lanius ludovicianus</i>	Loggerhead shrike	Aves		
<i>Sturnus vulgaris</i>	European starling	Aves		
<i>Vireo vicinior</i>	Gray vireo	Aves		
<i>Vireo plumbeus</i>	Plumbeous vireo	Aves		
<i>Vireo gilvus</i>	Warbling vireo	Aves		
<i>Vireo olivaceus</i>	Red-eyed vireo	Aves		
<i>Vermivora celata</i>	Orange-crowned warbler	Aves		
<i>Vermivora ruficapilla</i>	Nashville warbler	Aves		
<i>Vermivora virginiae</i>	Virginia's warbler	Aves		
<i>Parula americana</i>	Northern parula	Aves		
<i>Dendroica petechia</i>	Yellow warbler	Aves		
<i>Dendroica pensylvanica</i>	Chestnut-sided warbler	Aves		
<i>Dendroica coronata</i>	Yellow-rumped warbler	Aves		
<i>Dendroica coronata coronata</i>	Myrtle warbler	Aves		
<i>Dendroica coronata auduboni</i>	Audubon's warbler	Aves		
<i>Dendroica nigrescens</i>	Black-throated gray warbler	Aves		
<i>Dendroica townsendi</i>	Townsend's warbler	Aves		
<i>Setophaga ruticilla</i>	American redstart	Aves		
<i>Seiurus aurocapillus</i>	Ovenbird	Aves		
<i>Seiurus noveboracensis</i>	Northern waterthrush	Aves		
<i>Oporornis tolmiei</i>	MacGillivray's warbler	Aves		
<i>Geothlypis trichas</i>	Common yellowthroat	Aves		
<i>Wilsonia pusilla</i>	Wilson's warbler	Aves		
<i>Icteria virens</i>	Yellow-breasted chat	Aves		
<i>Piranga flava</i>	Hepatic tanager	Aves		
<i>Piranga rubra</i>	Summer tanager	Aves		
<i>Piranga ludoviciana</i>	Western tanager	Aves		
<i>Pheucticus ludovicianus</i>	Rose-breasted grosbeak	Aves		
<i>Pheucticus melanocephalus</i>	Black-headed grosbeak	Aves		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Guiraca caerulea</i>	Blue grosbeak	Aves		
<i>Passerina amoena</i>	Lazuli bunting	Aves		
<i>Passerina cyanea</i>	Indigo bunting	Aves		
<i>Spiza americana</i>	Dickcissel	Aves		
<i>Pipilo chlorurus</i>	Green-tailed towhee	Aves		
<i>Pipilo</i>	Spotted towhee	Aves		
<i>Pipilo</i>	Canyon towhee	Aves		
<i>Aimophila cassinii</i>	Cassin's sparrow	Aves		
<i>Aimophila ruficeps</i>	Rufous-crowned sparrow	Aves		
<i>Spizella arborea</i>	American tree sparrow	Aves		
<i>Spizella passerina</i>	Chipping sparrow	Aves		
<i>Spizella pallida</i>	Clay-colored sparrow	Aves		
<i>Spizella breweri</i>	Brewer's sparrow	Aves		
<i>Poocetes gramineus</i>	Vesper sparrow	Aves		
<i>Chondestes grammacus</i>	Lark sparrow	Aves		
<i>Amphispiza bilineata</i>	Black-throated sparrow	Aves		
<i>Calamospiza melanocorys</i>	Lark bunting	Aves		
<i>Passerculus sandwichensis</i>	Savannah sparrow	Aves		
<i>Ammodramus savannarum</i>	Grasshopper sparrow	Aves		
<i>Melospiza melodia</i>	Song sparrow	Aves		
<i>Melospiza lincolnii</i>	Lincoln's sparrow	Aves		
<i>Zonotrichia albicollis</i>	White-throated sparrow	Aves		
<i>Zonotrichia leucophrys</i>	White-crowned sparrow	Aves		
<i>Zonotrichia leucophrys oriantha</i>	Mountain white-crowned sparrow	Aves		
<i>Zonotrichia leucophrys gambelii</i>	Gambel's white-crowned sparrow	Aves		
<i>Zonotrichia querula</i>	Harris' sparrow	Aves		
<i>Junco hyemalis</i>	Dark-eyed junco	Aves		
<i>Junco hyemalis aikeni</i>	White-winged junco	Aves		
<i>Junco hyemalis hyemalis</i>	Slate-colored junco	Aves		
<i>Junco hyemalis montanus/shufeldt</i>	Oregon junco	Aves		
<i>Junco hyemalis mearnsi</i>	Pink-sided junco	Aves		
<i>Junco hyemalis caniceps</i>	Gray-headed junco	Aves		
<i>Calcarius mccownii</i>	McCown's longspur	Aves		
<i>Calcarius lapponicus</i>	Lapland longspur	Aves		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Calcarius ornatus</i>	Chestnut-collared longspur	Aves		
<i>Dolichonyx oryzivorus</i>	Bobolink	Aves		
<i>Agelaius phoeniceus</i>	Red-winged blackbird	Aves		
<i>Sturnella neglecta</i>	Western meadowlark	Aves		
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed blackbird	Aves		
<i>Euphagus cyanocephalus</i>	Brewer's blackbird	Aves		
<i>Quiscalus mexicanus</i>	Great-tailed grackle	Aves		
<i>Quiscalus quiscula</i>	Common grackle	Aves		
<i>Molothrus ater</i>	Brown-headed cowbird	Aves		
<i>Icterus spurius</i>	Orchard oriole	Aves		
<i>Icterus galbula</i>	Baltimore oriole	Aves		
<i>Icterus bullockii</i>	Bullock's oriole	Aves		
<i>Icterus parisorum</i>	Scott's oriole	Aves		
<i>Carpodacus cassinii</i>	Cassin's finch	Aves		
<i>Carpodacus mexicanus</i>	House finch	Aves		
<i>Loxia curvirostra</i>	Red crossbill	Aves		
<i>Carduelis pinus</i>	Pine siskin	Aves		
<i>Carduelis psaltria</i>	Lesser goldfinch	Aves		
<i>Carduelis tristis</i>	American goldfinch	Aves		
<i>Coccothraustes vespertinus</i>	Evening grosbeak	Aves		
<i>Passer domesticus</i>	House sparrow	Aves		
<i>Antilocapra americana</i>	Pronghorn	Mammalia		
<i>Canis latrans</i>	Coyote	Mammalia		
<i>Urocyon cinereoargenteus</i>	Gray fox	Mammalia		
<i>Vulpes velox</i>	Swift fox	Mammalia		Special concern
<i>Castor canadensis</i>	Beaver	Mammalia		
<i>Cervus elaphus</i>	Wapiti	Mammalia		
<i>Odocoileus hemionus</i>	Mule deer	Mammalia		
<i>Odocoileus virginianus</i>	White-tailed deer	Mammalia		
<i>Erethizon dorsatum</i>	Porcupine	Mammalia		
<i>Felis concolor</i>	Mountain lion	Mammalia		
<i>Lynx rufus</i>	Bobcat	Mammalia		
<i>Pappogeomys castanops</i>	Yellow-faced pocket gopher	Mammalia		
<i>Thomomys bottae</i>	Botta's pocket gopher	Mammalia		
<i>Chaetodipus hispidus</i>	Hispid pocket mouse	Mammalia		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Dipodomys ordii</i>	Ord's kangaroo rat	Mammalia		
<i>Perognathus flavescens</i>	Plains pocket mouse	Mammalia		
<i>Perognathus flavus</i>	Silky pocket mouse	Mammalia		
<i>Lepus californicus</i>	Black-tailed jack rabbit	Mammalia		
<i>Sylvilagus audubonii</i>	Desert cottontail	Mammalia		
<i>Nyctinomops macrotis</i>	Big free-tailed bat	Mammalia		
<i>Tadarida brasiliensis</i>	Brazilian free-tailed bat	Mammalia		
<i>Mus musculus</i>	House mouse	Mammalia		
<i>Neotoma albigula</i>	White-throated woodrat	Mammalia		
<i>Neotoma floridana</i>	Eastern woodrat	Mammalia		
<i>Neotoma mexicana</i>	Mexican woodrat	Mammalia		
<i>Neotoma micropus</i>	Southern plains woodrat	Mammalia		
<i>Ondatra zibethicus</i>	Muskrat	Mammalia		
<i>Onychomys leucogaster</i>	Northern grasshopper mouse	Mammalia		
<i>Peromyscus boylii</i>	Brush mouse	Mammalia		
<i>Peromyscus difficilis</i>	Rock mouse	Mammalia		
<i>Peromyscus leucopus</i>	White-footed mouse	Mammalia		
<i>Peromyscus maniculatus</i>	Deer mouse	Mammalia		
<i>Peromyscus truei</i>	Pinyon mouse	Mammalia		
<i>Reithrodontomys megalotis</i>	Western harvest mouse	Mammalia		
<i>Reithrodontomys montanus</i>	Plains harvest mouse	Mammalia		
<i>Sigmodon hispidus</i>	Hispid cotton rat	Mammalia		
<i>Conepatus mesoleucus</i>	Hog-nosed skunk	Mammalia		
<i>Spilogale gracilis</i>	Western spotted skunk	Mammalia		
<i>Taxidea taxus</i>	Badger	Mammalia		
<i>Mephitis mephitis</i>	Striped skunk	Mammalia		
<i>Bassariscus astutus</i>	Ringtail	Mammalia		
<i>Procyon lotor</i>	Raccoon	Mammalia		
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	Mammalia		Special concern
<i>Spermophilus tridecemlineatus</i>	Thirteen-lined ground squirrel	Mammalia		
<i>Spermophilus variegatus</i>	Rock squirrel	Mammalia		
<i>Spermophilus spilosoma</i>	Spotted ground squirrel	Mammalia		
<i>Tamias quadrivittatus</i>	Colorado chipmunk	Mammalia		
<i>Notiosorex crawfordi</i>	Desert shrew	Mammalia		
<i>Antrozous pallidus</i>	Pallid bat	Mammalia		

ATTACHMENT E.2

Vertebrates Known to Occur at the PCMS

Scientific Name	Common Name	Class	Federal Status	State Status
<i>Eptesicus fuscus</i>	Big brown bat	Mammalia		
<i>Lasiurus cinereus</i>	Hoary bat	Mammalia		
<i>Myotis yumanensis</i>	Yuma myotis	Mammalia		
<i>Plecotus townsendii</i>	Townsend's big-eared bat	Mammalia		

ATTACHMENT E.3

**Management Plan for Wintering Bald Eagles at
Fort Carson and the PCMS**

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Acronyms and Abbreviations

BGEPA	Bald and Golden Eagle Protection Act
CDOW	Colorado Division of Wildlife
DDT	dichlorodiphenyl trichlorethane
DECAM	Directorate of Environmental Compliance and Management
ESA	Endangered Species Act
FR	Federal Regulation
ft	feet
Guidelines	Draft National Bald Eagle Management Guidelines
kg	kilograms
km ²	square kilometers
lbs	pounds
m	meters
MBTA	Migratory Bird Treaty Act
mi ²	square miles
PCMS	Pinon Canyon Maneuver Site
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

1.1 Purpose

The purpose of this Technical Memorandum is to provide a conservation assessment and conservation goals for wintering bald eagles on Fort Carson and the Pinon Canyon Maneuver Site (PCMS). Elements of the memorandum include threats to bald eagles on Fort Carson and the PCMS, and specific management actions to mitigate negative effects on the bald eagle.

1.2 Project Overview

This plan is organized into four parts.

Section 1.0 Introduction: A brief overview of the purpose of this Technical Memorandum.

Section 2.0 Conservation Assessment: Current knowledge on bald eagle population status, ecology, and habitat requirements on Fort Carson, the PCMS, and regionally, including known and potential threats to the bald eagle on the installations.

Section 3.0 Conservation Goal: Specific management prescriptions for the bald eagle on Fort Carson and the PCMS.

Section 4.0 References: References cited in the preparation of the plan.

2.0 Conservation Assessment

2.1 Species Description

The bald eagle is a diurnal bird of prey. Adult bald eagles are readily identified by their white head and tail, dark brown body, and large yellow bill. Bald eagles weigh 3.6 to 6.4 kilograms (kg) (8 to 14 pounds [lbs]) and have wingspans of 1.7 to 2.4 meters (m) (5.5 to 8 feet [ft]). Northern bald eagles (Alaska and Canada) are significantly larger than their southern relatives, and females are larger than males. Juveniles are mottled brown and white and generally attain adult plumage by 5 years of age (U.S. Fish and Wildlife Service [USFWS], 2006a).



Juvenile Bald Eagle



Adult Bald Eagle

(Pictures from Birds of North America Online)

2.2 Species Distribution

2.2.1 General

The bald eagle is a North American species that has historically occurred throughout the contiguous United States and Alaska (USFWS, 2006a). Bald eagles nest in areas with forested shorelines or cliffs along aquatic habitats, including coastal areas, rivers, lakes, and reservoirs (Buehler, 2000). In winter, bald eagles may also occur in semi-deserts and grasslands, especially near prairie dog towns (Andrews and Righter, 1992).

2.2.2 Regional

Historically, the number of bald eagle pairs nesting in Colorado is unknown, but records indicate several mountain sites and one plains site. Bald eagles now nest across Colorado in large, mature cottonwoods or pines (Kingery et al., 1998). The Colorado population of bald eagles increases during the winter, and the bald eagle is a common local winter resident in western valleys, mountain parks, and on the eastern plains (Andrews and Righter, 1992).

2.2.3 Fort Carson

Most bald eagle records for Fort Carson are from the northern region (Figure E3-1), most likely due to the presence of prairie dog colonies. Bald eagles do not nest on Fort Carson or within its region of influence, and no bald eagles have been seen on Fort Carson during the breeding season. Most records of bald eagles on Fort Carson are from October to March, with the majority of sightings from November to January (Bunn, 2006). Bald eagle density likely increases during the big game hunting season on Fort Carson as bald eagles scavenge viscera left by hunters (Directorate of Environmental Compliance and Management [DECAM], 2002).

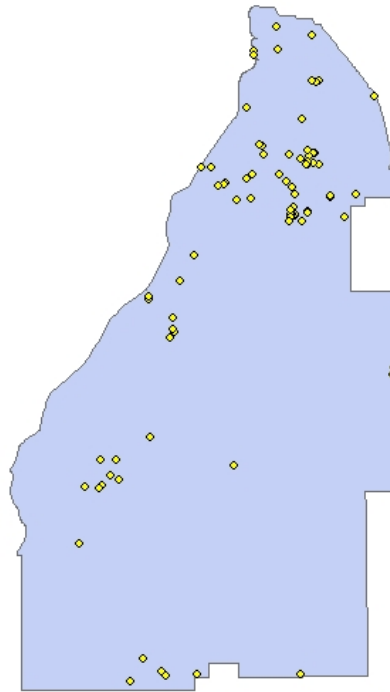


FIGURE E3-1
Bald Eagle Sightings on Fort Carson

2.2.4 Pinon Canyon Maneuver Site

Bald eagles are winter residents and migrants on the PCMS, especially in the southwestern grassland area (Figure E3-2). No evidence of active eyries has been found. As is the case at Fort Carson, bald eagle density probably increases during big game hunting season on the PCMS as bald eagles scavenge viscera left by hunters (DECAM, 2002). A bald eagle winter roost exists along County Road 54, off site of the PCMS (Klavetter, 2006).

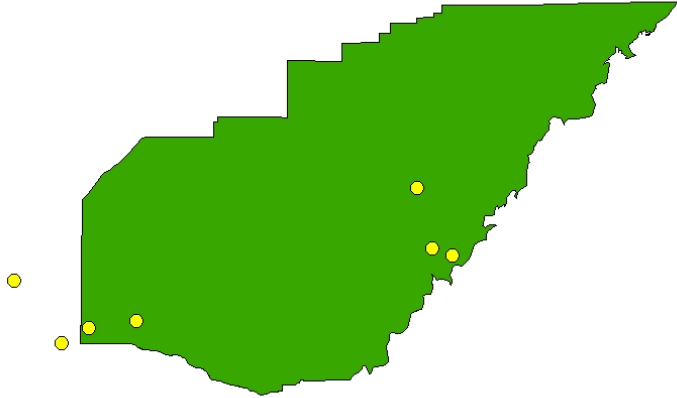


FIGURE E3-2
Bald Eagle Sightings on the PCMS and Surrounding Area

2.3 Habitat Requirements

2.3.1 General

Bald eagles winter primarily in the temperate zone, generally below 500 m (1,640 ft) elevation. In Colorado, however, wintering areas may reach 2,500 m (8,200 ft) elevation. Bald eagle winter habitat is generally defined by food availability, presence of roost sites that provide protection from inclement weather, and absence of human disturbance. The majority of wintering bald eagles are associated with aquatic areas with some open water for foraging (Buehler, 2000). In some areas, however, bald eagles use habitats in winter with little or no open water if other food sources (e.g., small mammals or carrion) are readily available (NatureServe, 2006). Type of food consumed (avian, mammalian, or fish) and means of availability (live or carrion) vary greatly across wintering range. Winter perching habitat is characterized by the presence of tall trees located less than 50 m (164 ft) from foraging areas (Buehler, 2000).

Bald eagles have shown high site fidelity to wintering grounds (Buehler, 2000). In Colorado, 10 of 36 immatures and adults repeatedly returned to the same area to winter, and one individual wintered in the same area for 10 years (Harmata and Stahlecker, 1993).

Bald eagle winter ranges, especially those of non-breeding birds, can be very large (NatureServe, 2006). An immature bald eagle wintered in Arizona over an area of more than 40,000 square kilometers (km²) (15,444 square miles [mi²]) and spent the summer in the Northwest Territories on a summer range of more than 55,000 km² (21,235 mi²) (Grubb et al., 1994). During February to April, the mean minimum winter home range of four immature bald eagles in Arizona averaged 400 km² (154 mi²) (Grubb et al., 1989), and in Montana, adults and immatures had winter ranges from 102 to 3,925 km² (39 to 1,515 mi²) (McClelland et al., 1996). Winter home ranges in Colorado averaged 311 km² (120 mi²); ranges for mated birds were less than for unmated birds (128 km² and 546 km², respectively) (49 mi² and 211 mi², respectively) (Harmata, 1984).

2.3.2 Fort Carson and the PCMS

Due to large winter home ranges and various migration routes, wintering and migrating bald eagles may be found throughout Fort Carson and the PCMS. However, bald eagles are generally found near prairie dog towns on both installations. Prairie dogs, other small mammals, and animal remnants left by hunters provide food for bald eagles on Fort Carson and the PCMS.

2.4 Life History

2.4.1 Reproduction and Mortality

Bald eagle nest-building activity and egg-laying timing vary throughout the United States depending on latitude (Buehler, 2000). In the northern United States, including Colorado, bald eagles begin building nests between December and mid-March, and eggs are laid from February through April. Bald eagles lay from one to four eggs, with one or two eggs being most common. Only one egg is laid per day, and eggs are not always laid on successive days. Incubation begins after the first egg is laid, and hatching of young occurs on different days, resulting in chicks of unequal size occupying the same nest. Incubation typically lasts 33 to 35 days but can be as long as 45 days. Egg hatching and young rearing take place from March to June and by mid-May to August, the young are fledging. At 10 to 12 weeks after hatching, eaglets make their first flights, and they fledge within a few days after that first flight. After fledging, young birds usually remain in the vicinity of the nest for several weeks. Young are almost completely dependent on their parents for food until approximately 6 weeks later, when they disperse from the nesting territory. Overall, the national fledging rate is approximately one chick per nest per year (USFWS, 2006a).

Bald eagles exhibit high nest fidelity and nesting territories are often used year after year. Generally, nests are found near coastlines, rivers, lakes, or streams that support an adequate food supply. Nests are located in mature or old-growth trees, snags, cliffs, rock promontories, but rarely on the ground and, with increasing frequency, on human-made structures, including power poles and communication towers (USFWS, 2006a). In suitable forested areas, nest trees are generally the largest trees with accessible limbs capable of holding a nest that can weigh more than 455 kg (1,000 lbs) (USFWS, 2006a; Buehler, 2000). Nests are constructed from large sticks and may be lined with moss, grass, plant stalks, lichen, seaweed, or sod. Bald eagle nests are typically 1.2 to 1.8 m (4 to 6 ft) in diameter and 0.9 m (3 ft) deep (USFWS, 2006a). Nest sites generally include at least one perch with good visibility of the surrounding area (USFWS, 2006a; Buehler, 2000).

Humans represent the single greatest cause of bald eagle mortality, including mortality from direct human actions (shooting, trapping, poisoning) and mortality related to indirect human development activities (power lines and other structures). Environmental contaminants are also a significant source of mortality. These include ingestion of lead from waterfowl, deer, and other game species' carcasses, and secondary poisoning through consumption of prey killed by pesticides or euthanasia (sodium pentobarbital). Bald eagles are also susceptible to motor vehicle-impact injuries while scavenging carcasses off highways (USFWS, 2006a; Buehler, 2000).

2.4.2 Movement and Behavior

Bald eagles have a complex pattern of migration that is dependent on age of the individual (immature or adult), location of breeding site (north versus south, interior versus coastal), severity of climate (especially during winter, but also possibly during summer), and year-round food availability. Adult bald eagles migrate as needed when food becomes unavailable. Bald eagles usually migrate alone but occasionally join other migrants. Concentrations of migrants may be found at communal feeding or roosting sites. Immature bald eagles migrate and move nomadically, presumably because they are not tied to a nest site (Buehler, 2000).

Bald eagles migrate widely over most of North America. Northward migration may be more rapid than the return trip south to wintering grounds because early arrival on breeding grounds provides advantages in competing for nest sites and mates. Migration southward may occur at a slower rate as birds respond to foraging opportunities along the way (Buehler, 2000).

2.4.3 Foraging and Diet

Bald eagles are opportunistic feeders, and fish make up most of their diet. Bald eagles also eat waterfowl, shorebirds/colonial water birds, small mammals, reptiles, amphibians, and carrion (USFWS, 2006a; Buehler, 2000). Bald eagles are visual hunters and usually locate their prey from a conspicuous perch or from soaring flight, then swoop down and strike. Large numbers of bald eagles often congregate in winter to feed on spawning salmon and other fish species or in areas below reservoirs (especially hydropower dams) where fish are abundant. In winter, bald eagles take birds from rafts of ducks on reservoirs and rivers, and congregate on melting ice sheets to scavenge dead fish. Bald eagles also eat roadkill and euthanized animal carcasses at landfills and feedlots. In addition, young eagles will often congregate to feed on easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays, and at landfills (USFWS, 2006a).

2.4.4 Population Status

The bald eagle has been extensively surveyed on breeding and wintering grounds throughout their range. In the 1980s, population estimates were from 70,000 to 80,000 birds, and populations in the 1990s undoubtedly increased (Buehler, 2000). In 1999, the entire bald eagle population was estimated to be around 100,000 individuals with the greatest numbers found in Alaska and British Columbia (Buehler, 2000).

In 1963, it was estimated that the lower 48 states had less than 500 pairs of nesting bald eagles, and USFWS-coordinated surveys in 1973-1974 estimated 1,000 pairs. In 2000, the USFWS recorded more than 6,471 occupied breeding areas. The 2001 estimate for breeding pairs in Colorado was 45 (USFWS, 2006b).

The estimated total wintering population of bald eagles in the continental United States was over 20,000 by 2000 (Buehler, 2000).

2.5 Species Status

The bald eagle was first listed under the Endangered Species Act (ESA) as endangered on March 11, 1967, (32 Federal Regulation [FR] 4001) and was downlisted to threatened in July 1995 (60 FR 35999 36010). Primary agents that contributed to listing the bald eagle are habitat loss and contaminants (USFWS, 2006b).

Due to population rebounds, the USFWS in 1999 proposed to remove the bald eagle from the threatened and endangered species list (64 FR 36454). The public comment period for the proposal to delist the bald eagle closed on June 19, 2006 (71 FR 8238). Banning dichlorodiphenyl trichlorethane (DDT) and other harmful organochlorines from use in the United States and promulgation of the ESA with the subsequent listing of the bald eagle were the two major actions contributing to the recovery of the bald eagle. Impacts from contaminants have also been reduced through elimination of lead shot for waterfowl hunting and restrictions on other harmful pesticides. Vigorous law enforcement efforts also added to the recovery by reducing the shooting of bald eagles (USFWS, 2006b).

Bald eagles are also protected by the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). Bald eagles are a Colorado state-listed threatened species.

2.6 Conservation Measures

The USFWS has developed and is implementing the Northern States Bald Eagle Recovery Plan, which includes Colorado (USFWS, 1983). The plan includes four basic elements:

- Determine current population and habitat status.
- Determine minimum population and habitat needed to achieve recovery.
- Protect, enhance, and increase bald eagle populations and habitats.
- Establish and implement a coordination system for information and communication.

In the event the bald eagle is removed from the Federal List of Endangered and Threatened Wildlife and Plants and does not have protection under the ESA, Draft National Bald Eagle Management Guidelines (Guidelines) have been established to promote the continued conservation of the bald eagle (USFWS, 2006a). The Guidelines are intended to:

- Publicize the provisions of the BGEPA that continue to protect bald eagles in order to reduce the possibility that people will violate the law.
- Advise landowners, land managers, and the general public of the potential for various human activities to disturb bald eagles.
- Encourage land management practices that benefit bald eagles and their habitat.

2.7 Conservation Issues on Fort Carson and the Pinon Canyon Maneuver Site

This section outlines potential natural and human-related threats to the bald eagle and its habitat on Fort Carson and the PCMS.

2.7.1 Natural Threats

Predators

Bald eagles will defend their nests against other avian species, especially ravens and other raptors. Bald eagle eggs, nestlings, and fledglings are the most vulnerable to predation. Black-billed magpies, gulls, ravens, crows, black bears, and raccoons have been reported to prey on eggs in nests. Black bears, raccoons, hawks, owls, crows, ravens, bobcats, and wolverines have been reported to kill nestlings, although there is little actual documentation. Fledglings on the ground are vulnerable to mammalian predators. Few non-human species are capable of or likely to prey on immature or adult bald eagles. Starving, injured, or diseased immatures and adults may be vulnerable to mammalian predation (Buehler, 2000).

Disease

Of 1,428 bald eagles examined during a 20-year period, only 2 percent died directly from disease. Diseases reported as leading to death included peritonitis, pneumonia, enteritis, septicemia, avian cholera, aspergillosis, hepatic necrosis, and myocardial infarction. Avian pox has been reported in a few cases, including one case involving mortality of two bald eagles (Buehler, 2000).

Parasites

Few data on parasites exist, and no parasites have been reported to cause death of an individual bald eagle. Parasites appear to be common on nestling bald eagles (Buehler, 2000).

Exposure

Although little mortality is attributed to exposure, extreme weather conditions that lead to food shortages may cause death. Bald eagles can tolerate extreme cold, wind, and snow as long as food is available (Buehler, 2000).

Black-Tailed Prairie Dog Plague Outbreaks

Black-tailed prairie dogs are an important food source for wintering bald eagles. If natural prairie dog plague outbreaks cause significant localized loss of prairie dog colonies, bald eagles may not use the area for foraging.

2.7.2 Human Threats

Bald eagles are sensitive to human disturbance, especially during the nesting season. During migration and winter, bald eagles often concentrate in large numbers, from hundreds to thousands of individuals, for feeding and sheltering. Bald eagles rely on established roost

sites because of their proximity to sufficient food sources. Human activities near or within roost sites may prevent bald eagles from feeding or taking shelter, especially if other undisturbed or productive areas are not available. Feeding may be disrupted if there are disturbance activities in the flight path of important foraging areas. Activities that permanently alter bald eagle habitat may altogether eliminate factors essential for foraging bald eagles (USWFS, 2006a).

Military Training

There are no training restrictions or buffer zones at Fort Carson and the PCMS associated with the management of the bald eagle. Military training occurs in many forms throughout areas in which bald eagles have been found on Fort Carson and the PCMS. The most likely military training to affect bald eagles would be training that may cause prairie dog populations to decline on Fort Carson and the PCMS.

Military Training Effects on Prairie Dogs

Military training activities within prairie dog colonies, including mine plows, large-caliber weapon firing, construction of trench obstacles, live small-arms-caliber munitions, equipment drops, and offroad vehicles, would have a direct impact on prairie dogs. Except in the smallest colonies, damage associated with this type of training would not be substantial. These activities would have a short-term adverse effect on prairie dogs and a negligible effect on the long-term viability of a colony.

Non-Military Activities

Infrastructure Construction

Construction of infrastructure, especially on Fort Carson, could have the greatest impact on existing colonies of black-tailed prairie dogs on the installations. Prairie dog burrowing activities near infrastructure may lead to human/wildlife conflicts (i.e., gnawing of electrical wiring causing malfunctions in equipment), and in these cases, prairie dogs may be controlled according to practices outlined in the *Biological Assessment and Management Plan for the Black-Tailed Prairie Dog on Fort Carson and the Pinon Canyon Maneuver Site* (DECAM, 2004). Loss of prairie dog populations could result in bald eagles foraging outside of the installations.

Recreation

Hunting is permitted on both Fort Carson and the PCMS. The Colorado Division of Wildlife (CDOW) sets hunting seasons, but Fort Carson and the PCMS may place additional restrictions if warranted. There is a permanent moratorium on all black-tailed prairie dog hunting on both installations. Bald eagles scavenge animal remains left by hunters, and hunting most likely increases the availability of food for bald eagles on the installations. Therefore, hunting restrictions are not warranted.

Pest Control

The *Biological Assessment and Management Plan for the Black-Tailed Prairie Dog on Fort Carson and the Pinon Canyon Maneuver Site* outlines approved prairie dog population-control methods. Lethal control of prairie dogs occurs on Fort Carson at sites where prairie dogs present a public health threat, threaten the safety of sanctioned Army activities, damage or threaten to damage Army property, or where their presence is incompatible with current land-use practices or management goals. No prairie dogs have ever been poisoned on the

PCMS, but lethal removal of prairie dogs could be employed on the PCMS in the future under the circumstances outlined above for Fort Carson (DECAM, 2004).

Aluminum phosphide (trade name Phostoxin) is the chemical agent used to control prairie dogs. Phostoxin use is restricted to times when soil temperatures are greater than 55 degrees Fahrenheit for 72 hours and acceptable soil moisture is present. Under proper conditions, Phostoxin combines with moisture in the soil to emit carbon dioxide. Phostoxin is lethal to all other wildlife species and is not used on sites where burrowing owls or mountain plovers are present (DECAM, 2004).

Bald eagles are susceptible to secondary poisoning in prairie dog colonies. The prairie dog is an important food source for bald eagles on Fort Carson and the PCMS, especially in winter. The application of any pesticide must consider the risk of secondary poisoning to bald eagles.

Power Lines

Bald eagles are susceptible to electrocution by power lines and power poles, as demonstrated by the electrocution deaths of golden eagles along Route 1 and Route 8 on Fort Carson (DECAM, 2002). Eagle electrocutions on power lines have been documented in several states, especially in the west. Problem lines are those with wires so close together that an eagle is apt to simultaneously touch two wires while attempting to land on a power pole. The problem seems to be most severe in terrestrial habitats where few suitable natural hunting perches are available (USFWS, 1983).

3.0 Conservation Goal

3.1 Goal

The goal of bald eagle management on Fort Carson and the PCMS is to protect and enhance bald eagle populations in accordance with the ESA, BGEPA, and MBTA. The primary conservation objective is to protect wintering bald eagles while on Fort Carson and the PCMS. Described below are specific management recommendations to protect bald eagles on Fort Carson and the PCMS.

3.1.1 Manage for Sustainable Black-Tailed Prairie Dog Populations

Restrict aboveground poisoning of black-tailed prairie dogs, especially in winter. Restricted use of pesticides would reduce the potential for ingestion of contaminated prey that could result in the death of bald eagles. By coordination, exclusion devices, and use of pesticides that are not poisonous or available to raptors, ensure that pest management programs do not inadvertently affect bald eagles on Fort Carson and the PCMS (DECAM, 2002). Black-tailed prairie dog recreational shooting is banned on Fort Carson and the PCMS, which may reduce the added risk of lead poisoning to eagles from scavenging prairie dog carcasses from hunters.

3.1.2 Implement Measures to Prevent Bald Eagles from Being Electrocuted on Towers, Poles, and Power Lines

Reduce accidental power line electrocution of bald eagles through identification of lines currently causing electrocution, modification of existing problem lines, and construction of new lines in accordance with recommended standards (USFWS, 1983). Recommendations for reducing impacts of power lines on raptors can be found in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996*, by Edison Electric Institute and Raptor Research Foundation.

Power lines will be inventoried to identify existing problem lines that should be modified. The DECAM will continue to monitor incidental take by electrocutions and will provide recommendations to the Directorate of Public Works regarding power lines that are known to kill raptors. Implementation of this objective includes gathering data on raptor electrocutions on the installations to identify raptor-killing lines and investigating methods to reduce the number of electrocutions on the installations (DECAM, 2002). The DECAM will provide technical assistance to ensure that wire/pole modifications to power lines do not accidentally electrocute bald eagles (or other large raptors). The DECAM will also notify the USFWS in the event of any bald eagle electrocution on Fort Carson or the PCMS.

In 2002, an independent survey by San Isabel Electric Company (Beth Dillion) was conducted for the potential for electrocution sites on all power lines within the PCMS. No locations were found on site that did not meet current guidelines/standards to avoid raptor electrocution (Klavetter, 2006).

3.1.3 Follow Applicable USFWS Guidelines for Protecting Bald Eagles

The USFWS describes management practices that land owners and planners can use to benefit bald eagles. Many of the recommendations are designed to protect bald eagle habitat and ensure against illegal take under the BGEPA (USFWS, 2006a). These recommendations include:

- Protect and preserve communal roost sites, potential nest sites, and important foraging areas. Retain mature trees and old-growth stands wherever possible, particularly within one-half mile of water.
- Avoid potentially disruptive activities and development in the eagles' direct flight path between their nest sites, roost sites, and important foraging areas.
- Locate long-term and permanent water-dependent facilities away from important eagle foraging areas.
- Avoid recreational and commercial boating and fishing near eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.
- Do not use explosives within one-half mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the USFWS and CDOW.
- Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.
- Only use pesticides, herbicides, fertilizers, and other chemicals in accordance with federal and state laws and labeled instructions for their use.
- Identify and monitor contaminants associated with hazardous waste sites (legal or illegal), and permitted releases especially within watersheds where eagles have shown poor reproduction or where bio-accumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.
- Where feasible, site wind turbines, communication towers, and high-voltage transmission power lines away from bald eagle communal roost sites to avoid collisions. Bury utility lines along forested shorelines and roadways in new development projects.
- Employ industry-accepted measures to prevent birds from being electrocuted on towers and poles.
- Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.
- Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collisions with windows and cars, and other mortality factors.
- Avoid excessive groundwater pumping and river diversion that can lead to destruction of nest trees, roosts, and foraging areas.

- Use an approved non-toxic shot when hunting waterfowl. Eagles can be poisoned by elevated levels of lead after feeding on fish and waterfowl that have ingested lead shot or carrion killed with lead shot.

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APPENDIX F

Cultural Resources Supporting Documentation

Provided by
Fort Carson Directorate of
Environmental Compliance and Management,
Cultural Resources Program



ATTACHMENT F.1

Prehistoric and Historic Cultural Sequences for the PCMS

**PREHISTORIC AND HISTORIC CULTURAL SEQUENCES FOR
THE PINON CANYON MANEUVER SITE (PCMS)**

Prehistoric Cultural Sequence

Three general stages of prehistory have been delineated for southeastern Colorado: the Paleoindian, Archaic, and Late Prehistoric. An earlier stage, the Pre-Clovis, has been proposed, but direct evidence of this stage in the region is lacking. The Paleoindian, Archaic, and Late Prehistoric stages in southeastern Colorado are each subdivided into three periods. These periods represent specific changes or innovations in the material culture of prehistoric peoples that suggest broader changes in environmental conditions and/or political and socio-economic structure. These periods span from approximately 11,500 B.P. to 225 B.P.

The following description of the prehistoric cultural chronology is taken from the cultural synthesis for Fort Carson provided in Zier et al. (1997), and the southeastern Colorado overviews found in Piper et al. (2006) and Zier and Kalasz (1999).

Pre-Clovis

The most noteworthy and generally widely accepted Pre-Clovis site is Monte Verde (Dillehay 1989; Meltzer et al. 1997) in southern Chile. In North America, a Pre-Clovis stage has been proposed by some archeologists based on the early radiocarbon dates found at sites like Cactus Hill site in southeastern Virginia (Adovasio 2002), Topper site in South Carolina (Goodyear 2002), and Meadowcroft rockshelter in Pennsylvania (Adovasio and Carlisle 1988).

Some sites in Colorado have Pre-Clovis age materials; however, radiocarbon dates at these locations have yet to be definitively associated with actual human activity (Zier and Kalasz 1999:75). Two northeastern Colorado sites, Dutton and Selby, produced bones of extinct megafauna that exhibit spiral fracturing and flake scars suggesting human modification. At the Lamb Spring site southwest of Denver, a possible Pre-Clovis component contained the remains of 23 mammoths, some of which appeared to have been left in piles, and bone flakes possibly resulting from the production of bone tools. Dates from the Dutton, Selby, and Lamb Spring sites range from 13,140 B.P. to 11,710 B.P.

Paleoindian 11,500-7,800 B.P.

The Paleoindian (11,500-7,800 B.P.) represents the earliest stage of cultural evolution in the archeological record of southeastern Colorado. This stage in southeastern Colorado is commonly divided into three periods based on diagnostic projectile points.

Clovis Period (11,500-10,950 B.P.)

The Clovis Period (11,500-10,950 B.P.), the earliest Paleoindian manifestation, has been delineated based on findings of large, fluted lanceolate spear points and prismatic blades, blade cores, and blade tools (Collins and Kay 1999:45-71). The latter were most likely used as knives, scrapers, and core/choppers. These characteristic artifacts have been found in association with

the remains of mammoth, horse, and other Pleistocene fauna suggesting economies were hunting-focused. Clovis sites in eastern Colorado include the Dent, Dutton, and Lamb Spring sites. The Drake cache in northeastern Colorado contained 13 large Clovis points and may represent a human interment (Frison 1991).

Other Clovis sites within the region include the Domebo site in southwestern Oklahoma and the Blackwater Draw site in east-central New Mexico. The Hahn site represents the only site of this age in southeastern Colorado (McDonald 1992), though surface Clovis points have been reported near Aguilar (Bair 1975:8), in Black Mesa State Park in the northwestern Oklahoma panhandle, and at several locations in western Kansas (Anderson 1990). Campbell (1969:360) identified a Clovis point in northern Las Animas County.

Folsom Period (10,950-10,250 B.P.)

The Folsom Period (10,950-10,250 B.P.) has been delineated based on fluted points found in association with extinct *Bison bison antiquitus*, as well as pronghorn, hare, wolf, fox, coyote, and turtle. The period coincided with early Holocene warming that saw the extinction of many large Pleistocene mammals. Besides fluted points, other Folsom period tools included knives, graters, spokeshaves, scrapers, cores, drills, burin-like implements, choppers, abrading stones, awls, beads, and needles (Zier and Kalasz 1999:86-87). There is some evidence for the processing of vegetal products and for the grinding of pigments (Anderson 1990). Folsom sites in the region include the “type” site in northeastern New Mexico (35 miles south of the PCMS), the Lindenmeier, Fowler-Parrish, Powars, and Johnson sites in north-central Colorado (Zier and Kalasz 1999:85), and the Stewart’s Cattle Guard, Zapata, and Linger sites in the San Luis Valley (Dawson and Stanford 1975; Jodry and Stanford 1992).

Though no Folsom sites have been reported in southeastern Colorado, surface projectile points have been reported in the Canon City area, Red Top Ranch, the Flank Field Storage Area, the Cimarron River basin (Zier and Kalasz 1999:87), near Fowler (Lotrich 1938), and on the Chaquaqua Plateau (Anderson 1975). Three Folsom point fragments have been recovered from PCMS sites, but two appear to have been brought there by later occupants. The other is of a local material and was broken during the fluting process (Owens and Loendorf 2005:581).

Plano Period (10,250-7,800 B.P.)

The Plano Period (10,250-7,800 B.P.) comprises several complexes characterized by different flake styles of lanceolate projectile points. Complexes include Midland, Agate Basin, Hell Gap, Alberta, Cody, Frederick, and Lusk (Gunnerson 1987; Wiesend and Frison (1998); Zier and Kalasz 1999:91-92). These complexes are thought to reflect a cultural continuum with adaptive modifications resulting in tool variability. An increasingly complex lifestyle is indicated by the presence of more varied tool kits, including a variety of stone and bone tools (Knell 1999). The presence of milling stones indicates a greater emphasis on processing plants. A great variety of kill, processing, and camp sites also occur, some with evidence suggestive of religious practices (Anderson 1990).

Evidence of Plano occupation in southeastern Colorado is plentiful; recorded sites of note include Olsen-Chubbock (Wheat 1972) and Runberg (Black 1986). On Fort Carson, two Cody complex projectile points and two unidentified Plano projectile points fragments have been recorded as surface finds. On the PCMS, Hell Gap points are quite common and have been found on eight sites and as isolates twice. Recently, PCMS archaeologists (Owens and Swan 2006) identified an Agate Basin site with four diagnostic projectile points and highly patinated debitage and chipped-stone tools.

Archaic 7,800-1,850 B.P.

The beginning of the Archaic Stage (7,800-1,850 B.P.) marks another turning point in the natural environment with the onset of the Altithermal climatic episode, a prolonged early Holocene period of general warming and drying in western North America (Benedict 1979). The Archaic Stage represents a shift from economies geared toward big game hunting to more generalized hunting and gathering. More importance was placed on wild plant foods like *Chenoams*, and the procurement of game became more diversified, with large and small mammals like rabbits and gophers represented (Piper et al. 1996). Ground stone implements became common and are the predominant artifact class at many Archaic sites. Lithic tool assemblages exhibit more variability, and many artifacts reflect specialized local adaptation (Zier and Kalasz 1999).

Based on changes in projectile point morphology, the Archaic stage has been divided into Early, Middle, and Late periods. Archaic projectile points are nearly all stemmed and are not as delicately flaked as those of the earlier Paleoindian stage. Generally, Archaic complexes in the region have been poorly defined (Anderson 1990; Zier and Kalasz 1999:100).

Early Archaic Period (7,800-5,000 B.P.)

The Early Archaic Period (7,800-5,000 B.P.) reflects human adaptations to a hotter and drier climate. In response to this drastic climate change, southeastern Colorado may have become partially depopulated (Owens and Loendorf 2005:661), with some groups possibly relocating to the relatively cooler and wetter foothill and mountain regions (Benedict 1979; Brunswig 1992; Feiler 1994:16).

Early Archaic projectile points in eastern Colorado tend to be large, with either corner-notching or shallow side-notching (Zier and Kalasz 1999:105). Tool kits have not been thoroughly described, though Cassels (1997:95) indicates that expedient ground stone first appears regularly at this time.

In southeastern Colorado, Early Archaic projectile points have been reported from nine sites in the Apishapa highlands and from one site in the John Martin Reservoir area (Zier and Kalasz 1999:102-104). On Fort Carson, a component of the Gooseberry Shelter site has been radiocarbon-dated to the Early Archaic (Kalasz et al. 1993). No Early Archaic archeological sites have been found at Pinon Canyon and only a few projectile point isolates have been identified (Owens and Loendorf 2005). The lack of Early Archaic remains results from either a cultural hiatus, brought on by drought, or poor site preservation resulting from natural geologic processes (Zier et al 1989:15).

Middle Archaic Period (5,000-3,000 B.P.)

The Middle Archaic Period (5,000-3,000 B.P.) witnessed a widespread reversion to more mesic climatic conditions following the Altithermal event. Middle Archaic sites indicate broad-spectrum adaptations by hunter-gatherers to plains, basin/valley, foothills, and montane environments (Gunnerson 1987:31-36). Sites display evidence of diverse resource procurement. Remains of large and small mammals, birds, reptiles, and shellfish occur, as do seeds of numerous wild plants (Zier and Kalasz 1999:121). Hearths are common and spaced-stone circles also appear. Characteristic projectile points of this period include large, basally concave or indented points such as McKean, Duncan, Hanna, and Mallory types (Gunnerson 1987:31-32). Other artifacts include formalized manos and grinding slabs, bifaces, scrapers, drills, spokeshaves, bone awls, and hammerstones (Anderson 1990).

In southeastern Colorado, one Middle Archaic site, Draper Cave in Custer County, has been excavated revealing mixed levels of Duncan, McKean, and Hanna projectile points. On Fort Carson, components of the Recon John Shelter site, the Gooseberry Shelter, and the Two Deer Shelter have been radiocarbon-dated to the Middle Archaic (Zier and Kalsaz 1999:115). Though isolated Middle Archaic projectile points are quite common, only one PCMS site can be attributed to the McKean Complex (Piper et al. 2006:3-4). Middle Archaic age rock art, in the form of Pecked Curvilinear and Pecked Rectilinear elements, is quite common on the PCMS.

Late Archaic Period (3,000-1,850 B.P.)

The Late Archaic Period (3,000-1,850 B.P.) saw the continued specialization in subsistence practices, and maize probably first spread into the region at this time (Zier and Kalasz 1999:137). Evidence of communal bison procurement is abundant for this period and suggests the development of complex intergroup cooperation in conjunction with population growth (Piper et al. 2006:3-6). In southeastern Colorado, Late Archaic sites are much more common than Middle Archaic sites. Diagnostic projectile points of the period include basal corner-notched types like Ellis, Garza, Marcos, Shumla, Williams, Palmillas, Ensor, Edgewood, and Yarbrough (Anderson 1990).

On Fort Carson, Late Archaic components have been discovered at many locations, including a number with Middle Archaic components, such as the Recon John Shelter, the Gooseberry Shelter, and the Two Deer Shelter (Zier and Kalasz 1999:128-129). Pinon Canyon contains many surface sites of this time period; those excavated indicate that communal plant collecting and processing were dominant activities (Piper et al. 2006:3-6 – 3-7). In the area around Pinon Canyon, Late Archaic remains are plentiful, especially in the canyons (Campbell 1969; Hand and Jepson 1996; Reed and Horn 1995).

Late Prehistoric 1,850-225 B.P.

The Late Prehistoric Stage (1,850-225 B.P.) observed important changes in subsistence patterns, artifact complexes, and demographics on the southern Plains. The beginning of the stage coincides with innovations like the bow and arrow, ceramics, and permanent or semi-permanent houses (Piper et al. 2006:3-7). The use of cultigens reached a significant level during this time, though few pollen or macrobotanical samples attest to this change in southeastern Colorado. Recently, however, excavations along the Purgatoire River have produced significant maize

pollen (Scott-Cummings and Varney 2002) at the Developmental Period/Diversification Period boundary.

The final centuries of the Late Prehistoric Stage reflect the effects of European incursions, including both direct intrusions by Europeans and diffusion and spread of material goods of European origin by indigenous groups (Secoy 1953; Zier and Kalasz 1999).

Developmental Period (1,850-900 B.P.)

The Developmental Period (1,850-900 B.P.) corresponds with what has traditionally been referred to by archeologists as the Plains Woodland Period (Winter 1988) or the Early Ceramic Period (Eighmy 1984). At this time, cordmarked and plain pottery, small corner-notched arrow points (Scallorn, Reed, Bonham, Alba, Washita, Fresno, Chaquaqua types), circular slab masonry architecture and some agriculture first appeared.

Ground stone tools are more common than chipped stone in this period. This suggests that vegetal materials, possibly including maize, and other cultigens probably constituted larger portions of the human diet (Piper et al. 2006:3-8). Faunal remains from excavated sites indicate that animals like deer and antelope were exploited, as well as small animals like cottontail rabbits and prairie dogs (Zier and Kalasz 1999:178). Aquatic species like fish, frogs, and fresh water mussels were also consumed (Sanders 1983; Zier and Kalasz 1999:178).

Developmental Period sites are much more numerous in the region than those of earlier periods. It has been noted that this increase in the number of recorded sites could be the result of improved site visibility due to the presence of architectural features (Zier et al. 1997). Observed site types include circular masonry architecture, rock shelters, brush and hide shelters with circular rock foundations, and open camps (Zier and Kalasz 1999:174-175)

Diversification Period (900-500 B.P.)

The Diversification Period (900-500 B.P.), also termed the Middle Ceramic (Eighmy 1984), marks the local variant of the Plains Village tradition. It is subdivided into the Sopris (900 to 750 B.P.) and Apishapa Phases (900 to 500 B.P.) in southeastern Colorado. The Sopris occurs in the area around Trinidad, Colorado, and relates to the Pueblo Indian occupation of New Mexico. Sites of this phase have never been found at the PCMS or Fort Carson and will receive little discussion here.

Based on the appearance of “fortified” sites on areas of high terrain, and massive architectural features, Withers (1954) proposed the concept of the Apishapa focus. More recently, Lintz (1984) proposed the concept of the Upper Canark regional variant for cultures of Plains Village age that occur along the western margin of the southern and central Plains. Within the Upper Canark regional variant, he recognized the Antelope Creek Phase of the Texas and Oklahoma Panhandles and northeastern New Mexico, and the Apishapa Phase of southeastern Colorado. Lintz’s dates for the Upper Carnark regional variant were approximately 900-500 B.P. (Zier et al. 1997).

There is little doubt that subsistence practices during the Diversification Period were geared more toward horticulture than those of the Developmental Period. However, floral and faunal evidence from Diversification sites still indicates that hunting and gathering predominated and that horticulture was supplemental. The degree to which architectural developments are reflective of permanent habitation is also uncertain. Where surface architecture is common (particularly along the canyons of the upper Arkansas River drainage basin), it is difficult to envision permanent habitation and a horticultural subsistence base, due to the marked absence of substantial middens (Zier et al. 1997).

Cultigens have been recovered from excavations on Diversification Period sites. Maize has been recovered from many rockshelters in the region including Medina Rockshelter, Pyeatt Rockshelter, Upper Plum Canyon Rockshelter, Gimmie Shelter, and Trinchera Cave (Zier and Kalasz 1999:217). Maize pollen has been recovered from open architectural sites along the major rivers of southeast Colorado (Gardner 2005; Gunnerson 1989). At Umbart Cave in the upper Arkansas River drainage basin, Campbell (1969:180) recovered beans in subsurface context. The presence of cultigens in the drainage basins of the Arkansas River indicates that horticulture was being practiced, or that these peoples were actively trading with the horticulturists of the Antelope Creek Phase.

Deer and antelope remains are common on Apishapa Phase sites, but bison bones are rarely encountered. Communal hunting of ungulates is portrayed in rock art of this time period with human figures portrayed herding or chasing quadrupeds (Piper et al. 2006:3-10).

Technologically, the most distinctive lithic characteristic of the period is the small triangular projectile point, either unnotched Fresno or side-notched Washita. Ceramics are also varied, but generally consist of cord-marked, globular, or conoidal jars. Bone artifacts are common and include awls, fleshers, wrenches, and beads. Ground stone includes manos, metates, and shaft abraders (Zier et al. 1997).

Many Diversification Period sites are found on the Army controlled lands in Colorado. The canyon settings of the PCMS exhibit defensive sites on every isolated high ridge point surrounded by a steep slope. At the Sorenson Site or Jason's Pillar, for example, Apishapa village sites were found on isolated canyon edges where their occupants could monitor the movement of adversaries during what was likely a raid or siege warfare event.

Protohistoric Period (500-225 B.P.)

The Protohistoric Period extends from roughly 500 to 225 B.P. The earliest European incursions into the region occurred during the first half of the sixteenth century, and the material cultures of indigenous populations were altered significantly over the course of the ensuing three centuries. Three principal indigenous groups entered southeastern Colorado during this period. In chronological order of appearance, they are the Apache, Comanche, and Cheyenne-Arapaho (Zier et al. 1997). In addition, southeastern Colorado was on the margin of Ute territory throughout protohistoric times.

The Protohistoric Period marks the start of the Plains Nomad Tradition (Gunnerson 1969, 1984). Material remains include metal artifacts, micaceous pottery, Pueblo pottery, chipped glass artifacts, and side-notched points. Most sites from this period are tipi encampments found along canyon heads though some earth ovens have been found (Winter 1988:77-78). Spanish expeditions onto the southern Plains reported groups of nomadic bison hunters (Athabaskan speaking Querechos) that also subsisted on corn, other large and small game, native plant seeds, greens and tubers, mussels and fish. The Caddoan-speaking Teyas, Escanjaques, and Quiviras are also reported. These sedentary Indians grew corns, beans, and squash, also hunted buffalo, and frequently moved their villages (Winter 1988:111).

In eastern Colorado, the Dismal River Aspect has been proposed for the remains recovered for the time period between A.D. 1675 and A.D. 1725. The Dismal River Aspect has been associated with Plains Apachean peoples (Anderson 1990; Gunnerson 1960) based on the previously mentioned Spanish accounts. Recently, Gulley (2000:7) has called into question the validity of these accounts and has determined that sites attributed to Dismal River actually represent a local manifestation of a Plains life way, rather than a definitive Apachean presence.

Tipi rings sites are common throughout the southern Plains, but only a few of them can be attributed to the Protohistoric. Sites on the Carrizo Ranches near the Colorado/New Mexico border have tipi rings and diagnostic pottery (Kingsbury and Gabel 1983). Protohistoric ceramics have also been found at two sites on the PCMS (Loendorf and Kuehn 1991).

Historic Cultural Sequence

Within southern Colorado, the initial European contact occurred mid 16th century. The Late Prehistoric aboriginal way of life probably changed little until the Spanish began settling in the region. Following Zier and Kalasz (1999:250), the transition between the Protohistoric to the Historic began around A.D. 1725. There is a paucity of ethnographic and historical data for the region; however, surviving documents record the first known aboriginal/European contact with Fray Marcos DeNiza's expedition of 1539.

Archaeologically, the recognition of Historic Indian sites in the region has been rare (Church 2002; Stoffle et al. 1984:33). Because of this, European cultural history will be the primary topic. The following description of the historic cultural chronology is largely taken from Carrillo (1990), Mehls and Carter (1984), Murray (1979), and Zier et al. (1997), though other, less known sources are also consulted.

Spanish Period (A.D. 1540 – A.D. 1822)

Initial European exploration into southeastern Colorado was associated with Spanish colonialism. In 1539, Viceroy Medoza sent Fray Marcos DeNiza to investigate the "Seven Cities of Cibola" described by Cabeza DeVaca (Carson 1998:5). In 1540, Francisco Coronado led another large expedition in search of the Seven Cities as far north as south-central Kansas. Though neither of these expeditions actually crossed into Colorado, the entire region became part of the territory claimed by Spain in the New World (Mehls and Carter II-1; Zier et al. 1997:II-52).

Through the late 16th century there were other Spanish expeditions onto the southern Plains. In 1598, Don Juan Onate sent Vincente de Zaldivar into region and Juan de Archuleta made the first documented trip into Colorado around 1664 when retrieving Taos Indians from El Cuartelejo (Freidman 1988:6; Mehls and Carter II-1-3). The Purgatoire River is said to have received its name because Spanish soldiers had died here and did not receive last rites. Perhaps members of the Bonilla and Humana expedition of 1594 (Taylor 1963) were the servicemen mentioned in this account. The river's Spanish name, "Rio de las Animas", means river of souls, to which was later added "Perdidias en Purgatorio," or lost in Purgatory. Records indicate that Gutierrez de Humana killed Captain Fransisco Leyva de Bonilla along the Arkansas River in Kansas. However, while retuning to Pecos Pueblo the rest of the group was attacked by Indians and most of the Spanish soldiers were killed (Murray 1979). The majority of scholars (Friedman 1989; Thomas 1924:289-299) confirm that the Humana expedition went into Kansas and not Colorado, but a skeleton in Spanish armor found in a canyon near La Junta (Jeancon 1925) and chain mail found in the area (Church and Cowen 2003) collaborate nicely with the legend.

The Spanish period also saw aboriginal groups on the Southern Plains. The migration of the Utes and Comanches was part of a broader pattern of rapidly shifting tribal territories, a pattern which had begun before the Spaniards reached the region, and continued into the late-nineteenth century (Kenner 1969:78-97). The Uto-Aztec speaking Ute Indians may have been the first historic tribe to enter Colorado when they migrated southeastward from the Great Basin (Zier et al. 1997:II-53). Following herds of bison, and because of ameliorating climatic conditions, Apaches entered the area from the north by the beginning of the 16th century (Piper et al. 2006:3-10). Other Athabaskans, the Navajos, migrated to extreme southern Colorado and northern New Mexico at this time (Zier et al. 1997:II-54). The Navajos and Apaches conducted both trade and warfare with the older pueblo groups further to the south. By the 1660s, the Apaches had become a mounted military threat to the Pueblos and the Spanish in what Secoy (1953:6) calls the Post-Horse-Pre-gun pattern. The Utes also had horses in the 1700s and they too began to raid New Mexico villages.

The first documentation of mounted and armor protected Indians occurred around the time of the 1680 Pueblo Revolt (Secoy 1953:20). The revolt had little direct impact north of New Mexico, though Spanish exploration into the area ceased as both soldiers and settlers retreated back into Mexico (Mehls and Carter 1984:II-1). Within a few years the Spanish regained control of the Rio Grande area and exploration into territories to the north resumed.

In the 1700s, French traders operating on the northern Plains and along the Mississippi River began to trade goods and arms to the various Indian groups, including members of the Pawnee family and the Comanche (Secoy 1953:82). These enemies of the Apache pushed back across the southern Plains, and along with the Ute who were also armed at this time, established military dominance. The semi-sedentary Apache were tied to their seasonal crops, and their more mobile, and better equipped, adversaries were able to pattern their location and dominate calvary warfare.

In 1704 the Comanches began to raid Spanish settlements in New Mexico and used the Purgatoire River area as a staging point for their trips (Stoffle et al. 1984:50). Competition between Comanches and Utes for the upper Arkansas River basin eventually led to general warfare between these former allies, while the remaining Apaches allied with the Utes (Zier et al. 1997:II-54).

The Spanish military pattern at this time was one of infantry and cavalry expeditions. To control the Indians of the southern Plains, and to assess French influence in the area, Spanish leaders dispatched a party lead by Antonio de Valverde in 1717 and another by Pedro de Villasur in 1729 (Mehls and Carter 1984:II-1; Murray 1979:15). On the Platte River of Nebraska, Villasur's expedition was nearly annihilated by the Pawnee and Spanish expeditions ceased across eastern Colorado until 1779.

Meanwhile, the Euro-Americans from the eastern United States were making headway into Colorado. The French Canadian brothers, Paul and Peter Mallet, are credited with the first expedition up the Arkansas and Purgatory River valleys while traveling to Santa Fe in 1739 to establish a trade route (Taylor 1959:8). On the journey, they apparently found stones bearing Spanish inscriptions on the banks of the Arkansas River (Folmer 1939:163-167). Although their exact route is not known, they may have followed the prehistoric Indian trade route, which would later become known as the Santa Fe Trail (Church and Cowen 2003).

In the 1770s, Comanche and Apache raiding parties terrorized the edge of the Spanish frontier. To combat these attacks, Governor Juan Bautista de Anza led an army of 600 soldiers, militiamen, and Indian allies against the Comanche (Murray 1979:15). They ambushed a large Comanche camp on the north side of the Wet Mountains in south central Colorado, and then traveled south to near the present town of Rye, where they routed another Comanche force led by Cuerno Verde (Stoffle et al. 1984:52-53). This Spanish victory initiated lasting peace with the Comanche in 1786 and led to the demise of the Apache on the Plains. It also began the Comanchero period (1786 to 1860) where the Spanish, New Mexicans, and Comanche came together for trading on the southern plains (Kenner 1969:78-97). At the same time, New Mexican buffalo hunters known as *ciboleros*, hunted throughout the region (Carrillo 1990:XVIII-7).

In the early 1800s, Napoleon Bonaparte needed money to support the French Empire elsewhere, and sold the French colony of Louisiana to the United States in 1803, thus ending the threat of French Settlement on the Southern Plains (Murray 1979:17). The boundaries of the Louisiana, largely disputed by Spain, but claimed by the United States, included the land extending west from the Mississippi River to the Rocky Mountains and the Rio Grande. It was not until 1819 that the Adams-Onis Treaty would establish the Arkansas River as the northern boundary of Spanish New Mexico (Zier et al. 1997:II-56).

President Jefferson did not waste any time in procuring federal funding for scientific expeditions to explore the newly acquired natural resources, and to gain knowledge of the Indians and the transportation routes of this uncharted territory. One of the first explorations was the renowned Lewis and Clark Expedition (1803-1806) that explored the area along the Missouri River and the Northwest region. Two later expeditions crossed into southern Colorado. Captain Zebulon Pike (1806) would explore the geography, natural history, and topography of the lands to the southwest, leading his party up the Arkansas River Valley into the mountains.

The expedition of Major Stephen H. Long traveled south from the Arkansas River to the Canadian River, in 1820. His route followed the deep red rock canyons of the Purgatory River and Chacuaco Canyon for several days (Tucker 1963:185-199). This is the earliest written record of Euro-American exploration in the area of the PCMS, though the lands were undoubtedly crossed earlier by unknown trappers and traders.

Fur trappers and traders were among the first Euro-Americans eastern Colorado, exploring the region in the process of economic enterprise. Trading and trapping networks had been in place by the early 19th century, and while private parties of New Mexico traders were encouraged by Spanish authorities to travel north and east to trade with the Indians, American traders were not always welcomed to trade in Santa Fe (Murray 1979:19). When American traders did venture to Santa Fe, their goods were confiscated and they would be detained in Spanish New Mexico. James Purcell explained to the captured Pike in 1807 that after coming from Missouri and traveling up the South Platte to South Park he and two French-American traders turned southward to trade their furs in Santa Fe. Upon arriving there, Spanish authorities appropriated their goods, and did not allow them to leave (Zier et al 1997).

In 1821, the Mexicans overthrew the Spanish during the Mexican Revolution. In 1822, the Mexican government worked to established trade with Americans (Mehls and Carter 1984:II-3).

Mexican Period (A.D. 1822 – A.D. 1848)

Though trading and trapping networks were in place by the early 19th century, Mexico's independence opened the door for large-scale trade in Santa Fe. In 1821, William Becknell set out from Missouri to trade with the Comanches, but upon learning of the new opportunities in Mexico, traveled to Santa Fe. His route across the plains and over Raton Pass became known as the Mountain Branch of the Santa Fe Trail (Taylor 1971:3). The Mountain Branch parallels State Highway 350 along the Timpas Creek drainage on the south side of the PCMS. Site 5LA4965 represents the small segment that passes through the PCMS (Johnson and Carrillo 1987).

Bent's Fort was established as a trading post on the Santa Fe Trail in about 1830. It was located on the north bank of the Arkansas River, which defined the international border between the United States and Mexico. Taylor (1959:15) indicates that the Cheyenne, Comanche, Arapaho, Ute, Kiowa, and others were active traders at Bent's Fort (approximately 45 km north of the PCMS). The establishment of the fort led to increased use of the Mountain Branch of the Santa Fe Trail. The company that established this trading post, Bent, St. Vrain and Company, was also largely responsible for the initial attempt at permanent settlement in the region. As the trading posts both competed with and depended on the Mexican traders (*comancheros*) for foodstuffs, more Hispanic settlements began to appear. The first Mexican settlement in the area, known as

Fort El Pueblo (or Milk Fort), was established five miles upstream of Bent's Fort in 1839 (Friedman 1988:19).

Trading and trapping were the primary economic activities between 1804 and 1856 (Mehls and Carter 1984:II-9). In the area of the PCMS, beaver pelts were being collected and grizzly bears hunted (Stoffle et al. 1983:62). Kit Carson remains the most famous of the trappers, but others of note include John Gantt, "Uncle Dick Wooten, Ceran St. Vrain, Carlos Beabien and Mariano Medina. In 1834, Gantt's Fort Cass was established at the mouth of the Purgatoire River. This adobe stockade was a temporary trade location where hides were traded (Mehls and Carter 1984:II-10).

American exploration continued within the area of southern Colorado in the mid 19th century, but it was often related to military travel. In 1835, following the route of the Stephen H. Long expedition, Army Colonel Henry Dodge traveled through the PCMS area while leading patrols designed to intimidate the local Indians. Between 1842 and 1852, John C. Fremont passed through the grasslands, and followed many of the larger waterways, between Fort Carson and the PCMS while attempting to establish travel corridors for new settlers.

In 1846, the United States entered into war with Mexico and General Stephen Watts Kearney led an army to capture Mexican settlements (Murray 1979:34). This group passed by Bent's Fort, and then followed the Santa Fe Trail south over the mountains into New Mexico and Arizona (Mehls and Carter 1984:II-27).

The end of the Mexican-American War in 1848 produced a change in national boundaries; land in southern Colorado and New Mexico became U.S. territory through the Treaty of Guadalupe-Hildago. Over the next three decades appreciable changes transpired throughout the region as the Anglo presence increased.

American Period (A.D. 1849 - A.D. 1940)

After the war with Mexico ended, several significant changes occurred within southern Colorado. The Tierra Amarilla, Conejos, Sangre de Cristo, and Luis Baca Grant No. 4 land grants were confirmed, recognizing the settler's legal title to these large land parcels. But several of the grants were reduced in size (Mehls and Carter 1984:II-17). This created open land for Anglo settlement into the area, but Mexican settlers remained abundant. The *pobladores* migrated into the San Luis Valley around 1849 and established San Luis and San Pedro, the first permanent agricultural settlements in Colorado (Carillo 1990).

Though most of the migrants into the upper Arkansas River basin were Hispanic pioneers, a few Euro-American settlers established residences. Early settlers included Uriel Higbee, James Gray, "Uncle Dick" Wooten, Joseph Doyle, and Charles Autobees (Carrillo 1990; Friedman 1988:29). Anglo-American and Hispanic settlement in the area naturally caused tension between Native Americans and emigrants. On Christmas day, 1854, a combined Ute and Apache force attacked El Pueblo and massacred its occupants (Murray 1979:31). In the area of the PCMS, Kiowas, Comanches, and Arapahoes continued raiding along the Santa Fe Trail between 1846 and 1847 (Mehls and Carter 1984:II-54).

The 1858 Colorado Gold Rush and the Homestead Act of 1862 lured merchants, miners, and settlers into the area. In an attempt to prevent further Indian hostilities and secure the region for settlement, several military posts were established. The first true military post in southern Colorado was established at the base of Mount Blanca in the San Luis Valley (Mehls and Carter 1984:II-35). Fort Massachusetts was in use between 1852 and 1858. It was abandoned and a new post, Fort Garland, was established closer to the trail across the mountain pass. Camp Fillmore and Fort Reynolds were other two small military on the Arkansas River that were used in the 1860s.

The Army established a military post along the bottomlands of the Arkansas River near Bents New Fort in the summer of 1860 (Taylor 1971:18). Originally, named Fort Wise after a Virginia Governor, it was renamed Fort Lyon in 1862. The site flooded in June 1867, and was then relocated about 30 miles upriver near present day Las Animas. Cavalry and infantry units were stationed here and charged with patrolling the Santa Fe Trail, escorting stage and mail coaches, and protecting settlers from Indian depredations.

Despite the military presence in the region, and the 1861 treaty of Ft. Wise, Indians and settlers continued to clash. In 1864, Southern Cheyennes and Arapahoes attacked the Iron Springs Stage station on the Santa Fe Trail (Friedman 1988:40) and the Hungate family of Running Creek was killed by Arapahoes (Howbert 1914:147). In retaliation, Colonel John M. Chivington led the Third Colorado Volunteers in an attack on a large camp of Cheyenne and Arapahoe at Sand Creek in 1864 (Mehls and Carter 1984:II-55-56). A major military campaign occurred in the winter of 1868-1869 that resulted in the relocation of most of the Southern Cheyenne and Arapaho to an Oklahoma reservation (Carillo 1990).

The Supplement to the Official Records (Hewett 2001) provides details of additional military movements near or through the PCMS during the Civil War. In August, 1862, 1st Colorado Cavalry and 2nd Colorado Volunteer Infantry were stationed at Pleasant Valley Camp, midway between Fort Lyon, Colorado and Fort Union, New Mexico, under orders to protect mail and wagon trains on the Mountain Branch of the Santa Fe Trail. Troops were again stationed at this post, later referred to as Gray's Ranch, the following two summers. The Hole in the Rock stage station on Timpas Creek was also utilized by military patrols (Simmons 2001:154).

Troops stationed at Fort Lyon were involved with protecting the settlers from the Indians through the 1870s. In 1873, companies of the 6th Cavalry were sent to 9 Mile Bottom and Red Rocks to intercept Indians in those areas. In May 1874, H Co. 6th Cavalry established camp on the Purgatoire River midway between that post and the Raton Mts. (Owens and Rasfeld 2006). Indian troubles flared across the plains in July of 1874, and herders were attacked in Bent Canyon. Cavalry stationed at Fort Lyon were dispatched in pursuit (Taylor 1971:164). Two 19th Infantry companies assigned to escort Cavalry horses to Trinidad left graffiti near Bent Canyon stage station (Owens and Rasfeld 2006).

Settlement of the Pinon Canyon Area

In the late 1860's, the Pinon Canyon region went from being a nearly uninhabited region to a viable ranching community. Hispanic pioneers came north from New Mexico with their sheep and goats to found plazas along the Purgatory River and its drainages (Clark 2003). As transportation to the area improved in the 1870s, with the service from the stage line and railroad, Anglo settlers increased and cattle were introduced (Zier et al. 1997). In the 1880's large Anglo-owned cattle ranches began to challenge for control of the range, often buying up water sources and allowing their herds to roam across public and private land.

John W. Prowers had established the first of the large cattle operations in southern Colorado in 1861. His land extended from the Purgatoire River to the Kansas State line and was comprised of over 600 cows (Murray 1979:41). In 1864, the Goodnight-Loving Trail was established and Texas longhorn cattle were passing through the region in large herds (Zier *et al.* 1997).

Stage stations had been established in 1861 at Gray's Ranch and at Iron Spring along the Santa Fe Trail (Taylor 1971:78). Barlow and Sanderson were awarded a mail contract in April 1866, and added new stations at Hole-in-the-Prairie and Hole-in-the-Rock (Friedman (1989:50), which are just outside the western PCMS boundary.

In the spring of 1871, Barlow & Sanderson's Southern Overland Mail & Express Company established a new route that left the Santa Fe Trail at Iron Spring and meandered southeast through Sheep Canyon to what would later be PCMS lands. PCMS sites 5LA4967 and 5LA5040 represent segments of this route, which crossed the head of the Bent Canyon (5LA3179), and then proceeded west through Stage Canyon to upper Lockwood Canyon (5LA5454) along what is now Military Service Roads (MSR) 1 and 1a. From the Lockwood Canyon stage stop, the trail (PCMS site 5LA5039) continued southwest across the prairie to the Hogback Stage Station (5LA5824), and then to Gray's Ranch, and subsequently Trinidad (Taylor 1971:153; Jones 2003).

A home station, providing meals and a change of horses, was opened at aforementioned Bent Canyon in April, 1871. The stage route was later rerouted closer to the Purgatoire as described in a June 1875 *Las Animas Leader* article which reported that the first stage station was at Alkali, 20 miles out from West Las Animas. Approximately a quarter of a mile beyond, the road then branched, and the left fork went to the Nine Mile Bottom, eventually passing through Fagin and Brown's sheep camp, otherwise known as Vogel station (approximately 11 miles from Alkali). From here, it was then 15 miles further to Bent Canyon station (Taylor 1971:167).

In the end, the stage line was short-lived. The *Las Animas Leader* (Aug 27, 1874) proclaimed the day that the Atchison, Topeka and Santa Fe (AT&SF) Railroad reached town. By the spring of 1876, the AT&SF had reached Pueblo, and the Denver & Rio Grande was providing service to Trinidad (Taylor 1971:21). The Southern Overland Mail and Express Company terminated service to settlers along the Purgatoire River on September 1, 1876 (Taylor 1971:173).

Southern Colorado's coal mining industry began in 1875 when geologists of the U.S. geological survey identified high-quality deposits along the Front Range (Murray 1979:61). The coal market boomed as coal was required for powering steam engines, home heating, and for smelting steel (Mehls and Carter 1984:II-87). The Walsen mine, established in 1881, represents the first commercial coal mine in the region. Other mines in the area include Starkville, Engleville, Hastings, Ludlow, Delagua, Bowen, Gray Creek, and Jewell (Murray 1979:61-62). Several small-scale mining operations have been recorded in the Welsh Canyon area of the PCMS.

In 1927 the Colorado Interstate Gas Company constructed a natural gas pipeline between Clayton, New Mexico and Denver, Colorado. The pipeline bisects the PCMS from north to south and one of its booster stations exists near the southern boundary (5LA4438). The station was comprised of a small company town with a compressor engine building, 16 houses, two bunkhouses, a recreation hall, and a school (Carillo 1990).

A helium plant was constructed in Thatcher in 1930 in the former headquarters of the Bloom Cattle Company. Several PCMS sites on the area of the Big Arroyo Hills are related to this activity.

Many of the southern Colorado mines closed during the 1920s and 1930s because of the Depression (Murray 1979:102). Coupled with the Dust Bowl, ranchers and farmers lost their land holdings and left the area to seek employment elsewhere. For those that eked out an existence, however, many of their descendants still live in the area today.

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Provided by
Fort Carson Directorate of
Environmental Compliance and Management,
Cultural Resources Program



ATTACHMENT F.2

**1980 Memorandum of Agreement Regarding
Fort Carson Military Reservation**

1980 MEMORANDUM OF AGREEMENT REGARDING FORT CARSON MILITARY RESERVATION

Advisory
Council On
Historic
Preservation

1522 K Street, NW
Washington, DC 20005

MEMORANDUM OF AGREEMENT

WHEREAS, the Department of the Army, Headquarters Fort Carson and Headquarters 4th Infantry Division (Army), propose to continue training at the Fort Carson (Installation); and,

WHEREAS, the Army proposes to acquire additional training land within Southeastern Colorado (for the purposes of this Agreement the term "Fort Carson" includes the existing installation as well as any additional lands that may be acquired); and,

WHEREAS, the Army, in consultation with the Colorado State Historic Preservation Officer (SHPO), has determined that these undertakings as proposed may have an adverse effect upon cultural properties included in or eligible for the National Register of Historic Places; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320), Section 2(b) of Executive Order 11553, "Protection and Enhancement of the Cultural Environment," the Army has requested the comments of the Advisory Council on Historic Preservation (Council) in accordance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800); and,

WHEREAS, representatives of the Council, the Army and the Colorado SHPO have consulted and reviewed the undertakings as proposed; and,

NOW, THEREFORE, it is mutually agreed that the implementation of the undertakings, in accordance with the following stipulations, will avoid, minimize, or mitigate adverse effects on cultural properties.

Stipulations

The Army will ensure that the following stipulations are carried out at Fort Carson (Installation).

- I. All survey, evaluations, data recovery, monitoring of land disturbing activities, or rehabilitation work performed in accordance with this Agreement will be conducted under the direct supervision of a person who meets at a minimum the appropriate professional qualifications set forth in 36 CFR Part 1210, Appendix C and who has professional experience relevant to Southeastern Colorado.
- II. The Army will ensure compliance with the Archeological Resources Protection Act of 1979 and will advise all contract and Army personnel

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Memorandum of Agreement
U.S. Army
Fort Carson

and resident dependents against illegal collection of cultural materials and of the penalties for such collection imposed by the Act.


- III. Copies of all scopes of work, reports, plans, or other products generated under this Agreement will be provided to the Colorado SEPO for review and comment.
- IV. Copies of any final technical reports will be furnished to the Council and to Interagency Archeological Services (Heritage Conservation and Recreation Service, Department of the Interior, Washington, D.C. 20243), for possible submission to the National Technical Information Service (NTIS). Any precise locational data should appear in a separate appendix and may be withheld from NTIS publication pursuant to Section 11 of the General Authorities Act of 1970, as amended (P. L. 94-458).
- V. An Historic Preservation Program for the Installation will be developed and implemented in consultation with the Colorado SEPO and, as appropriate, historical architects, archeologists, or other historic preservation specialists. The Historic Preservation Program will be included as an element of the Installation Master Plan and will be used to guide installation and training exercise planning. In order to promote consistency in the treatment of cultural properties on the Installation, the Historic Preservation Program will be responsive to Army Technical Manuals TMS-801-1, TMS-801-2, and Technical Note No. 78-17, dated September 15, 1978, until it is superseded by Army Technical Manual TMS-801-3 (presently in draft form).
 - A. The Historic Preservation Program must include, but need not be limited to, the following elements:
 1. A cultural property overview and archeological research design (or designs) that identifies the types of cultural properties that are expected to be found on the installation; that sets forth the research topics to be addressed; and that establishes survey and other investigation strategies for the identification and evaluation of such properties.
 2. A strategy for completing the cultural property survey required by Section 2(a) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment." This strategy will include:
 - a. assignment of all installation land into land-use categories based on intensity of military use or land disturbing activities, such as planned construction and new training areas;
 - b. survey priorities based on the land-use categories;
 - c. time table for completion of the survey; and,

- d. staffing and funding programs.
3. An Installation procedure to be followed in determining historic and cultural properties eligible for inclusion in the National Register of Historic Places, which is consistent with 36 CFR 1204.
 4. An Installation procedure for reviewing actions to determine ~~effects~~ (36 CFR Sec. 800.3) on National Register or eligible properties.
 5. An Installation procedure for the preservation of affected National Register or eligible properties. This procedure will include, but need not be limited to, the following:
 - a. an assessment of alternatives that would avoid project effects by project design, relocation or physical means such as signing, fencing or patrolling,
 - b. an assessment of alternatives designed to mitigate any adverse effects, where it is not prudent and feasible to avoid effects.
 - c. a process for selecting an appropriate alternative course of action (avoidance or mitigation) that includes consultation with the Colorado SHPO. The Council will be afforded an opportunity to comment where agreement cannot be reached with the Colorado SHPO and the Army, the affected property is of national significance (recognized as a National Landmark, National Historic Site, National Historic Monument, or National Historic Trail), or beyond its historic or scientific value is known to have historic or cultural significance to a community, ethnic, or social group that would be impaired by its disturbance.
 - d. standards and guidelines for archeological data recovery that take into account 36 CFR Part 1210 and the Council's "Recommendations for Archeological Data Recovery" (Part III of Guidelines-attached).
 - e. a procedure to be followed, if after meeting all the responsibilities for identification of National Register or eligible properties, the Army finds or is notified after the undertaking has begun that the undertaking will affect a previously unidentified National Register or eligible property. This procedure should permit delay of the undertaking, consultation with the Colorado SHPO and compliance with Section 800.7 of the Council's regulations.

6. Provision for curation of all specimens, field notes, photographs, negatives, and processed data in a manner that makes them available for future study at an appropriately equipped institution that meets the standards set forth in 36 CFR Sec. 1210.4 and that makes these data available to other parties for research or other appropriate purposes. Specimens may be disposed of permanently only with the written concurrence of the Secretary of the Interior and the Colorado SHPO.
 7. Provision for routine maintenance of all National Register or eligible properties consistent with Army Technical Manual TMS-801-1.
 8. Provision for periodic review and refinement of the Historic Preservation Program in consultation with the Colorado SHPO.
- B. After the Historic Preservation Program has been developed, it will be submitted to the Council and the Colorado SHPO for review. If, after 30 days, neither has provided written objections, the program may be implemented. Once approved, should the Historic Preservation Program be modified, the Council and the Colorado SHPO will be afforded an opportunity to provide written objections within 30 days of receipt of the modified program. Should the Council or the Colorado SHPO object to the proposed Historic Preservation Program, or any modifications thereof, the Army, Colorado SHPO, and the Council will consult to resolve the objections.
- VI. Within 180 days after ratification of this Agreement, the Army will submit a draft of the Historic Preservation Program to the Council and the Colorado SHPO.
- VII. Until the Historic Preservation Program is implemented and during any period in which objections between the Army and SHPO remains unresolved, the Army will follow the procedure set forth in 36 CFR Part 800.
- VIII. If any of the signatories to this Agreement determine that the terms of the Agreement cannot be met or believes a change is necessary, that signatory shall immediately request the consulting parties to consider an amendment or addendum to the Agreement. Such an amendment or addendum shall be executed in the same manner as the original Agreement.

Robert Sawyer Nov. 17 1980
Executive Director | (date)
Advisory Council on Historic Preservation

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Memorandum of Agreement
U.S. Army
Fort Carson


BERNARD B. FRIEND
Colonel, MPC
Deputy Post Commander
Fort Carson, U.S. Army

26 Nov 8
(date)


Arthur C. Zimmerman
Colorado State Historic
Preservation Officer

12-9-80
(date)


Robert H. Gatta
Chairman
Advisory Council on Historic Preservation

12-18-80
(date)

CULTURAL RESOURCES LAWS, REGULATIONS, AND EXECUTIVE ORDERS

The Cultural Resources Management Program at the US Army Environmental Center offers a variety of resources to help support military readiness and quality of life for our soldiers.

An archeological project is not complete simply because the artifacts are out of the ground and a final report has been submitted. The materials recovered from archeological inventories, evaluations and data recovery projects must be appropriately curated for the benefit of future scientists, educators, and museum specialists.

Statutes:

- [Abandoned Shipwreck Act of 1987 \(43 USC 2101-2106\)](#)
- [Archeological Resources Protection Act of 1979 \(16 USC 470aa-470mm\)](#)
- [American Indian Religious Freedom Act of 1978, as amended \(42 USC 1996-1996a\)](#)
- [Archeological and Historic Preservation Act of 1974 \(16 USC 469-469c\)](#)
- [National Environmental Policy Act of 1969 \(42 USC 4321-4370c\)](#)
- [National Historic Preservation Act of 1966, as amended \(16 USC 470-470w\)](#)
- [Historic Sites, Buildings and Antiquities Act of 1935 \(16 USC 461-467\)](#)
- [Antiquities Act of 1906 \(16 USC 431-433; 34 Stat 225\)](#)
- [Native American Graves Protection and Repatriation Act of 1990 \(25 USC 3001-3013\)](#)

Federal Regulations and Guidelines:

- [Advisory Council on Historic Preservation: Protection of Historic Properties \(36 CFR 800\)](#)
- [Council on Environmental Quality: Regulations Implementing the National Environmental Policy Act \(40 CFR 1500-1508\)](#)
- [Department of Defense: American Indian and Alaska Native Policy](#)
- [Department of Defense Guidelines for the Curation of Archeological Soil Samples](#)
- [Protection of Archeological Resources \(32 CFR 229\)](#)
- [Department of the Interior: Native American Graves Protection and Repatriation Act Regulations \(43 CFR 10\)](#)
- [Department of the Interior: Curation of Federally-owned and Administered Archeological Collections \(36 CFR 79\)](#)
- [Department of the Interior: Determinations of Eligibility for Inclusion in the National Register of Historic Places \(36 CFR 63\)](#)
- [Department of the Interior: National Historic Landmarks Program \(36 CFR 65\)](#)
- [Department of the Interior: National Register of Historic Places \(36 CFR 60\)](#)
- [Department of the Interior: Preservation of American Antiquities \(43 CFR 3\)](#)
- [Department of the Interior: Protection of Archeological Resources \(43 CFR 7\)](#)
- [Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act](#)
- [Secretary of the Interior's Professional Qualification Standards \(48 FR 22716, 1983\)](#)

- [Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation](#)
- [Secretary of the Interior's Standards for Architectural and Engineering Documentation: HABS/HAER Standards](#)
- [Secretary of the Interior's Standards for Rehabilitation](#)
- [Secretary of the Interior's Illustrated Guidelines for Rehabilitating Historic Buildings](#)
- [Secretary of the Interior's Standards for the Treatment of Historic Properties \(36 CFR 68\)](#)

Executive Orders:

- [EO 11593 Protection and Enhancement of the Cultural Environment](#)
- [EO 13006 Locating Federal Facilities in Historic Properties in our Nation's Central Cities](#)
- [EO 13007 Indian Sacred Sites](#)
- [EO 13175 Consultation and Coordination with Indian Tribal Governments](#)
- [EO 13287 Preserve America](#)

DoD and Army Regulations and Policy:

- [Army Regulation 200-4: Cultural Resources Management](#)
- [DA Pamphlet 200-4: Cultural Resources Management](#)
- [Environmental Assessment for AR 200-4 —83.5kb DOC](#)
- [Department of Defense: American Indian and Alaska Native Policy](#)
- [Department of Defense: American Indian and Alaska Native Policy Memo](#)

Prepared by
ICI, LLC

Under Contract to
CH2M HILL

for

U.S. Army, Fort Carson, Colorado



ATTACHMENT F.3

Fort Carson and PCMS Comparative Analysis

FORT CARSON AND PCMS COMPARATIVE ANALYSIS

PURPOSE

The purpose of this comparative analysis exercise is to establish a projection as to the number of archaeological sites/historic properties with potential to be eligible for inclusion in the National Register of Historic Places (NRHP) that may be encountered and/or adversely impacted as a result of increased military training activities at Fort Carson and the Pinon Canyon Maneuver Site (PCMS).

Inventory and evaluation occur as the initial stages of cultural resources management for federal agencies. Both Executive Order 11593, *Protection and Enhancement of Cultural Environment* (1971) and Section 110 (1980) of the National Historic Preservation Act (NHPA) require the agency to locate and evaluate all properties under their control that may be eligible for inclusion in the National Register to determine the level of potential impact to known resources. Inventory and evaluation may also occur as part of the review process per Section 106 of the NHPA. Inventories identify cultural resources using literature review and physical, pedestrian survey methods.

This analysis is intended to be used as a projection of potential eligible sites, for planning and budgeting purposes only, and should in no way be interpreted as providing data to be used in lieu of archaeological pedestrian inventories or evaluation studies that determine site eligibility.

METHODOLOGY

It must first be noted that there are limitations and deficiencies in the data used for this comparative analysis. For example, there is the missing data problem. This occurs when project data was not entered correctly (data gaps), and this problem was observed in some of the early archaeological report information as site tallies in the conclusion chapters did not always match the number of sites discussed in the text. There is the selection bias problem; time and money constraints would not allow for utilizing all data from all projects that have ever occurred on Ft. Carson controlled lands. Several of the larger reports were selected based on similarity to land requiring survey for BRAC. More importantly, there are observational biases. Through time, and as methods have been refined, each individual archaeologist's interpretation of site information may differ radically from that of the initial recorder.

Recognizing these shortcomings, the following analysis standardizes the data utilizing a modified version of Binford's (1980) site-type model for prehistoric sites. The model is not currently in use on Fort Carson owned lands, but several large-scale archeological projects in southeast Colorado have applied the system to manage site data. In the current model, recorded sites have been classified as residential bases, locations, field camps, caches, or stations (Ahler 1986; Binford 1980). Historically, site function is much easier to determine and sites were classified appropriately.

Seventeen hundred and sixty-seven (1,767) sites were used in this analysis. Data was collected from 12 project reports (Table 1); 6 resulting from archaeological work on Fort Carson, and 6 from work on, or adjacent to, Pinon Canyon. Three hundred and thirteen (313) sites were sampled of the 1663 (19% of the total) from Fort Carson, and 1,454 were sampled from the area in, and around, Pinon Canyon.

DATA SOURCES

Fort Carson

A brief discussion of the projects from which the data were taken is in order. The Alexander et al. (1982) survey covered approximately 38,291 acres of land on Fort Carson. A total of 149 areas with cultural materials were identified. Discounting isolated finds and sites subsequently re-evaluated by archaeologists from Centennial Archaeology, Fort Lewis College, and New Mexico State University, 73 sites in this analysis came from the Alexander project. Sites were recorded in all geographical areas with most classified as locations where either foodstuffs or lithic materials were being procured.

In 1995, Fort Lewis College surveyed 1,460 acres of land on Booth Mountain on Fort Carson. They encountered 35 archaeological sites, most of which were food or lithic procurement areas. The next year, 842 acres were surveyed and 18 sites were identified (Charles et al. 1991). In addition, 87 previously recorded sites were re-evaluated to contemporary standards (Charles et al. 1999a). Most of the sites were found in the hills, and it is interesting to note the number of residential base sites. Fort Lewis continued re-evaluation work in 1999, recording 13 additional sites (Charles et al. 2001).

In the mid 1990's, Centennial Archeology surveyed 4,067 acres of Fort Carson land (Zier et al. 1996). A total of 87 sites were recorded; most of these were food or lithic procurement locations.

Pinon Canyon Maneuver Site

Most of the Pinon Canyon sources result from the archaeological work of New Mexico State University (NMSU). In 1995 and 1996, 3,205 acres of land was surveyed in the Welsh Canyon area with 234 sites identified (Loendorf and Loendorf 1999). In 1997, 5,463 acres of land was surveyed in the Black Hills of the PCMS. Primarily lithic and food procurement sites were found, with a total of 323 recorded (Owens et al. 2000). In 1998, large areas of open prairie were surveyed in the Training Area 7 portion of the PCMS. Only 169 sites were identified, these were primarily food procurement locations and field camps (Owens and Loendorf 2002).

In the largest Pinon Canyon project to date, NMSU surveyed 25,646 acres of high-priority land between 1999 and 2001 (Owens and Loendorf 2004). Most of this work occurred along the tops of canyons where abundant resources led to a high number of residential sites. In 2002 and 2003, 5,791 acres were surveyed in high-priority areas near Cedar Hill, Van Bremer Arroyo, and Bent Canyon of the PCMS (Owens and Loendorf 2005). A high proportion of residential base sites were identified among the 113 project sites recorded.

In the early 1990's, archaeologists surveyed 7,150 acres of Forest Service land just east of Pinon Canyon (Reed and Horn 1995). Three hundred sites (300) were identified, with most occupying the talus slopes of the Purgatoire River. This report is the most relevant to the PCMS data of this comparative analysis as it pertains to survey conducted in the Purgatoire Canyon. Since 1983, the canyons of the PCMS have been off-limits to mechanized military training, so they have not been subjected to an in-depth archaeological inspection.

COMPARATIVE ANALYSIS SITES

The overwhelming majority of the sites reviewed for this comparative analysis are prehistoric, with only 182 historic sites found in the literature (Table 1). The dominance of prehistoric sites in the sample is underscored by the fact that 59 of the historic sites also have a prehistoric component.

Five hundred and twenty-one (521) of the sites (29.5% of the total) were determined to be eligible for inclusion in the National Register of Historic Places (NRHP). Seven (7) of the sites require additional analysis before an eligibility recommendation can be given, 1,237 sites are not eligible, and two paleontological sites require no determination.

The 1,767 sites providing data for this comparative analysis are comprised of 3 caches, 286 field camps, 2 fortified sites, 123 historic only sites, 22 sites with mixed historic and prehistoric field camps, 29 locations with mixed historic and a prehistoric location, 7 sites with mixed historic and a prehistoric residential base, 902 prehistoric location sites, 360 prehistoric sites classified as a residential base, 27 sites with only rock art (one historic only), 2 prehistoric residential bases exhibiting rock art, 1 prehistoric residential base with outcropping paleontological remains, 2 locations with dinosaur fossil remains, and 1 stacked stone feature of unknown temporal affiliation.

Chronologically, the sample sites, other than those with paleontological remains, cover the entire span of human existence in North America: 1,071 are of unknown affiliation, 8 of the temporally diagnostic sites are Paleoindian, 52 sites date to the Archaic period, the cultural remains from 35 sites were produced sometime between the Late Archaic and Developmental periods, 9 sites exhibit one occupation between the Late Archaic and Diversification periods, 1 site has an occupation that occurred sometime between the Middle Archaic and Developmental periods, 194 sites exhibit multiple, yet discrete, occupations, 275 sites are of strictly Late Prehistoric affiliation, and 120 sites are historic.

RESULTS

In the analysis of the comparative analysis sites, geographical settings were also recorded. The criteria for designating the settings were based wholly on physiographic differences in the landform types. Figure F.3-1 presents the land forms on Fort Carson, and Figure F.3-2 presents the land forms on the PCMS. Utilizing GIS data provided by Fort Carson, 6 settings were recorded: canyon top, hill, multiple, open prairie, talus slope, and valley floor. Most of the comparative analysis sites were encountered in the hills (597). Fewer sites were noted at the top

of canyons (395), on talus slopes (310), in the open prairie (280), and on the valley floor (179). Six (6) of the sites occupied multiple landforms and were recorded as such.

As of May 2006, there are 59,807 acres that remain un-surveyed on Fort Carson, and 70,402 on the PCMS. It should be noted that archaeological work on both installations is ongoing and these numbers will continue to decrease. The remaining acres to be surveyed for each installation were examined in accordance with the geographical information described above.

Fort Carson

At Fort Carson only three different landforms (see Figure F.3-1) contain land requiring future survey. Most work will occur in open prairie (44,555 acres) and hill (15,215) settings, with much less on talus slopes (36 acres). It should be noted that the acreage contained within the Large and Small Impact Areas will be subtracted. Due to past use and the danger for potential unexploded ordinance (UXO), the impact areas have been exempt from further survey. As such, only 34,594 acres will be surveyed at Fort Carson: 15,215 acres in the hills, 19,342 acres in the open prairie, and 36 acres in the talus.

The data presented in Table 1 reveals that far fewer sites are to be expected at Fort Carson as compared to Pinon Canyon, and the acreage per site calculations which appear in Alexander et al. (1982) seem erroneous when compared against those of other Fort Carson projects. For open prairie data the numbers from Zier et al. (1999) were used. In that project, 46 acres were surveyed for every site encountered. This means that a total of 420 sites should be expected. One in seven of the Zier et al. (1999) sites were eligible, so 60 eligible sites should be expected.

The information in Charles et al. (1997) was used to compile hill data. Charles' crew encountered 1 site per 41 acres, with one in three being determined as eligible. Therefore, the survey of the remaining hill acreage at Fort Carson will reasonably produce 371 sites, 123 of which will be eligible.

Regardless of the data is used, only 1 site should be expected in the remaining talus slope acreage.

Pinon Canyon Maneuver Site

At Pinon Canyon, there are 11,573 acres to be surveyed along the canyon tops, 8,875 acres to be surveyed in the hills, 39,430 acres in the open prairie, 3,809 acres on talus slopes, and 5176 valley bottom acres. See Figure F.3-2 for the distribution of land forms at the PCMS.

For canyon top survey data, the Owens and Loendorf (2004) data was used for comparative purposes (Table 1). At 81 acres per site, 142 sites are to be expected. One in four will be eligible for inclusion in the National Register, equating to 36 sites. Sites from all time periods will be expected, with a very high percentage of those being multi-component.

Hill data is best represented by Owens et al. (2000). One site per every 16 acres is projected, for a total of 555 sites anticipated in the remaining hill acreage to be surveyed. One in every seven sites is expected to be eligible for the National Register, or 79 sites.

The best PCMS open prairie comparative data is that of Owens and Loendorf (2002). They found an archaeological site for every 58 acres inspected. With 39,430.45 acres remaining to be surveyed at Pinon Canyon, a total of 680 new sites are to be anticipated. Given a lack of quality resources in the open plains, only one in fourteen sites is expected to be eligible, or 49 total eligible sites.

Only the reports of Loendorf and Loendorf (1999) and Reed and Horn (1996) provide talus slope data. Reed and Horn contain the larger sample (200 of their 300 total sites are found on talus slopes), and as such was used for the purpose of this comparative analysis. They encountered a site every 23 acres, so a total of 165 new sites are to be anticipated. Following the data in Table 1, almost every other site, or one in two, will be eligible for the National Register. If this pattern remains for the future survey areas, then 110 of the anticipated sites will be eligible.

The data in Loendorf and Loendorf (1999) best represents the valley floor. They encountered a site every 13 acres, for a total of 398 new sites to be encountered. Almost one in every three sites will be eligible, 132 in all.

CONCLUSIONS

Table 2 contains the predicted numbers generated by this comparative analysis. Because of its relatively pristine condition, Pinon Canyon will have sites from all time periods and in all settings. A total of 2,040 sites are expected, with 406 eligible for inclusion in the National Register.

Fort Carson, on the other hand, has experienced intense military training for many years, and its landforms have been obliterated. Likely the site and eligible site numbers presented here are inaccurate, and perhaps, the Alexander et al. (1982) numbers are not that unrealistic. Prior to heavy military impact, 792 sites would have been expected to be found during survey, with only 183 of these eligible for the National Register.

Table 1: Report Data for Comparative Analysis

	Alexander et al. 1982	Charles et al. 1997	Charles et al. 1999	Charles et al. 1999a	Charles et al. 2001	Loendorf and Loendorf 1999	Owens and Loendorf 2002	Owens and Loendorf 2004	Owens and Loendorf 2005	Owens et al. 2000	Reed and Horn 1995	Zier et al. 1996	Total
Size of Survey Area	38,291	1460	842	0	0	3205	9857	25646	5791	5463	7,150	4067	101,412
Number of Sites	73	35	18	87	13	234	169	315	113	323	300	87	1767
Eligible Sites	2	11	3	50	5	97	12	76	20	44	189	12	521
Canyon Top Sites	9	0	0	3	0	105	6	224	9	5	29	5	395
Hill Sites	18	35	14	44	11	3	41	27	55	318	0	31	597
Multiple Landform Sites	0	0	0	0	0	0	0	0	0	0	1	5	6
Prairie Sites	19	0	2	19	1	0	122	58	38	0	0	21	280
Talus Slope Sites	13	0	0	4	1	69	0	5	5	0	200	13	310
Valley Floor Sites	14	0	2	17	0	57	0	1	6	0	70	12	179
Acres Per Site *	524	41	46	0	0	13	58	81	51	16	23	46	57
Caches	0	0	0	0	0	1	0	0	0	0	2	0	3
Field Camp	9	4	3	20	7	43	49	38	8	37	54	14	286
Prehistoric Fortified	0	0	0	0	0	0	0	0	0	0	2	0	2
Paleontological	0	0	0	0	0	0	0	0	0	0	2	0	2
Historic Only	14	9	3	8	0	7	6	10	9	4	35	18	123
Mixed Historic and Prehistoric Field Camp	0	0	0	1	0	1	8	3	0	2	7	0	22
Mixed Historic and Prehistoric Location	0	2	2	2	0	0	2	7	4	7	2	1	29
Mixed Historic and Prehistoric Residential Base	0	0	0	1	0	0	0	5	0	0	1	0	7
Rock Art	0	0	0	4	0	1	1	3	2	0	16	0	27
Location	40	12	8	19	0	105	100	177	66	242	83	50	902
Residential Base	10	8	2	32	6	74	3	72	24	31	95	4	361
Mixed Residential Base and Rock Art	0	0	0	0	0	2	0	0	0	0	0	0	2
Unknown	0	0	0	0	0	0	0	0	0	0	1	0	1

Table 2: Site Predictions for BRAC EIS

PCMS						
	Canyon	Hill	Prairie	Talus	Valley	Total
Acres	11,573.51	8,875.42	39,430.45	3,809.74	5,176.41	68,865.53
Sites	142	555	680	265	398	2040
Eligible	36	79	49	110	132	406
FT. Carson						
Acres	0	15,215.06	19,342.96	36.39	0	34,594.41
Sites	0	371	420	1	0	792
Eligible	0	123	60	0	0	183

Provided by
Fort Carson Directorate of
Environmental Compliance and Management,
Cultural Resources Program



ATTACHMENT F.4

Comprehensive Agreement

COMPREHENSIVE AGREEMENT

Regarding Tribal Access, Privacy and Information Sharing, and Inadvertent Discovery and Intentional Excavation of Native American Human Remains and Cultural Items Culturally Affiliated with the Following Indian Tribes:

**Apache Tribe of Oklahoma
Cheyenne and Arapaho Tribes of Oklahoma
Comanche Nation of Oklahoma
Kiowa Tribe of Oklahoma
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe of the Pine Ridge Reservation
Shoshone Tribe (Eastern Band)
Southern Ute Indian Tribe
Ute Mountain Ute Tribe**

Within Federal Lands Owned or Controlled by Fort Carson, Colorado

Whereas, Fort Carson has need to engage in ongoing activities that may result in the inadvertent discovery or intentional excavation of human remains and/or cultural items culturally affiliated with the aforementioned Federally Recognized Tribes (Tribes); and

Whereas, Fort Carson, in consultation with the Federally Recognized Tribes, is responsible for identification, protection, and disposition of human remains and cultural items on lands it administers pursuant to the Native American Graves Protection and Repatriation Act of 1990 [25 U.S.C. 3001-3013] (NAGPRA) and 43 CFR 10; and

Whereas, appropriate treatment of Native American human remains and cultural items that may be affiliated with the Tribes requires respect for the cultural traditions of tribal members; and

Whereas, the Tribes represented by the signatories hereto were aboriginal occupants of lands now administered by Fort Carson and, based on cultural and/or aboriginal affiliation, do hereby claim and assert the right of possession and control of human remains and associated funerary objects on these lands in accordance with Section 3a(2)(B) of NAGPRA; and

Whereas, Section 11 of NAGPRA and 43 CFR 10.5(f) specifically encourage the development of comprehensive agreements between federal agencies and federally recognized tribal governments to ensure the appropriate treatment of Native American human remains and cultural items;

NOW, THEREFORE, Fort Carson and the identified Tribes agree that the following procedures will be followed for tribal notification and consultation and for the treatment and disposition of all Native American human remains and cultural items that are inadvertently discovered or excavated on lands administered by Fort Carson.

Definitions

For the purposes of this agreement, the following definitions apply:

- *Cultural affiliation* means “that there is a relationship of shared group identity which can reasonably be traced historically or prehistorically between members of a present-day Indian Tribe or Native Hawaiian organization and an identifiable earlier group. Cultural affiliation is established when the preponderance of the evidence, based on geographical, kinship, biological, archeological linguistic, folklore, oral tradition, historical evidence, or other information or expert opinion, reasonably leads to such a conclusion” [43 C.F.R. 10.2(e)].
- *Cultural items* means, collectively, human remains, associated and unassociated funerary objects, sacred objects, and objects of cultural patrimony [25 U.S.C. 3001].
- *Federally recognized tribe* means any tribe, band, nation, or other organized Indian group or community of Indians which is recognized as eligible for special programs and services provided by the United States to Indians because of their status as Indians. Such acknowledged or *federally recognized* Indian tribes exist as unique political entities in a government-to-government relationship with the United States.
- *Funerary objects* mean “items that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains.” [43 C.F.R. 10.2(d)(2)]. *Associated funerary objects* are “those funerary objects for which the human remains with which they were placed intentionally are also in the possession or control of a museum or federal agency” [43 C.F.R. 10.2(d)(2)(i)]. *Unassociated funerary objects* are “those funerary objects for which the human remains with which they were placed intentionally are nor in the possession or control of a museum or federal agency” [43 C.F.R. 10.2(d)(2)(ii)].
- *Human remains* means the “physical remains of a human body, including but not limited to bones, teeth, hair, ashes, or mummified or otherwise preserved soft tissues, of a person of Native American ancestry. For the purposes of determining cultural affiliation, human remains incorporated into a funerary object, sacred object, or object of cultural patrimony, as defined below, must be considered as part of that item” [43 CFR 10.2(d)(1)].
- *Inadvertent discovery* means “the unanticipated encounter or detection of human remains, funerary objects, sacred objects, or objects of cultural patrimony found under or on the surface of Federal or tribal lands pursuant to section 3(d)” of NAGPRA [43 C.F.R. 10.2(g)(4)].
- *Intentional excavation* means “the planned archeological removal of human remains, funerary objects, sacred objects, or objects of cultural patrimony found under or on the surface of Federal or tribal lands pursuant to section 3(c)” of NAGPRA [43 C.F.R. 10.2(g)(3)].
- *NAGPRA SOP* is the *Fort Carson NAGPRA Standard Operating Procedures*, appended to this agreement.
- *Objects of cultural patrimony* means “items having ongoing historical, traditional, or cultural importance central to the Indian Tribe or Native Hawaiian organization itself, rather than property owned by an individual tribal or organization member. These objects are of such central importance that they may not be alienated, appropriated, or conveyed by any individual tribal or organization member. Such objects must have been considered inalienable by the culturally affiliated Indian Tribe or Native Hawaiian organization at the time the object was separated from the group” [43 C.F.R. 10.2(d)(4)].
- *Sacred objects* means “items that are specific ceremonial objects needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present day adherents. While many items, from ancient pottery sherds to arrowheads, might be imbued with sacredness in the eyes of an individual, these regulations are specifically limited to objects that were devoted to a traditional Native American religious ceremony or ritual and which have religious significance or function in the continued observance or renewal of such ceremony” [43 C.F.R. 10.2(d)(3)].

Article I: Inadvertent Discovery of Human Remains

A. In the event of an inadvertent discovery of human remains or cultural items on lands administered by Fort Carson, Fort Carson will follow the procedures outlined in the NAGPRA Standard Operating Procedures (SOP - Appendix A).

B. All inadvertently discovered human remains that are not associated with a crime scene shall be analyzed *in situ* by means of non-destructive analysis to potentially determine cultural affiliation. Non-destructive analysis shall consist of direct physical measurement of the material, preceded, if necessary, by cleaning with a non-corrosive solution that does not damage or alter the material or object. Fragments or samples of the material shall not be taken. A qualified professional physical anthropologist or archeologist shall conduct such analysis. Other methods of analysis shall be conducted only upon consultation with the Tribes.

C. All inadvertently discovered cultural items associated with human remains shall be analyzed *in situ* and shall not be removed from their context. Other methods of analysis shall be conducted only upon consultation with the Tribes.

D. In the event that lineal descendants and cultural affiliation cannot be determined based on preliminary analysis, the signatory Tribes to this agreement, based on aboriginal occupation and use of Fort Carson lands, shall hereby claim joint ownership of the human remains and/or cultural items. Other notified Tribes not party to this agreement will have sixty (60) days within which to claim ownership.

E. The Tribes claiming ownership shall, among themselves, determine which Tribe will act as the lead in the disposition of the human remains and/or cultural items depending upon the particular circumstances of the case. If a lead cannot be determined, Fort Carson will follow the dispute resolution procedures outlined in the NAGPRA SOP (Section 6.0), and the matter may be put before the NAGPRA Review Committee.

Article II: Archeological or Other Investigation That May Result in the Discovery of Human Remains or Cultural Items

A. If Fort Carson proposes to undertake an archeological investigation or other activity that has a high probability to result in the discovery of Native American human remains, NAGPRA points-of-contact for the consulting Tribes shall be notified. Fort Carson shall consult with the Tribes (allowing for a thirty (30)-day period for response from the Tribes) to ensure that the scope of work for the investigation or activity addresses the concerns of the Tribes.

B. High probability for the discovery of Native American human remains or burial items will be determined by the Fort Carson Cultural Resources Manager based on whether the scope of work for the planned investigation or activity indicates that excavation is proposed in areas in which Native American cultural resources are likely to occur.

C. In the event of the discovery of human remains or cultural items during a planned investigation, all activity within a 30 meter radius of the remains shall stop, and the Fort Carson CRM will follow the procedures for consultation outlined in the NAGPRA SOP.

D. Analysis to determine cultural affiliation will be conducted *in situ* as stipulated in Article I of this agreement.

E. In the event that lineal descendants and cultural affiliation cannot be determined based on preliminary analysis, the signatory Tribes to this agreement, based on aboriginal occupation and use of Fort Carson lands, shall hereby claim joint ownership of the human remains and/or cultural items. Other notified Tribes not party to this agreement will have sixty (60) days within which to claim ownership.

F. The Tribes claiming ownership shall, among themselves, determine which Tribe will act as the lead in the disposition of the human remains and/or cultural items depending upon the particular circumstances of the case. If a lead cannot be determined, Fort Carson will follow the dispute resolution procedures outlined in the NAGPRA SOP (Section 6.0), and the matter may be put before the NAGPRA Review Committee.

Article III: Access

A. In accordance with the American Indian Religious Freedom act of 1978, as amended, it is the policy of Fort Carson to accommodate requests by the Tribes for access to Fort Carson and the Pinon Canyon Maneuver Site to carry out their traditional and accustomed beliefs and practices when such access will not interfere with the military mission.

B. Tribes interested in visiting for ceremonial or other purposes shall submit a written request to the CRM at least forty-five (45) days in advance of their visit. Requests may be made via mail or e-mail. The CRM may be contacted at:

Department of Army
Directorate of Environmental Compliance and Management
ATTN: Pamela Cowen, Cultural Resources Manager
1638 Elwell St. – Bldg. 6236
Fort Carson, CO 80913-4356
pamela.cowen@carson.army.mil

C. Requests must come from the federally recognized tribal government, either via the tribal chairperson, a NAGPRA representative, or an authorized cultural or spiritual representative.

D. Depending on the circumstances, visitors may need to be escorted on site by Fort Carson personnel.

E. Tribal use of plants or other natural resources under the stewardship of Fort Carson for ceremonial or traditional purposes must be coordinated with the CRM and approved by the Director, DECAM.

Article IV: Privacy and Information Sharing

A. Fort Carson shall not provide details of any discovered human remains or cultural items to any media, agency, organization or individual, public or private, with the exception of other federally recognized tribes that may express interest. If it is determined that other parties need to be informed, information may be released upon the approval of all consulting parties.

B. Fort Carson shall not provide details of traditional cultural properties, sacred sites, or other resources of cultural significance to the Tribes to any outside media, agency, organization or individual, public or private, with the exception of Colorado State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP). If it is determined that other parties need to be informed, information may be released upon the approval of all consulting parties.

C. Both the Tribes and Fort Carson shall comply with the confidentiality provisions of the Archeological Resources Protection Act (ARPA) in 16 U.S.C. 470hh.

D. The Tribes may contact the Fort Carson CRM at any time to request information on cultural resources management activities.

E. Per Section 106 of the National Historic Preservation Act of 1966, as amended, the Tribes will be included in review of Fort Carson undertakings with potential to affect historic properties of cultural significance to the Tribes.

F. Subject to any applicable laws to the contrary, the Tribes may obtain copies of any Fort Carson cultural resources reports of investigations upon request, provided that requests do not exceed the photocopying capacity of the program.

Article V: Terms of the Agreement

A. This agreement shall become binding upon a party when it is signed by an authorized representative of that party. Each party warrants that it has the requisite authority to execute, deliver, and consummate the stipulations this agreement.

B. Any party may terminate its participation in this agreement by providing thirty (30) days written notice to the other parties.

C. This agreement shall remain in effect so long as Fort Carson and at least one Tribe remain as participants under it.

D. Any party to this agreement may propose in writing that it be amended, whereupon the parties will consult to consider such an amendment.

Anti-Deficiency Act Statement

All commitments made under this agreement are subject to the availability of funds. Nothing in this agreement will be construed as limiting or affecting the legal authorities of the U.S. Army or the Tribes as binding upon the parties to assume or expend funds in excess of available appropriations.

Signatures:

THOMAS L. WARREN Date
Director
Environmental Compliance and Management
Fort Carson, Colorado

MICHAEL RESTY JR. Date
COL, CM
Garrison Commander
Fort Carson, Colorado

ALONZO CHALEPAH Date
Chairman
Apache Tribe of Oklahoma

GILBERT BRADY Date
NAGPRA Representative
Northern Cheyenne Tribe

JOE BIG MEDICINE Date
Southern Cheyenne NAGPRA Representative
Cheyenne and Arapaho Tribes of Oklahoma

JOHN YELLOW BIRD STEELE Date
President
Oglala Sioux Tribe of the Pine Ridge Reservation

WILLIAM LEE PEDRO Date
Southern Arapaho NAGPRA Representative
Cheyenne and Arapaho Tribes of Oklahoma

DELPHINE CLAIR Date
NAGPRA Representative
Shoshone Tribe (Eastern Band)

WALLACE COFFEY Date
Chairman
Comanche Nation of Oklahoma

NEIL BUCK CLOUD Date
NAGPRA Coordinator
Southern Ute Indian Tribe

BILLY EVANS HORSE Date
Chairman
Kiowa Tribe of Oklahoma

TERRY KNIGHT SR. Date
NAGPRA Representative
Ute Mountain Ute Tribe

ROBERT J. GOGGLES Date
NAGPRA Representative
Northern Arapaho Tribe

FORT CARSON

NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT (NAGPRA) STANDARD OPERATING PROCEDURES (SOP)

1.0 INTRODUCTION

a. Fort Carson is engaged in continuing archeological survey and evaluation of cultural resources on Fort Carson and the Pinon Canyon Maneuver Site (PCMS).

- 1) Approximately 55% of installation lands have been surveyed (as of October 2002).
- 2) A total of 5,616 archeological sites have been identified on Fort Carson and the PCMS.
- 3) A total of 861 sites have been determined eligible for inclusion in the National Register of Historic Places.
- 4) Prehistoric sites number 4,258; historic sites number 890. A total of 468 are multi-component, *i.e.* have both prehistoric and historic components.

b. Models of site location probability indicate that the lands remaining to be surveyed are likely to contain additional sites and National Register eligible properties. The studies conducted to date indicate that human burials are rare but do occur on Fort Carson administered lands.

c. This SOP is an integral feature of the Fort Carson *Integrated Cultural Resources Management Plan, 2002-2006* (ICRMP), an internal planning document guiding cultural resources management on Fort Carson and the PCMS. This SOP supersedes the interim NAGPRA SOP in Section 6.4 of the ICRMP.

d. Appended to these procedures are:

- 1) Appendix A: a list of applicable legislation, executive orders, and Presidential memoranda.
- 2) Appendix B: a template for notification of the Garrison Commander and Indian Tribes.
- 3) Appendix C: a list of official tribal contacts.

2.0 DEFINITIONS: Reference: Native American Graves Protection and Repatriation Act 25 U.S.C. 3001, Sec. 2, unless indicated otherwise.

- *Burial site* means “any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which as a part of the death rite or ceremony of a culture, individual human remains are deposited, and includes rock cairns or pyres which do not fall within the ordinary definition of grave site” [43 C.F.R. 10.2(d)(2)].
- *Cultural affiliation* means “that there is a relationship of shared group identity which can reasonably be traced historically or prehistorically between members of a present-day Indian Tribe or Native Hawaiian organization and an identifiable earlier group. Cultural affiliation is established when the preponderance of the evidence, based on geographical, kinship, biological, archeological linguistic, folklore, oral tradition, historical evidence, or other information or expert opinion, reasonably leads to such a conclusion” [43 C.F.R. 10.2(e)].
- *Cultural objects* specifically refers to associated funerary objects, sacred objects, and objects of cultural patrimony.

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- *Funerary objects* means “items that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains.” [43 C.F.R. 10.2(d)(2)]. *Associated funerary objects* are “those funerary objects for which the human remains with which they were placed intentionally are also in the possession or control of a museum or federal agency” [43 C.F.R. 10.2(d)(2)(i)]. *Unassociated funerary objects* are “those funerary objects for which the human remains with which they were placed intentionally are nor in the possession or control of a museum or federal agency” [43 C.F.R. 10.2(d)(2)(ii)].
- *Human remains* means the “physical remains of a human body, including but not limited to bones, teeth, hair, ashes, or mummified or otherwise preserved soft tissues, of a person of Native American ancestry. For the purposes of determining cultural affiliation, human remains incorporated into a funerary object, sacred object, or object of cultural patrimony, as defined below, must be considered as part of that item” [43 CFR 10.2(d)(1)].
- *Inadvertent discovery* means “the unanticipated encounter or detection of human remains, funerary objects, sacred objects, or objects of cultural patrimony found under or on the surface of Federal or tribal lands pursuant to section 3(d)” of NAGPRA [43 C.F.R. 10.2(g)(4)].
- *Indian Tribe* means “any tribe, band, nation, or other organized group or community of Indians, including any Alaska Native village or corporation as defined in or established by the Alaska Native Claims Settlement Act [43 U.S.C. 1601 et seq.], which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians” [43 C.F.R. 10.2(b)(2)].
- *Intentional excavation* means “the planned archeological removal of human remains, funerary objects, sacred objects, or objects of cultural patrimony found under or on the surface of Federal or tribal lands pursuant to section 3(c)” of NAGPRA [43 C.F.R. 10.2(g)(3)].
- *Objects of cultural patrimony* means “items having ongoing historical, traditional, or cultural importance central to the Indian Tribe or Native Hawaiian organization itself, rather than property owned by an individual tribal or organization member. These objects are of such central importance that they may not be alienated, appropriated, or conveyed by any individual tribal or organization member. Such objects must have been considered inalienable by the culturally affiliated Indian Tribe or Native Hawaiian organization at the time the object was separated from the group” [43 C.F.R. 10.2(d)(4)].
- *Sacred objects* means “items that are specific ceremonial objects needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present day adherents. While many items, from ancient pottery sherds to arrowheads, might be imbued with sacredness in the eyes of an individual, these regulations are specifically limited to objects that were devoted to a traditional Native American religious ceremony or ritual and which have religious significance or function in the continued observance or renewal of such ceremony” [43 C.F.R. 10.2(d)(3)].
- *Tribal contacts* means the Indian Tribes listed in Appendix C.

3.0 POLICY

a. The Garrison Commander will ensure compliance with the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) [25 U.S.C. 3001-3013, 43 C.F.R. 10]. The Garrison Commander-appointed Cultural Resources Manager (CRM) (Directorate of Environmental Compliance and Management, DECAM) will coordinate with the Staff Judge Advocate (SJA), Criminal Investigation Division (CID), Provost Marshal’s Office (PMO), Directorate of Planning, Training and Mobilization (DPTM), and Master Planning (Directorate of Public Works, DPW) to ensure that the CRM is:

- 1) incorporated in the planning of training and construction in order to assess the potential for the discovery of Native American burials and archeological sites, and
- 2) identified as the point-of-contact to be notified immediately if a Native American burial or archeological site is inadvertently discovered on installation property.

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4.0 PROCEDURES: Reference: NAGPRA 25 U.S.C. 3002 Sec. 3(d), 43 C.F.R. 10.

4.1 Contingency 1: Inadvertent Discovery of Native American Human Remains and Associated Funerary Objects, Sacred Objects, or Objects of Cultural Patrimony

4.1.1. Discovery, Preliminary Assessment, Protection, and Verification

a. Upon discovery of known or suspected human remains or cultural objects on Fort Carson administered lands, all activity within a 30 meter radius of the remains shall stop, no material shall be moved or removed, the area shall be secured, and the Director DECAM ((719) 526-2022) and the CRM ((719) 526-3806) shall be notified immediately. Dig permits and contracts for archeological investigations or construction on installation lands include the requirement to notify the CRM immediately upon discovery of human remains or cultural objects.

b. When notified of the possible discovery of human remains or cultural objects, the CRM will visit the site within twenty-four (24) hours of the notification of discovery. The CRM will make an initial determination whether the remains or objects meet the criteria defined in NAGPRA.

c. If upon examination the remains appear to be human and associated with a crime scene, the CRM will ensure that the Provost Marshal's Office (PMO) and the Criminal Investigation Division (CID) are notified. The CID will assume custody of the area.

d. If upon examination the remains are identified as non-human, the CRM will determine if archeological contexts are present that need to be evaluated pursuant to Section 106 of the National Historic Preservation Act [16 U.S.C. 470-470w].

e. If the remains are determined to be non-Native American (e.g. Caucasian, African American, or Asian American) and not associated with a crime, then NAGPRA will not apply and requirements of this SOP will be complete.

f. If the remains are determined to be Native American and not associated with a crime, the CRM will prepare a preliminary report outlining the circumstances of the discovery, description of the site and/or context of the remains, a description of the remains and objects, and an evaluation of their antiquity and significance.

- 1) The human remains and cultural objects will be evaluated *in situ* and only descriptive analysis will be permitted at this time.
- 2) The CRM may consult with a qualified physical or forensic anthropologist if necessary.
- 3) The site will be protected by temporary fencing and signing as "Off Limits." Stabilization or covering may be employed if necessary.

g. If preliminary assessment is inconclusive, the CRM will assume Native American affiliation and proceed as described below.

4.1.2 Notification of the Responsible Federal Agency Official (Garrison Commander) [43 C.F.R. 10.4]

a. Upon confirmation of the discovery of Native American human remains and cultural objects, the CRM will immediately notify the Garrison Commander or his/her official designee by the most expeditious means. This notification will be followed within 48 hours by a Memorandum of Notification, a written notification that summarizes the results of the field evaluation and a plan to deal with the consultation tasks and disposition of the discovered objects. A template for the Memorandum of Notification is provided as Appendix B.

b. No later than 48 hours after receipt of the Memorandum of Notification from the CRM, the Garrison Commander or his/her official designee will forward to the CRM confirmation that he/she has received the notification.

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4.1.3 Notification of Native American Tribes

a. Within three (3) working days after receipt of confirmation from the Garrison Commander of receipt of the Memorandum of Notification, the CRM shall notify culturally affiliated Indian Tribes of the discovery. Notification will be by telephone and by forwarding a notification packet by certified mail. The notification packet will include:

- 1) the Memorandum of Notification, this time signed by the Garrison Commander;
- 2) the report of the preliminary analysis of cultural affiliation; and
- 3) a proposed time and place for consultation and which other Indian Tribes are being notified.

b. The notification packet shall be sent to the tribal chairpersons and a copy furnished to the designated tribal NAGPRA coordinators.

c. Decisions on which Indian Tribes to notify will be based on information in the Native American contacts list appended to this SOP [Appendix C].

4.1.4 Native American Consultation

a. After the notification packet has been sent to the Tribes or review, the CRM will continue to consult with the Tribes. Representatives of Indian Tribes may decide to visit the site.

b. The Garrison Commander will notify the Installation Management Agency Northwest Region (IMA NWR), POC Rick Sharp, regarding the details of the case.

Determining Custody

c. An Indian Tribe that wishes to make a claim of ownership of human remains or cultural objects must be able to demonstrate an affiliation by a preponderance of evidence according to the criteria for the priority of custody specified in 25 U.S.C. 3002, Sec.3(a) and 43 C.F.R. 10.6.

d. Priority of ownership or control of Native American human remains and cultural objects is: [For details, see 25 U.S.C. 3002, Sec. 3(a)(1)-(2), 43 C.F.R. 10.6]

- 1) Lineal descendants, as determined pursuant to 43 C.F.R. 10.14(b).
- 2) Indian Tribe land owner.
- 3) Culturally affiliated Indian Tribe, as determined pursuant to 43 C.F.R. 10.14.
- 4) Indian Tribe recognized as the aboriginal owners of the land by a final judgment of the Indian Claims Commission or the United States Court of Claims.
- 5) Indian Tribe aboriginally occupying the land.
- 6) Indian Tribe with the strongest demonstrated cultural relationship.
- 7) Unclaimed.

e. If a single, legitimate claimant cannot be identified, signatories to the NAGPRA Comprehensive Agreements will claim custody of the human remains or cultural objects as allowed for in the agreements. Consultation will continue to consider treatment and disposition.

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Plan of Action

f. Consultation must result in a written plan of action in accordance with 43 C.F.R. 10.5(e) between the appropriate Indian Tribes and the Garrison Commander.

- 1) Development, review, and signature of the plan of action will follow Army protocol specified in AR 200-4 (paragraph 3-3).
- 2) The CRM may prepare the written plan of action.
- 3) The Garrison Commander or his/her official designee will approve and sign the plan of action.
- 4) Copies of the written plan of action will be provided to the consulting Indian Tribes.

g. Information to be gained during the consultation that should be included in the plan of action include the following.

- 1) Kinds of material to be considered as cultural objects pursuant to 43 C.F.R. 10.2(b).
- 2) Specific information used to determine custody pursuant to 43 C.F. R. 10.6.
- 3) Treatment, care, and handling of human remains and cultural objects.
- 4) Archeological recording of the human remains and cultural objects.
- 5) Kinds of analysis for identification of human remains and cultural objects.
- 6) Kind(s) of traditional treatment(s) to be afforded the human remains or cultural objects.
- 7) Nature of the reports to be prepared.
- 8) Disposition of human remains and cultural objects in accordance with 43 C.F.R. 10.6.
- 9) Steps to be followed to contact Indian Tribe officials if there is a future inadvertent discovery or before any intentional excavation of human remains or cultural objects.

h. If no agreement can be reached, refer to dispute resolution in Section 6.0 of this SOP.

- 1) Unclaimed Native American human remains and cultural objects shall be treated in accordance with the regulations developed by the NAGPRA Review Committee.

4.1.5 Treatment and Disposition of Native American Human Remains, Associated Funerary Objects, Sacred Objects, and Objects of Cultural Patrimony

a. The treatment and disposition of Native American human remains and cultural objects recovered from Fort Carson administered lands will follow the plan of action developed through consultation with Indian Tribes (see above).

b. If the human remains or cultural objects have been removed from their context, they will be maintained in a safe and secure manner agreeable to the consulting parties as required by 43 C.F.R. 10.6(c) and 10.15 until the plan of action is implemented.

Publishing Notice

c. Following 43 C.F.R. 10.6(c), prior to the disposition of human remains and cultural objects to the lineal descendants or the apparent most closely affiliated Indian Tribe/s, the Garrison Commander or his/her official designee must publish notices of the proposed disposition in a newspaper of general circulation in the area in which the human remains and cultural objects were discovered and in which the lineal descendants or affiliated Indian Tribe/s currently reside.

- 1) The notice must provide information as to the nature and affiliation of the human remains, funerary objects, sacred objects, or objects of cultural patrimony and solicit further claims to custody.
- 2) The consulting Indian Tribes may review the content of the notice before its publication.

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- 3) Privileged information should not be included in the notice.
- 4) The notices must be published twice, at least a week apart. A copy of the notice and information on when and in what newspaper/s the notice was published must be sent to the Departmental Consulting Archeologist, Department of the Interior.

Disposition

- d. Per 43 C.F.R. 10.6(c), the disposition of human remains and cultural objects must not take place until at least thirty days after the publication of the second notice to allow time for any additional claimants to come forward.
- e. If, during the period of publication, additional claimants come forward and the Garrison Commander or his/her designee is unable to determine which claimant is entitled to custody, proceed to Section 6.0, *Dispute Resolution*, of this SOP.
- f. Fort Carson will provide an opportunity for appropriate tribal religious ceremony or ceremonies pursuant to the American Indian Religious Freedom Act (AIRFA) [42 U.S.C. 1996-1996a] and E.O. 13007 for burial site restoration and/or re-internment.

4.1.6 Resumption of Activity [43 C.F.R. 10.4(d)(2)]

- a. The activity that resulted in the inadvertent discovery of Native American human remains or cultural objects may resume thirty (30) days after certification by the Commanding of the receipt of the Memorandum of Notification, if otherwise lawful.
- b. Activity may resume before that time if there is a written plan of action approved by consulting parties that outlines steps for stabilization and protection of the site with no removal of human remains and cultural objects, excavation or removal of the human remains or cultural objects in accordance with 43 C.F.R. 10.3, or their disposition to lineal descendants or Indian Tribe/s with priority of custody as defined in 25 U.S.C. 3002, Sec. 3(a) and 43 C.F.R. 10.6.

4.2 Contingency 2: Intentional Archeological Excavation That May Result in the Discovery of Native American Human Remains, Associated Funerary Objects, Sacred Objects, and Objects of Cultural Patrimony

- a. Archeological excavations or other investigations that have a high potential to result in the discovery or removal of Native American human remains, associated funerary objects, sacred objects, or objects of cultural patrimony are permitted only after:
 - 1) Issuance of a permit pursuant to the Archaeological Resources Protection Act [16 U.S.C. 470aa-470ll], if applicable, and
 - 2) Consultation with potential culturally affiliated Indian Tribes to establish provisions for the identification, treatment, and disposition of Native American human remains and cultural objects and meet the requirements of 43 C.F.R. 10.5., and
 - 3) For sites determined eligible for the National Register of Historic Places, compliance with Section 106 of the National Historic Preservation Act [16 U.S.C. 470-470w].
- b. Before issuing any approvals or permits for excavations that may result in the discovery of Native American human remains or cultural objects, the CRM must provide written notification signed by the Garrison Commander or his designee to the Indian Tribes listed in Appendix C.
- c. The notice to the Indian Tribes of planned excavations must describe the planned activity, its general location, the basis for the determination that human remains and cultural objects may be encountered during excavation, and the

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basis for the determination of likely custody pursuant to 43 C.F.R. 10.6.

d. If no response is received in fifteen (15) days from a written notification, a follow-up telephone call will be made by the CRM.

e. The CRM will then consult with the Tribes to ensure that the scope of work for the investigation or activity addresses the concerns of the Tribes.

f. In the event of the discovery of human remains or cultural items during the excavation, the CRM will follow the procedures set forth in Section 4.1 of this SOP.

5.0 TIME CONFLICTS

On those occasions when Fort Carson or the Indian Tribe(s) are unable to meet their commitments pertaining to time schedules for any activity specified herein, the party that is unable to meet the schedule will notify the other party as soon as physically possible to reschedule the activities to the mutual satisfaction of both parties. Emergency actions will be coordinated by telephone or FAX.

6.0 DISPUTE RESOLUTION

a. All disputes regarding the cultural affiliation of discovered human remains and/or cultural objects shall be resolved in accordance with Sections 3 and 7(e) of NAGPRA and the implementing regulations 43 C.F.R. 10.

b. Should any interested Indian Tribe make a conflicting claim of cultural affiliation or dispute the methods of treatment or disposition of human remains and/or cultural objects as delineated herein, the Garrison Commander will notify the Installation Management Agency Northwest Region, POC Rick Sharp, and the Army Environmental Center (AEC).

c. Fort Carson will continue consultation with the disputing parties, suggest that the disputing parties seek resolution among themselves, and, if the disputing parties concur, go before the NAGPRA Review Committee which is given the authority under 25 U.S.C 3006, Sec. 8(c)(4) and 43 C.F.R. 10.16 and 10.17 to make recommendations on the resolution of disputes.

d. If, upon receipt of the recommendations of the Review Committee, the most appropriate claimant still cannot be determined, Fort Carson shall retain the disputed remains or cultural objects until the question of custody is resolved, as stated in 43 C.F.R. 10.15(a)(2).

7.0 ADDITIONAL PARTIES

a. Interested Indian Tribes claiming lineal descent or cultural affiliation may join these procedures at any time should they express a desire to do so.

b. In accordance with 43 C.F.R. 10.15 (a)(1), if an interested party fails to make a written claim prior to the time human remains and cultural objects are duly repatriated or disposed of to a claimant in accordance with 43 C.F.R. 10, the interested party is deemed to have irrevocably waived any right to claim such items pursuant to these regulations.

APPENDIX A to NAGPRA SOP

MANDATES

FEDERAL STATUTES

American Indian Religious Freedom Act of 1978, as amended, 42 U.S.C. 1996-1996a
Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa-470ll
Native American Graves Protection and Repatriation Act of 1990, 25 U.S.C. 3001-3013
National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321-4370c
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470w

FEDERAL REGULATIONS

32 C.F.R. 229 Protection of Archeological Resources
36 C.F.R. 60 National Register of Historic Places
36 C.F.R. 63 Determinations of Eligibility for Inclusion in the National Register of
 Historic Places
36 C.F.R. 78 Waiver of Federal Agency Responsibility under Section 110 of the
 National Historic Preservation Act
36 C.F.R. 800 Protection of Historic Properties
40 C.F.R. 1500-1508 Regulations Implementing the National Environmental Policy Act
43 C.F.R. 7 Protection of Archaeological Resources
43 C.F.R. 10 Native American Graves Protection and Repatriation Act Regulations

EXECUTIVE ORDERS

E.O. 11593 Protection and Enhancement of the Cultural Environment
E.O. 13007 Indian Sacred Sites
E.O. 13175 Consultation and Coordination with Indian Tribal Governments,
 November 6, 2000

ARMY REGULATIONS

Army Regulation (AR) 200-4, Cultural Resources Management, 1 October 1998
Army Pamphlet 200-4, Cultural Resources Management, 1 October 1998

APPENDIX B to NAGPRA SOP

**TEMPLATE FOR
MEMORANDUM OF NOTIFICATION OF THE GARRISON COMMANDER**

1. PURPOSE:

- a. To notify the Garrison Commander that Native American human remains and/or cultural objects have been inadvertently discovered on Fort Carson or the PCMS.
- b. Recommend an action plan that implements requirements of the Native American Graves Protection and Repatriation Act (NAGPRA) [25 U.S.C. 3001-3013, 43 C.F.R. 10], outlined in the NAGPRA Standard Operating Procedures.
- c. Request certification of this notification by the Garrison Commander to be forwarded directly to the CRM.

2. SITUATION:

- a. Describe circumstances of discovery: by whom, where, and how were Native American human remains and/or cultural objects discovered on the installation.
- b. Describe discovered items: condition and contents of the burial, including any grave goods; the primary and secondary context of the remains and any artifacts, including site location described according to standard Fort Carson archeological practice; probable antiquity and significance of the remains and/or cultural objects.

3. ACTION PLAN

- a. Continue to protect the site.
- b. Mention that the CRM must receive confirmation of receipt of the Memorandum of Notification within forty-eight (48) hours.
- c. Notify the Indian Tribes listed in Appendix C of the discovery by telephone and written report within three working days after receipt of confirmation from the Garrison Commander.
- d. Inform each notified Indian Tribe of the names of the other Indian Tribes being consulted.
- e. Consult with the Indian Tribes regarding the cultural affiliation, treatment, and disposition of the remains and/or objects.
- f. Document the decisions made as a result of consultation in a written plan of action or as specified in Section 4.1 of this SOP.
- g. Carry out treatment and disposition of remains and/or objects as agreed upon in consultations according to the process outlined in Section 4.1 of this SOP.

APPENDIX C to NAGPRA SOP

TRIBAL CONTACTS

Apache Tribe of Oklahoma

Mr. Alonzo Chalepah, Chairman
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Gilbert Brady, NAGPRA Representative (Northern Cheyenne Culture Commission)
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Vance Blacksmith, NAGPRA Coordinator

Shoshone Tribe (Eastern Band)

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Ute Mountain Ute

Mr. Harold Cuthair, Acting Chair
Ute Mountain Ute Tribe
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APPENDIX G

Socioeconomic Resources Supporting Documentation

ATTACHMENT G.1

PCMS Socioeconomic Supplemental Data

TABLE G.1-1
ROI Employment (1995-2005)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
State of Colorado	2,000,022	2,004,741	2,080,012	2,155,740	2,198,147	2,300,192	2,301,155	2,300,065	2,325,210	2,382,873	2,419,241
Huerfano County	2,924	3,059	3,446	3,752	3,453	2,913	2,790	3,267	3,053	2,959	2,938
Las Animas County	6,048	5,773	5,926	6,397	6,310	6,417	6,178	7,395	7,336	7,533	7,712
Otero County	8,405	8,372	8,442	8,474	8,357	8,457	8,054	8,972	8,623	8,725	8,743
ROI Total	17,377	17,204	17,814	18,623	18,120	17,787	17,022	19,634	19,012	19,217	19,393

Change 1995-2005 Year-to-Year Percent

	Numeric	Percent	Average Annual Percent	1995-1996 (percent)	1996-1997 (percent)	1997-1998 (percent)	1998-1999 (percent)	1999-2000 (percent)	2000-2001 (percent)	2001-2002 (percent)	2002-2003 (percent)	2003-2004 (percent)	2004-2005 (percent)
State of Colorado	419,219	20.96	1.92	0.24	3.75	3.64	1.97	4.64	0.04	-0.05%	1.09%	2.48	1.53
Huerfano County	14	0.48	0.05	4.62	12.65	8.88	-7.97	-15.64	-4.22	17.10%	-6.55%	-3.08	-0.71
Las Animas County	1,664	27.51	2.46	-4.55	2.65	7.95	-1.36	1.70	-3.72	19.70%	-0.80%	2.69	2.38
Otero County	338	4.02	0.40	-0.39	0.84	0.38	-1.38	1.20	-4.77	11.40%	-3.89%	1.18	0.21
ROI Total	2,016	11.60	1.10	-1.00	3.55	4.54	-2.70	-1.84	-4.30	15.34%	-3.17%	1.08	0.92

Source: Colorado Department of Labor and Employment, 2006

TABLE G.1-2
ROI Population by State, County, and Community (1980-2004)

State, Counties, and Municipalities	April 1, 1980	April 1, 1990	April 1, 2000	July 2001	July 2002	July 2003	July 2004	Numeric			Average Annual Percent			Percent		
								1980-1990	1990-2000	2000-2004	1980-1990	1990-2000	2000-2004	1980-1990	1990-2000	2000-2004
State of Colorado	2,889,735	3,294,473	4,301,261	4,446,965	4,521,873	4,586,768	4,653,023	404,738	1,006,788	351,762	1.32	2.70	1.98	14.01%	30.56%	8.18%
Huerfano County	6,440	6,009	7,862	7,857	8,034	8,060	7,969	-431	1,853	107	-0.69	2.72	0.34	-6.69%	30.84%	1.36%
La Veta	611	726	924	917	929	920	901	115	198	-23	1.74	2.44	-0.63	18.82%	27.27%	-2.49%
Walsenburg	3,945	3,300	4,182	4,119	4,156	4,079	3,993	-645	882	-189	-1.77	2.40	-1.15	-16.35%	26.73%	-4.52%
Unincorp. Area	1,884	1,983	2,756	2,821	2,949	3,061	3,075	99	773	319	0.51	3.35	2.78	5.25%	38.98%	11.57%
Las Animas County	14,897	13,765	15,207	15,550	15,836	16,302	16,242	-1,132	1,442	1,035	-0.79	1.00	1.66	-7.60%	10.48%	6.81%
Aguilar	624	520	593	600	604	602	554	-104	73	-39	-1.81	1.32	-1.69	-16.67%	14.04%	-6.58%
Branson	73	58	77	80	83	85	85	-15	19	8	-2.27	2.87	2.50	-20.55%	32.76%	10.39%
Cokedale	90	116	139	142	145	148	146	26	23	7	2.57	1.83	1.24	28.89%	19.83%	5.04%
Kim	100	76	65	67	69	73	73	-24	-11	8	-2.71	-1.55	2.94	-24.00%	-14.47%	12.31%
Starkville	127	104	128	132	136	138	137	-23	24	9	-1.98	2.10	1.71	-18.11%	23.08%	7.03%
Trinidad	9,663	8,580	9,078	9,254	9,418	9,481	9,344	-1,083	498	266	-1.18	0.57	0.72	-11.21%	5.80%	2.93%
Unincorp. Area	4,220	4,311	5,127	5,275	5,381	5,775	5,903	91	816	776	0.21	1.75	3.59	2.16%	18.93%	15.14%
Otero County	22,567	20,185	20,311	19,976	19,717	19,754	19,664	-2,382	126	-647	-1.11	0.06	-0.81	-10.56%	0.62%	-3.19%
Cheraw	233	265	211	207	203	203	201	32	-54	-10	1.30	-2.25	-1.21	13.73%	-20.38%	-4.74%
Fowler	1,227	1,154	1,206	1,180	1,160	1,161	1,150	-73	52	-56	-0.61	0.44	-1.18	-5.95%	4.51%	-4.64%
La Junta	8,338	7,678	7,568	7,456	7,373	7,384	7,334	-660	-110	-234	-0.82	-0.14	-0.78	-7.92%	-1.43%	-3.09%
Manzanola	459	437	525	518	510	510	505	-22	88	-20	-0.49	1.85	-0.97	-4.79%	20.14%	-3.81%
Rocky Ford	4,804	4,162	4,286	4,213	4,153	4,157	4,182	-642	124	-104	-1.42	0.29	-0.61	-13.36%	2.98%	-2.43%
Swink	668	584	696	688	681	690	688	-84	112	-8	-1.33	1.77	-0.29	-12.57%	19.18%	-1.15%
Unincorporated Area	6,838	5,905	5,819	5,714	5,637	5,649	5,604	-933	-86	-215	-1.46	-0.15	-0.94	-13.64%	-1.46%	-3.69%
ROI Total	43,904	39,959	43,380	43,383	43,587	44,116	43,875	-3,945	3,421	495	-0.94	0.82	0.28	-8.99%	8.56%	1.14%
Huerfano County % Share	14.67%	15.04%	18.12%	18.11%	18.43%	18.27%	18.16%									
Las Animas County % Share	33.93%	34.45%	35.06%	35.84%	36.33%	36.95%	37.02%									
Otero County % Share	51.40%	50.51%	46.82%	46.05%	45.24%	44.78%	44.82%									

Sources: U.S. Census Bureau; State of Colorado, State Demography Office (<http://dola.colorado.gov/demog/demog.cfm>)

TABLE G.1-3
ROI Selected Housing Characteristics (2000)

	County		
	Huerfano	Las Animas	Otero
Occupied	67.0%	80.9%	89.9%
Owner Occupied	70.6%	70.4%	69.2%
Renter Occupied	29.4%	29.6%	30.8%
Vacant	33.0%	19.1%	10.1%
For Seasonal, Recreational, or Occasional Use	70.0%	46.6%	5.0%
Median Number of Rooms	4.9	5.1	5.3
Single Units	75.0%	75.4%	80.2%
2-9 Units	8.3%	8.0%	7.3%
10-49 Units	1.2%	2.6%	4.1%
50 or More Units	0.0%	0.5%	0.5%
Mobile Home	14.5%	12.8%	7.9%
Year Structure Built (1990-2000)	19.0%	15.0%	8.3%
Year Structure Built (1980-1989)	13.9%	8.7%	5.0%
Year Structure Built (1970-1979)	15.1%	14.3%	15.6%
Year Structure Built (1960-1969)	7.0%	5.4%	12.1%
Year Structure Built (1950-1959)	5.4%	9.5%	13.9%
Year Structure Built (prior to 1959)	39.6%	47.0%	45.0%
Median Year Structure Built:			
Total	1967	1953	1954
Owner Occupied	1965	1952	1951
Renter Occupied	1959	1956	1959
Lacking Complete Plumbing Facilities	4.6%	3.8%	0.8%
Lacking Complete Kitchen Facilities	4.9%	3.9%	0.6%
Median Contract Rent	351	316	301
Median Value	\$79,700	\$86,300	\$67,700

TABLE G.1-4
ROI County Sources of Revenue

Revenue Source	County					
	Huerfano		Las Animas		Otero	
	(\$)	(%)	(\$)	(%)	(\$)	(%)
Total Taxes	2,533,551	35.55	5,482,463	36.91	3,925,663	35.11
Property	2,035,089	28.55	3,023,917	20.36	1,979,665	17.71
Sales and Use	241,868	3.39	1,772,833	11.94	1,380,695	12.35
Other	256,594	3.6	685,713	4.62	565,303	5.06
Licenses and Permits	26,199	0.37	18,512	0.12	0	0
Intergovernmental Transfers	3,478,812	48.81	7,561,417	50.91	5,819,814	52.05
Federal	877,586	12.31	468,540	3.15	950,036	8.5
State	2,591,000	36.35	6,959,545	46.85	4,649,055	41.58
Other	10,226	0.14	133,332	0.9	220,723	1.97
Charges for Services	650,074	9.12	1,029,878	6.93	831,750	7.44
Other Sources	438,893	6.16	761,308	5.13	602,911	5.39
Total	7,127,529		14,853,578		11,180,138	

TABLE G.1-5
ROI County Expenditure Categories

Expenditure Category	County					
	Huerfano		Las Animas		Otero	
	(\$)	(%)	(\$)	(%)	(\$)	(%)
Operating Expenditures	6,046,221	84.66	11,332,610	84.07	10,515,813	85.77
General Government	1,489,349	20.85	2,284,110	16.94	2,398,914	19.57
Judicial	99,784	1.4	223,829	1.66	0	0
Public Safety	1,072,812	15.02	1,685,248	12.5	1,369,116	11.17
Public Works	1,451,317	20.32	2,342,214	17.37	2,066,776	16.86
Health	437,495	6.13	217,183	1.61	810,852	6.61
Culture & Recreation	42,620	0.6	30,912	0.23	194,215	1.58
Social Services	1,294,188	18.12	4,381,911	32.51	3,597,670	29.34
Miscellaneous	158,656	2.22	167,203	1.24	78,270	0.64
Transfers to Other Governments	88,633	1.24	170,490	1.26	137,654	1.12
Capital Outlay	757,000	10.6	1,208,142	8.96	1,606,557	13.1
Principal Payments	200,000	2.8	450,558	3.34	0	0
Interest Payments	49,855	0.7	318,609	2.36	0	0
Outstanding Debt	801,377		5,995,787		0	
Total	7,141,709		13,480,409		12,260,024	

TABLE G.1-6

PCMS ROI, School Districts, Selected Characteristics (2005)

County	Organization Name	Total	Student Membership				Student/ Teacher Ratio
			Percent Minority	Percent Free Lunch	Percent Reduced Cost Lunch	Percent Free and Reduced Cost Lunch	
Huerfano	Huerfano RE-1	747	63.32	50.86	11.10	61.96	14.49
	La Veta RE-2	247	11.74	39.74	15.28	55.02	12.46
County Subtotal		994	50.50	48.10	12.13	60.24	
Las Animas	Trinidad 1	1,528	64.53	39.71	12.52	52.23	16.36
	Primero Reorganized 2	240	44.17	17.21	3.72	20.93	14.14
	Hoehne Reorganized 3	359	38.16	18.79	21.68	40.46	14.65
	Aguilar Reorganized 6	164	57.32	69.86	9.59	79.45	9.01
	Branson Reorganized 82	1,130	24.25	15.42	9.89	25.31	18.52
	Kim Reorganized 88	65	3.08	45.16	8.06	53.23	6.36
County Subtotal		3,486	45.87	29.32	11.81	41.12	
Otero	East Otero R-1	1,575	59.24	48.07	11.57	59.64	14.29
	Rocky Ford R-2	851	72.86	62.02	9.84	71.86	12.92
	Manzanola 3J	210	60.48	63.64	13.88	77.51	9.65
	Fowler R-4J	375	20.00	30.40	9.33	39.73	11.87
	Cheraw 31	218	17.89	35.05	18.56	53.61	11.21
	Swink 33	373	27.61	15.82	4.56	20.38	12.37
County Subtotal		3,602	52.67	46.15	10.71	56.87	
ROI Subtotal		8,082					
State Total		780,708	37.47	27.44	6.30	33.74	

TABLE G.1-7
Race, Ethnicity and Poverty Status in the Area Surrounding PCMS

	Adjacent Areas	Las Animas County	ROI	State of Colorado
Total Population	3,412	15,207	43,380	4,301,261
Hispanic or Latino ^{a, b}	27.7%	41.7%	38.8%	17.1%
Not Hispanic or Latino	72.3%	58.3%	61.2%	82.9%
White	87.8%	82.7%	80.4%	82.7%
Not Hispanic or Latino	69.7%	55.1%	57.5%	74.4%
Hispanic or Latino	18.1%	27.6%	23.0%	8.3%
Black or African American	0.3%	0.2%	0.8%	3.7%
American Indian and Alaska Native	1.1%	2.7%	2.1%	1.0%
Asian	0.3%	0.4%	0.5%	2.2%
Native Hawaiian and Other Pacific Islander	0.0%	0.2%	0.1%	0.1%
Some Other Race	7.4%	9.7%	12.4%	7.2%
Two or More Races	3.1%	4.1%	3.7%	3.1%
Total Minority ^c Population	30.3%	44.9%	42.5%	25.6%
Poverty Rate	17.6%	17.3%	18.1%	9.3%

Source: U.S. Census American FactFinder, 2006

^aHispanics or Latinos are those people who classified themselves in one of the specific Spanish, Hispanic, or Latino categories listed on the Census 2000 questionnaire (e.g., Mexican, Mexican American, Chicano, Puerto Rican, Cuban and those and who indicate they are "other Spanish/Hispanic/Latino." People who identify their origin as Hispanic or Latino may be of any race.

^bAll percentages are of the total population in each area.

^cPercent minority includes all people identifying themselves as either a racial minority group member (including two or more races) or as White and of Hispanic or Latino origin.

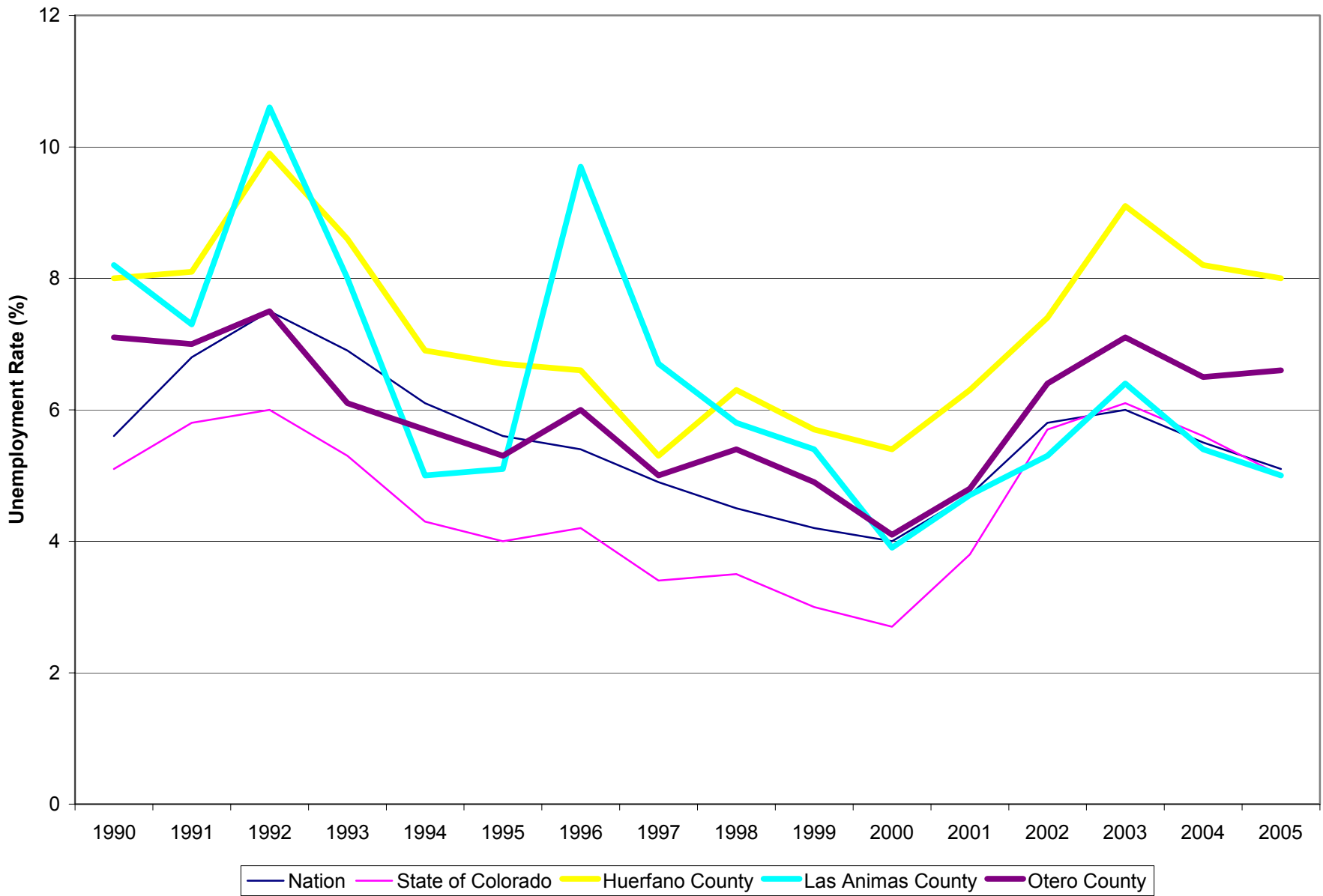


FIGURE G.1-1
PCMS ROI Unemployment Rate, 1990-2004

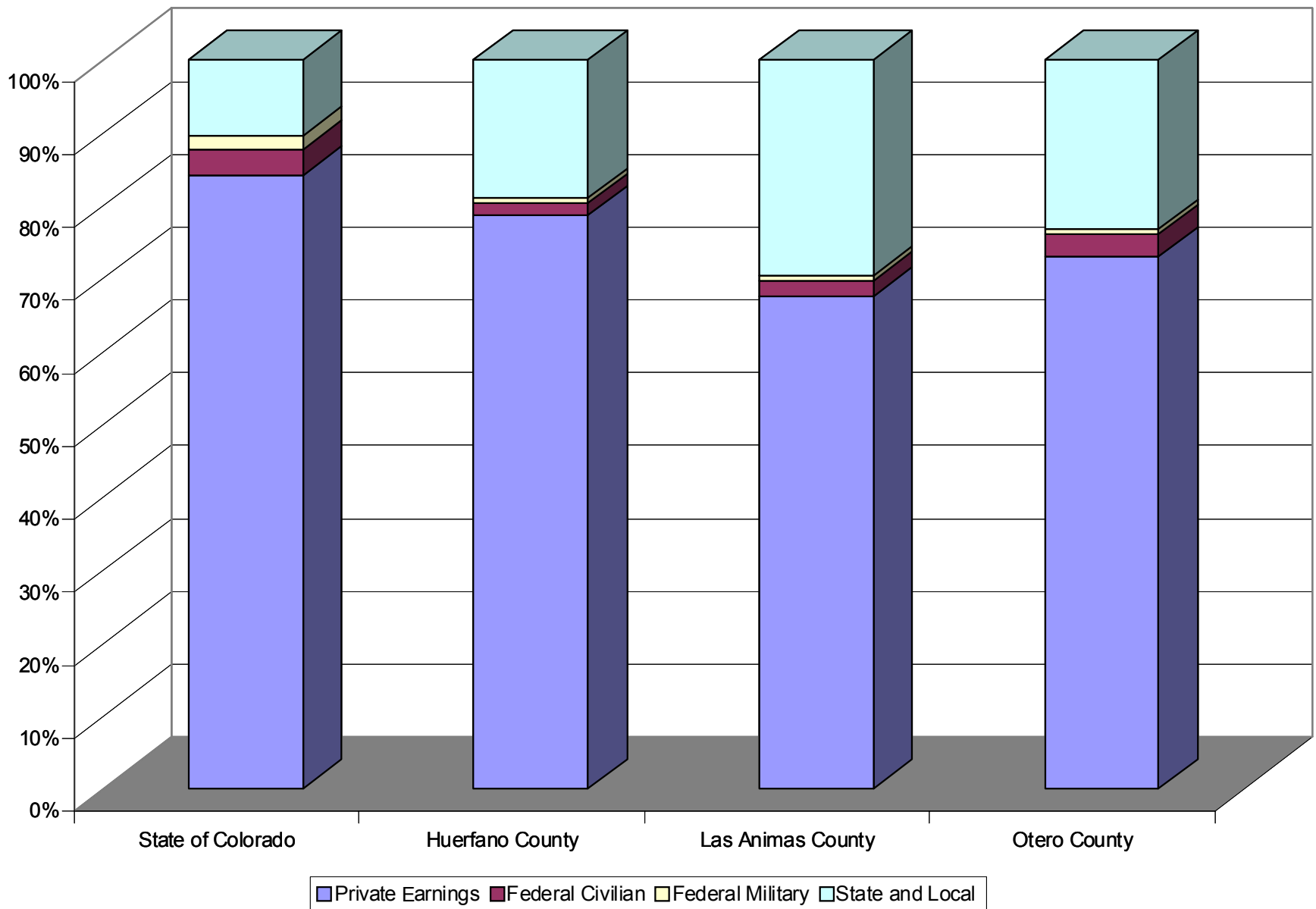


FIGURE G.1-2
PCMS ROI, Earnings by Sector

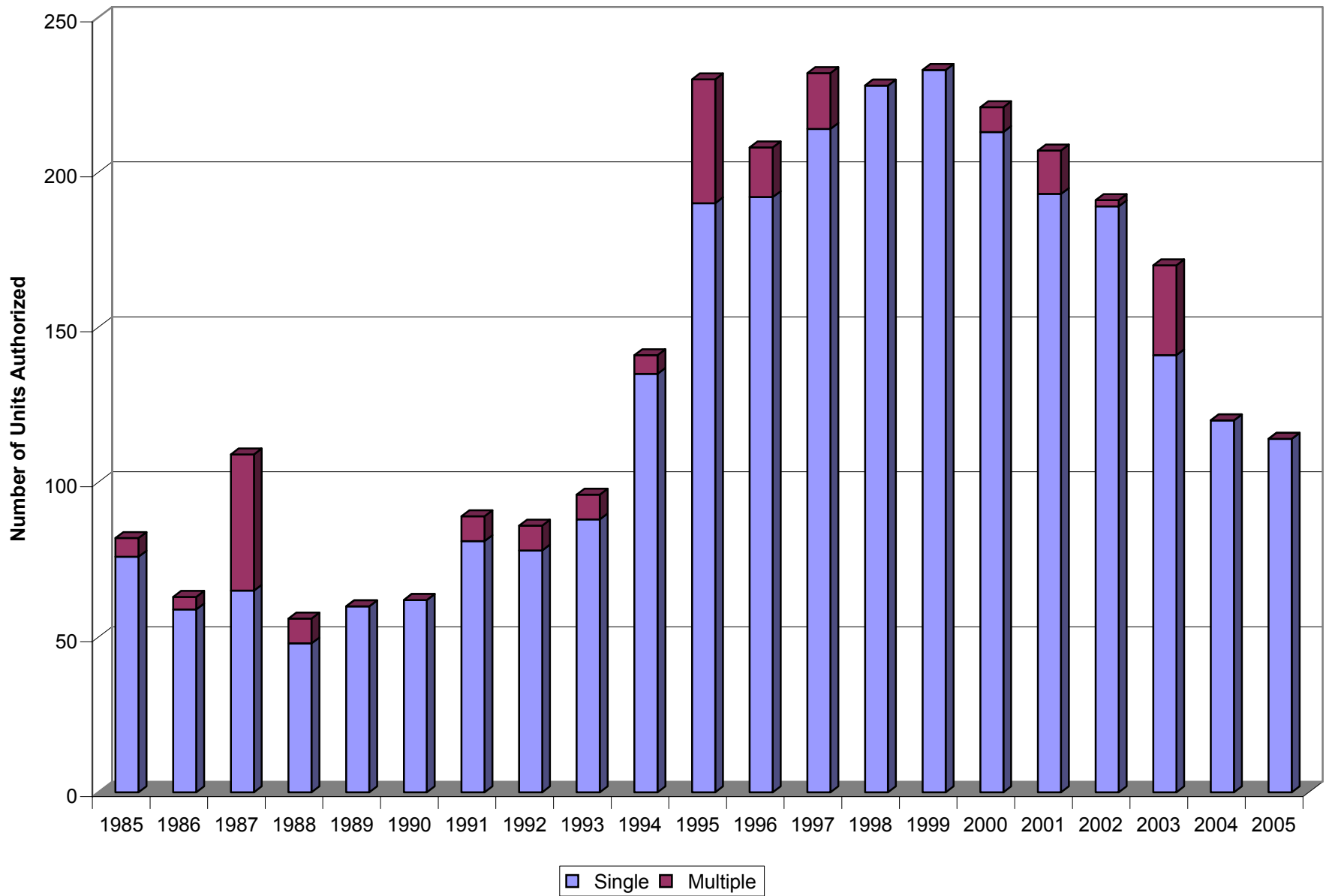
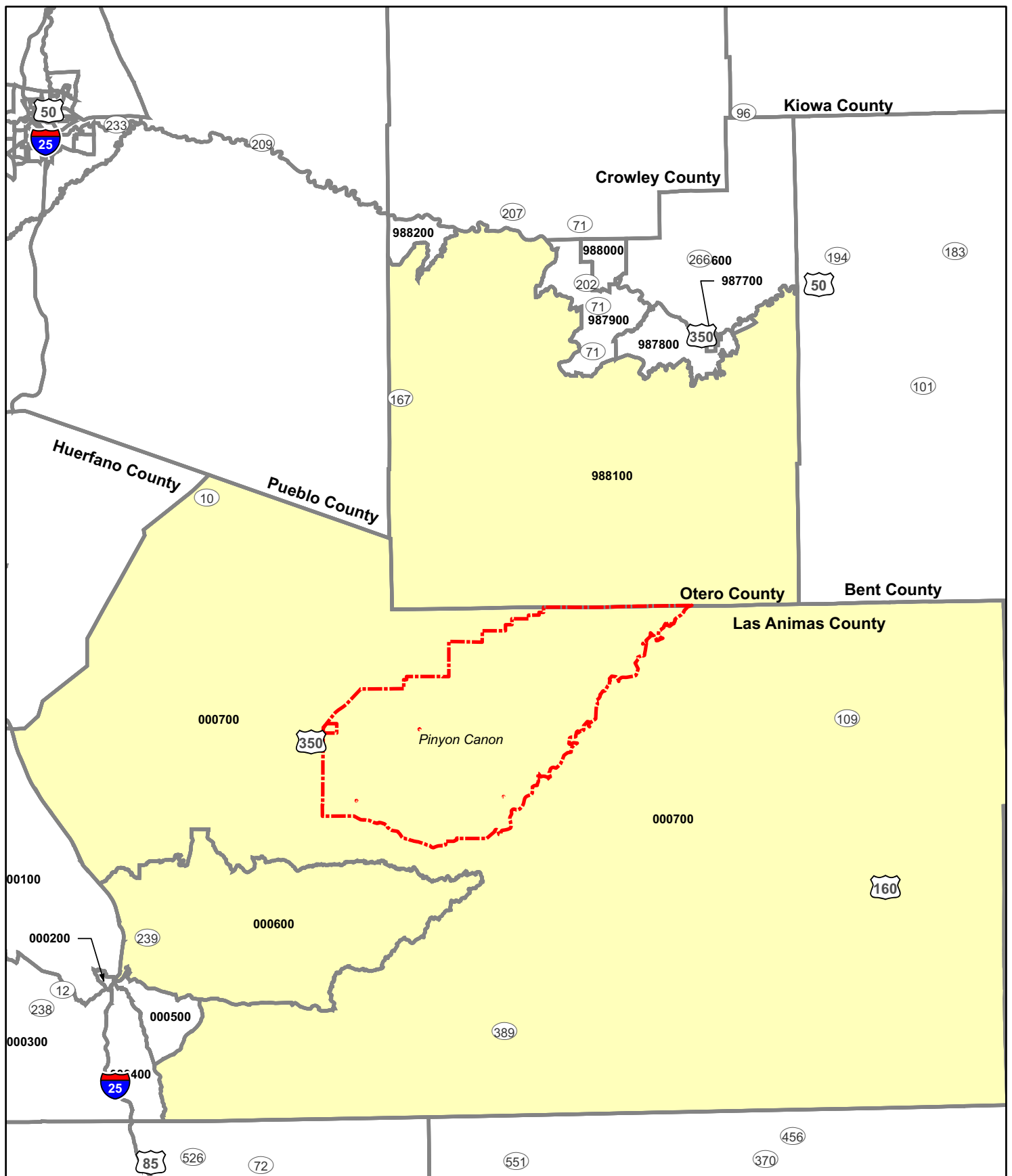


FIGURE G.1-3
PCMS ROI, Housing Units Authorized for Construction, 1985-2005



- Legend**
- PCMS Installation Boundary
 - Census Tract Boundary
 - Study Areas

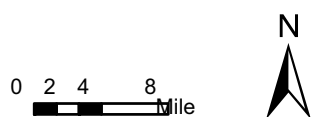


Figure G.1-4
Census Tracts Surrounding the PCMS

ATTACHMENT G.2

**PCMS Economic Impact Forecast System
Methodology and Results**

APPENDIX G.2 ECONOMIC IMPACT FORECAST SYSTEM

THE NEED FOR SOCIOECONOMIC IMPACT ASSESSMENT

Assessing socioeconomic impacts that result from Army actions can be one of the more controversial issues related to the realignment or closure of an installation. The economic and social well-being of a local community can be dependent upon the activities of the installation, and disruptions to the status quo can become politically charged and emotion-laden. The objective of a socioeconomic analysis of Army actions is an open, realistic, and documented assessment of the potential effects.

The requirement to assess socioeconomic impacts in environmental assessments (EAs) or environmental impact statements (EISs) has been a source of legal discussion since the passage of the National Environmental Policy Act (NEPA). Although NEPA is predominately oriented toward the biophysical environment, court decisions have supported the need for analyzing socioeconomic impacts when they are accompanied by biophysical impacts.

THE ECONOMIC IMPACT FORECAST SYSTEM

The U.S. Army developed the Economic Impact Forecast System (EIFS) with the assistance of many academic and professional economists and regional scientists to address the economic impacts pursuant to NEPA and to measure the significance of the impacts. As a result of its designed applicability, and in the interest of uniformity, the Assistant Secretary of the Army (Installations, Logistics, and Environment) (ASA [IL&E]) mandates using EIFS in the NEPA assessment of base realignment and closure recommendations. EIFS is designed for the scrutiny of a populace affected by the actions being studied. The algorithms in EIFS are simple and easy to understand, but still have firm, defensible bases in regional economic theory.

EIFS, in its current form, exists as a World Wide Web-based application. The application resides on a Web server hosted by the US Army Corps of Engineers, Mobile District. The EIFS model is available to U.S. government employees, contractors, and other people who have an approved login and password. Military planners, analysts and their contractors are authorized to access the EIFS application for the purpose of preparing the 2005 Base Realignment and Closure Act (BRAC) National Environmental Policy Act (NEPA) documentation.

As currently configured, EIFS provides:

- Selected statistics about the socioeconomic characteristics of any county or any multi-county area in the United States, including metropolitan statistical areas, and planning commission regions.
- An analytical process for estimating the magnitude and significance of potential socioeconomic effects of proposed military activities in these areas.

THE EIFS IMPACT MODEL

The basis of the EIFS analytical capabilities is the calculation of multipliers that are used for estimating the impacts resulting from Army-related changes in local expenditures and employment. In calculating the multipliers, EIFS uses the economic base model approach that relies on the ratio of total economic activity to “basic” economic activity. Basic, in this context, is defined as the production or employment engaged to supply goods and services outside the ROI or by federal activities (such as military installations and their employees). According to economic base theory, the ratio of total income to basic income is measurable (as the multiplier) and sufficiently stable so that future changes in economic activity can be forecast. This technique is especially appropriate for estimating “aggregate” impacts and makes the economic base model ideal for the EA/EIS process.

The multiplier is interpreted as the total impact on the economy of the region resulting from a unit change in its basic sector; for example, a dollar increase in local expenditures due to an expansion of a military installation. EIFS estimates its multipliers using a “location quotient” approach, which is based on the concentration of industries within the region relative to the industrial concentrations for the nation.

The EIFS model produces output that includes:

- Change in total sales by local businesses
- Change in total income
- Change in total employment
- Change in total population
- The significance of these changes

THE SIGNIFICANCE OF SOCIOECONOMIC IMPACTS

Once model projections are obtained, the rational threshold values (RTV) enable the user to evaluate the significance of the impacts. This analytical tool shows the historical trends for the defined region and develops measures of local historical fluctuations in sales volume, employment, income, and population. The evaluation identifies a range of positive and negative changes, within which a project can affect the local economy without creating a significant impact.

The techniques have two major strengths: (1) they are specific to the region under analysis and (2) they are based on actual historical time series data for the defined region. The use of the EIFS impact model in combination with the RTV has proven very successful in addressing perceived socioeconomic impacts. The EIFS model and the significance-measuring techniques are theoretically sound and have been reviewed on numerous occasions.

RTVs are positive and negative percent changes that establish an acceptable range around the maximum historic percentage fluctuations in the ROI. The average yearly decreases or increases in the ROI are obtained by analyzing regional data for the last 16 to 19 years, depending on data availability. For each variable (sales volume, employment, income, and population), the current time-series data available from the U.S. Bureau of Economic Analysis (BEA) for the ROI is used. The average annual change is calculated as the

difference between the first and last observations in the particular data set, divided by the number of years in the time series (see RTV tables, following). The maximum percent positive and negative deviations from that average are the basis for the RTVs.

Negative RTVs are percentages of the maximum negative deviations. These percentages are weighted to reflect the severity of potential impacts on individuals. Population changes are the most heavily weighted, at 50 percent, followed by employment and personal income changes (67 percent); changes in sales volume receive the least weight (75 percent). Using population as an example, if the greatest historic negative deviation from the annual average population change in the ROI was -0.952 percent, a population decrease of more than half of that (-0.476 percent) would be considered significant.

Positive RTVs represent the maximum positive historical fluctuation in the ROI, because of the generally positive connotations of economic growth. If the maximum historic positive deviation from annual average employment growth was 2.368 percent, an increase of more than 2.368 percent would be considered significant in the ROI.

Definitions

Change in Local Expenditures: Dollar value of expenditures for all services and supplies that are related to the action. This figure is entered by the user when the local purchases are not known. The system then computes an estimated value for the local purchases. Items supplied by General Services Administration (GSA) or Defense Logistics Agency (DLA) are not normally included in expenditures. A negative value is entered for a decrease in activity and a positive value is used if there is an expansion.

Change in Civilian Employment: Number of civilian personnel affected by the action. These are separated or newly added civilian employees. Personnel shifted from one position to another within the same geographic area should not be included. Enter a positive number for an increase or a negative number for a decrease.

Average Income of Affected Civilian Personnel: Average annual gross (before tax) income of civilian personnel affected by the action. Average income figures are entered as positive numbers. Income, in EIFS, is a broader concept than just the wages and salaries of employees. Consideration should also be given, if possible, to income earned from second jobs, working dependents, unearned income (i.e. interest, dividends, and rents), etc.

Percent of Civilians Expected To Relocate: The actual value will vary depending on work force composition and local availability of labor in the required skill categories. If the employees affected generally are clerical, professional, or highly skilled technical personnel, then it is likely that some of these workers will move to or from other geographic areas. If the action involves a large number of personnel, the proportion of those relocating is also likely to increase.

Change in Military Employment: Number of military personnel affected by the military action. These are the transferred (out of the region) or newly added military personnel. Personnel shifted from one position to another on post or within the same geographic area should not be included. Enter a positive number for an expansion or a negative number for a decrease.

Average Income of Affected Military Personnel: Average annual gross (before tax) income of all military personnel affected by the military action.

Percent of Military Living On-post: Percentage of affected military personnel residing on post.

Employment Multiplier: The export-employment multiplier based on the location quotient methodology.

Income Multiplier: The export-income multiplier based on the location quotient methodology.

Sales Volume - Direct: Direct change in business activity attributable to the military action. This represents the change in sales volume at local retail and wholesale service establishments where civilian and military personnel spend their wages and salaries and where local procurements are made. Housing expenditures are also included in this variable.

Sales Volume - Induced: Induced change in local business volume due to the military action. Defined as the difference between total change and direct change of local business volume.

Sales Volume - Total: Total change in local business volume due to the military action. Business volume is defined as local business activity or sales and is the sum of total retail and wholesale trade sales, total selected service receipts, and value added by manufacturing.

Employment - Direct: Direct change in local employment due to the military action. These are establishments that are initially affected by the military action.

Employment - Total: Total change in local employment due to the military action. This not only includes the direct and secondary changes in local employment, but also includes those military and civilian personnel who are initially affected by the military action.

Income - Direct: Direct change in local wages and salaries due to the military action. This is assumed to be earnings of the employees in local retail, wholesale, and service establishments that are initially affected by the military action.

Income - Total (place of work): Total change in local wages and salaries earned in the area due to the military action. This is the sum of the direct and secondary changes in wages and salaries plus the income of the civilian and military personnel affected by the military action.

Income - Total (place of residence): Total change in local personal income of residents due to the military action. This not only includes the direct and secondary changes in local personal income, adjusted for commuting patterns, but also includes the income of the civilian and military personnel initially affected by the military action.

Source: U.S. Army Corps of Engineers Mobile District

EIFS REPORT

PROJECT NAME

PCMS - Peak construction (Run 2)

STUDY AREA

08055 Huerfano, CO
08071 Las Animas, CO
08089 Otero, CO

FORECAST INPUT

Change In Local Expenditures	\$94,750,700	
Change In Civilian Employment	1295 construction workers	
Average Income of Affected Civilian	\$36,519 construction workers	
Percent Expected to Relocate	0	
Change In Military Employment	0	
Average Income of Affected Military	\$0	
Percent of Military Living On-post	0	

FORECAST OUTPUT

Employment Multiplier	2.07	
Income Multiplier	2.07	
Sales Volume - Direct	\$87,000,260	
Sales Volume - Induced	\$93,090,280	
Sales Volume - Total	\$180,090,500	20.58%
Income - Direct	\$56,477,480	
Income - Induced)	\$17,458,450	
Income - Total(place of work)	\$73,935,930	9.84%
Employment - Direct	1760	
Employment - Induced	497	
Employment - Total	2257	10.60%
Local Population	0	
Local Off-base Population	0	0%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	6.93 %	6.57 %	5.34 %	2.3 %
Negative RTV	-6.38 %	-7.33 %	-3.31 %	-1.3 %

RTV DETAILED

SALES VOLUME

Year	Value	Adj_Value	Change	Deviation	n
1969	73834	322655	0	0	0
1970	79242	327269	4615	1065	0.33
1971	85185	337333	10063	6513	1.93
1972	95288	364953	27620	24070	6.6
1973	103864	374949	9996	6446	1.72
1974	111382	361992	-12958	-16508	-4.56
1975	121009	360607	-1385	-4935	-1.37
1976	134720	379910	19304	15754	4.15
1977	139322	367810	-12100	-15650	-4.25
1978	154461	379974	12164	8614	2.27
1979	176709	390527	10553	7003	1.79
1980	196429	381072	-9455	-13005	-3.41
1981	204834	360508	-20564	-24114	-6.69
1982	204978	340263	-20244	-23794	-6.99
1983	212881	342738	2475	-1075	-0.31
1984	220836	340087	-2651	-6201	-1.82
1985	231489	344919	4831	1281	0.37
1986	226887	331255	-13664	-17214	-5.2
1987	226580	351199	19944	16394	4.67
1988	240419	326970	-24229	-27779	-8.5
1989	243707	314382	-12588	-16138	-5.13
1990	257297	316475	2093	-1457	-0.46
1991	274502	323912	7437	3887	1.2
1992	283070	322700	-1213	-4763	-1.48
1993	306845	340598	17898	14348	4.21
1994	332695	359311	18713	15163	4.22
1995	357076	374930	15619	12069	3.22
1996	361910	369148	-5782	-9332	-2.53
1997	391771	391771	22623	19073	4.87
1998	433408	424740	32969	29419	6.93
1999	445488	427668	2929	-621	-0.15
2000	469082	436246	8578	5028	1.15

INCOME

Year	Value	Adj_Value	Change	Deviation	%Deviation
1969	119485	522149	0	0	0
1970	127557	526810	4661	-4388	-0.83
1971	141187	559101	32290	23241	4.16
1972	155706	596354	37253	28204	4.73
1973	171867	620440	24086	15037	2.42
1974	191926	623760	3320	-5729	-0.92
1975	210569	627496	3736	-5313	-0.85
1976	226723	639359	11863	2814	0.44
1977	237720	627581	-11778	-20827	-3.32
1978	263692	648682	21102	12053	1.86
1979	304566	673091	24409	15360	2.28
1980	346301	671824	-1267	-10316	-1.54
1981	375672	661183	-10641	-19690	-2.98
1982	385313	639620	-21563	-30612	-4.79
1983	403596	649790	10170	1121	0.17
1984	420584	647699	-2090	-11139	-1.72
1985	431020	642220	-5480	-14529	-2.26
1986	437810	639203	-3017	-12066	-1.89
1987	447630	693826	54624	45575	6.57
1988	465842	633545	-60281	-69330	-10.94
1989	484953	625589	-7956	-17005	-2.72
1990	517285	636261	10671	1622	0.25
1991	546262	644589	8329	-720	-0.11
1992	572771	652959	8370	-679	-0.1
1993	607550	674381	21422	12373	1.83
1994	631588	682115	7735	-1314	-0.19
1995	682212	716323	34208	25159	3.51
1996	701443	715472	-851	-9900	-1.38
1997	751431	751431	35959	26910	3.58
1998	803357	787290	-35859	26810	3.41
1999	831033	797792	10502	1453	0.18
2000	872800	811704	13912	4863	0.6

EMPLOYMENT

Year	Value	Change	Deviation	%Deviation
1969	16484	0	0	0
1970	16320	-164	-339	-2.08
1971	16247	-73	-248	-1.53
1972	16973	726	551	3.25
1973	17514	541	366	2.09
1974	17614	100	-75	-0.43
1975	17472	-142	-317	-1.81
1976	17975	503	328	1.82
1977	17690	-285	-460	-2.6
1978	17660	-30	-205	-1.16
1979	18145	485	310	1.71
1980	18732	587	412	2.2
1981	18493	-239	-414	-2.24
1982	17976	-517	-692	-3.85
1983	17887	-89	-264	-1.48
1984	17883	-4	-179	-1
1985	17507	-376	-551	-3.15
1986	16988	-519	-694	-4.09
1987	16355	-633	-808	-4.94
1988	17462	1107	932	5.34
1989	17326	-136	-311	-1.79
1990	17417	91	-84	-0.48
1991	17587	170	-5	-0.03
1992	17409	-178	-353	-2.03
1993	18139	730	555	3.06
1994	19337	1198	1023	5.29
1995	19949	612	437	2.19
1996	20476	527	352	1.72
1997	21299	823	648	3.04
1998	21941	642	467	2.13
1999	21771	-170	-345	-1.58
2000	22072	301	126	0.57

POPULATION

Year	Value	Change	Deviation	%Deviation
1969	45607	0	0	0
1970	45782	175	246	0.54
1971	45596	-186	-115	-0.25
1972	46269	673	744	1.61
1973	46089	-180	-109	-0.24
1974	45704	-385	-314	-0.69
1975	46607	903	974	2.09
1976	46460	-147	-76	-0.16
1977	45629	-831	-760	-1.67
1978	44405	-1224	-1153	-2.6
1979	43728	-677	-606	-1.39
1980	43949	221	292	0.66
1981	44026	77	148	0.34
1982	44187	161	232	0.53
1983	44340	153	224	0.51
1984	43665	-675	-604	-1.38
1985	42936	-729	-658	-1.53
1986	42419	-517	-446	-1.05
1987	41668	-751	-680	-1.63
1988	40828	-840	-769	-1.88
1989	40607	-221	-150	-0.37
1990	39872	-735	-664	-1.67
1991	39725	-147	-76	-0.19
1992	39876	151	222	0.56
1993	40349	473	544	1.35
1994	41061	712	783	1.91
1995	41957	896	967	2.3
1996	42475	518	589	1.39
1997	42951	476	547	1.27
1998	43064	113	184	0.43
1999	43341	277	348	0.8
2000	43348	7	78	0.18

***** End of Report *****
 ***** End of Report *****

APPENDIX H

Response to Comments

Response to Comments

This appendix contains the comments submitted to the U.S. Army (Army) on the *Pinon Canyon Maneuver Site (PCMS) Transformation Draft Environmental Impact Statement (DEIS)* and presents the Army's responses to those comments. The Army prepared the Transformation DEIS in accordance with the Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) (Title 40 of the Code of Federal Regulations [CFR] 1500-1508) and the Army's NEPA-implementing regulations (32 CFR 651). These procedures and regulations provide for a period of public comment on a DEIS prior to the publication of a Final EIS (FEIS).

The Notice of Availability (NOA) of the *PCMS Transformation DEIS* was published in the *Federal Register* on October 13, 2006 (71 FR 60509). The NOA provided for a 45-day public comment period (from October 13 to November 27, 2006), which is in accordance with NEPA regulations [40 CFR 1506.10(c)]. On December 1, 2006, in response to public and elected officials' requests, the Army subsequently extended the public comment period for the *PCMS Transformation DEIS* by an additional 45 days (to January 11, 2007) (71 FR 69652). Additionally, on February 2, 2007, the Army announced another extension of the comment period (72 FR 5049) for the *PCMS Transformation DEIS* in response to requests by elected officials. The additional extension was made because severe weather in southeastern Colorado could have prevented local residents from sending comments to the Army before the close of the second comment period. The comment period for the *PCMS Transformation DEIS* ended on February 16, 2007. The Army has determined that both the original and the extended comment periods were sufficient for the public to review the *PCMS Transformation DEIS*.

The Army held three public meetings to receive comments on the *PCMS Transformation DEIS*, as described in Section 1.4 of the *PCMS Transformation FEIS*. Meetings were held in Fountain (near Colorado Springs), Trinidad, and La Junta on November 1, 2, and 3, 2006, respectively. Approximately 1,000 people attended these meetings, and 86 chose to provide oral comments.

During the public comment period, approximately 5,000 individual comments were received. All comments that were received have been considered in preparing the *PCMS Transformation FEIS*.

Section H.1 presents a set of five Master Responses to issues that were raised commonly in the comment letters. Section H.2 includes a discussion and copies of each form letter received on the *PCMS Transformation DEIS*. Copies of all individual comment letters submitted to the Army on the *PCMS Transformation DEIS* and the Army's responses to those letters are presented in Section H.3. Cross-references to the Master Responses are provided in the responses to the individual comments when the comment is representative of numerous other similar comments received on the *PCMS Transformation DEIS* and the responses noted in the Master Responses are applicable. The format of the response to individual comments is further described in Section H.3.

H.1 Master Responses

To aid decision makers and the reviewing public, Master Responses have been developed to address the comments made on the *PCMS Transformation DEIS*. The intent of the Master Responses is to provide background and concise responses on each of the commonly raised issues to support the more specific responses included in the “Response to Individual Comments” (Section H.3). These Master Responses supplement, but do not replace, specific responses to the individual comments submitted and are not intended to address every issue raised in individual letters.

Master Responses to the following issues are presented in this section of the *PCMS Transformation FEIS*:

- Potential expansion of the PCMS (Section H.1.1)
- Segmentation of the PCMS and the Fort Carson Transformation Proposed Actions (Section H.1.2)
- Segmentation of the PCMS Transformation Proposed Action and the Potential Expansion Action (Section H.1.3)
- Number of Alternatives Considered (Section H.1.4)
- Requests to Extend the *PCMS Transformation DEIS* Public Comment Period (Section H.1.5)

Many of the Master Responses are linked and, therefore, must be considered as a group to gain the full context of the Army’s responses to the substantive and common issues raised. For example, many people commented on segmentation, the number of alternatives, and PCMS expansion in ways that interrelate, particularly in the context of the issue of possible future expansion of the PCMS.

H.1.1 Expansion of the PCMS

H.1.1.1 Summary of Comments

The Army received many comments on the potential acquisition of land around the PCMS stating that the Army is moving forward with expanding the boundaries of the PCMS and that expansion should have been evaluated in some context in the *PCMS Transformation DEIS*, including as part of the Transformation Proposed Action; as an alternative to the Transformation Proposed Action; or as an action subject to cumulative analysis.

Commenters state that existing Army documents discuss potential expansion and that these documents demonstrate the need to include expansion as an alternative or as part of the Transformation Proposed Action. Some of these same commenters state that expansion should be addressed as a reasonably foreseeable future action subject to cumulative impact analyses. In addition, several comments have been made that the Army ignored the public’s vital role in the scoping process.

Numerous other comments express general opposition to potential expansion of the PCMS. The general opposition is noted in this Transformation FEIS. Thousands of form letters

registering opposition to the expansion of the PCMS are discussed in Section H.2. Other opposition comments note possible direct and indirect impacts of military training on an expanded PCMS (e.g., to Picketwire Canyon). As discussed below, the Transformation Proposed Action of the *PCMS Transformation DEIS* does not include expansion. Expansion will be addressed in a separate EIS.

During the DEIS public comment period, the Department of Defense (DoD) has made decisions relevant to the waiver on land acquisition around the PCMS. This Master Response provides an update on these recent decisions.

H.1.1.2 Army's Response

The Army recognizes that many people and agencies in southeastern Colorado and elsewhere are concerned about the Army's potential expansion of the PCMS. The significant attendance at public meetings and the numerous written and oral comments received regarding expansion are testament to the importance of this issue to members of the community, particularly those who live in the proximity of possible PCMS expansion. The Army was particularly impressed with the number of young people who chose to become involved and speak and/or provide written comments related to the potential expansion. As discussed throughout these Master Responses and in the individual comment responses, the Army understands the public's historical and future concerns about possible land expansion for the PCMS.

In responding to the many comments on this issue, it is important to explain and provide an update on the Army's major land acquisition conceptual planning activities and decisions, as well as to explain why expansion is not part of the Transformation Proposed Action, is not in the range of reasonable alternatives for the Transformation EIS, and is not an action subject to cumulative assessment in the Transformation EIS.

On the basis of comments received on the *PCMS Transformation DEIS* and on recent DoD decisions relevant to expanding the PCMS, the Army has revised the *PCMS Transformation FEIS* to update the discussion of land acquisition and potential expansion of the PCMS. In particular, Sections 1.3.3, 1.4.4, 2.1.3, 2.4.2, 3.13.2, and the Executive Summary of this FEIS have been revised to clarify in more detail the issue of land expansion at the PCMS and its relationship to the Transformation Proposed Action. It should be noted that none of the modifications or clarifications to the *PCMS Transformation DEIS* changes the findings of environmental impacts or mitigations included in the *PCMS Transformation DEIS*.

Update on Major Land Acquisition Conceptual Planning and Decisions

Several recent DoD decisions are discussed below in the context of how these decisions affect the *PCMS Transformation DEIS*. The issues are 1) the major land acquisition process, 2) Army planning to support the major land acquisition waiver request, and 3) the processes to initiate an expansion EIS.

Major Land Acquisition Process. In 1990, the Deputy Secretary of Defense imposed a moratorium on the acquisition of land by the military departments. Under this policy, any land acquisition involving more than 1,000 acres or costing more than \$1.0 million requires the prior approval of the Office of the Secretary of Defense (OSD). This moratorium was reaffirmed on November 17, 2002, and the OSD delegated approval to the USD (AT&L). Department of Defense (DoD) Instruction 4165.71 (January 6, 2005) incorporates this policy

into DoD regulation and provides that such land acquisitions require approval of the USD (AT&L) for any public announcement; request for proposals; notice of intent to perform environmental analysis; request for legislation or budget line item; press release; or other official notice.

Subsequent to the release of the *PCMS Transformation DEIS* in October 2006 (and prior to the release of this *PCMS Transformation FEIS*), the Under Secretary of Defense (Acquisition, Technology, and Logistics) [USD (AT&L)] approved a waiver request to allow the Army to “begin the Real Estate Planning Report and the Environmental Impact Study including the Environmental Baseline Study” for acquisition of approximately 418,000 acres of land around the PCMS (U.S. Army, Major Land Acquisition Moratorium Request, February 7, 2007).

Now that the waiver has been approved, the Army is formulating a Notice of Intent (NOI) for an EIS. The NOI is the first step in the NEPA process, and it must contain a description of the proposed action and alternatives to the proposed action.

Once the NOI is completed, it will be published and followed by the entire EIS process, which will undoubtedly be lengthy, culminating in the signing of a Record of Decision (ROD). Even then, though, the Army cannot by law (10 United States Code [U.S.C] 2676) purchase any property unless the acquisition is expressly authorized by Congress. As noted in Army Regulation 405-10 (Acquisition of Real Property and Interests Therein), “[w]hile the Federal Government has the inherent power to acquire land for its constitutional purposes, this power can be exercised only at the discretion of Congress.”

Army Planning to Support the Major Land Acquisition Waiver Request. It is important to understand the process and context for the lengthy preliminary planning that is necessary to obtain approval to develop a proposed action and alternatives for land acquisition and issue an NOI for an EIS. The Army is a hierarchical organization that requires chain-of-command approval before any major action can be initiated. The additional restrictions on major land acquisitions further delay the development of a Proposed Action or alternatives.

The Army, at the installation level, has prepared several documents required as part of the major land acquisition process to inform the Department of the Army of the need for and feasibility of expanding the PCMS, and general ways in which to optimize future use of the PCMS for meeting its mission training requirements. This preliminary planning does not comprise a binding commitment to purchase lands adjacent to the PCMS. None of the preliminary planning documents commits any resources to implementation, and all the documents recommend additional study.

Preliminary planning identifying considered shortfalls of training lands at the PCMS and Fort Carson sites began prior to 2003 with the Revision to Section 7 of Fort Carson’s *Range and Training Land Program Development Plan* (2003 Plan). From 2003 to 2007, Fort Carson continued to prepare documents to demonstrate the need to expand the PCMS and satisfy the requirements of the major land acquisition waiver request. These documents were forwarded through the Army’s and DoD’s chain of command, as summarized below.

- In 2003, Fort Carson completed an analysis of its training lands and identified a potential shortfall of training lands at PCMS and Fort Carson, as described in the Revision to Section 7 of Fort Carson’s *Range and Training Land Program Development Plan*.

- In May 2004, Fort Carson expanded on the analysis of the 2003 Plan and completed an *Analysis of Alternatives Study* (AAS) (May 6, 2004) to “provide the documentation necessary for review and concurrence [emphasis added] from Forces Command, the Department of the Army, and others concerning the acquisition of training land to expand the PCMS.”
- In April 2005, Fort Carson completed a *Land Use Requirements Study* (LURS) and another AAS (both dated April 12, 2005).
- The purpose of the LURS, as articulated in the study, is to “assist the installation commander in assessing the available training land [emphasis added] on PCMS and provides a basis for the installation to prepare to acquire more land. The study provides the documentation necessary for review and concurrence [emphasis added] from Forces Command, the Department of the Army, and others concerning the acquisition of training land to expand the PCMS.”
- The 2005 AAS restates the purpose of the LURS to provide “a basis for the installation to prepare” for land acquisition and provide documentation for approval by higher headquarters. The AAS concludes with these recommendations: “It is recommended that Fort Carson pursue the land acquisition process by seeking HQDA [Headquarters, Department of the Army] approval of this AAS document [emphasis added]. The document also recommends that Fort Carson begin to scope the environmental and Real Estate Planning Report requirements [emphasis added] to determine what method the installation will use to produce these documents, what costs are involved, and how Fort Carson will meet these costs if HQDA approves the acquisition plan.”

These documents were forwarded to the HQDA and eventually the USD (AT&L) for “review and concurrence” that land acquisition is an action worthy of consideration. Between 2004 and 2006, the Army hosted several meetings with landowners and other interested parties in the area to discuss the Army’s desire to expand the PCMS. Although the Army did not (and does not) have a specific plan for land acquisition, Fort Carson made its intentions clear (as well as the circumstances required for internal approval to initiate consideration of the action).

In February 2007, approximately 4 years after the first internal publication assessing potential expansion of the PCMS, a waiver to the land acquisition moratorium was granted allowing the Army to move forward with an EIS (and other studies). None of the preliminary planning activities commits the Army to a course of action for land acquisition.

As noted previously, a major land acquisition requires many steps before the actual acquisition process could begin. These steps include substantial pre-planning to support conceptual approval; development and refinement of a specific proposed action and alternatives to the action; completion of substantial environmental baseline studies; preparation and public review of an EIS; completion of Real Estate Planning Report; congressional approval; and landowner negotiations. The Army has completed only the first step, which is planning to support the conceptual approval to begin more detailed study of expansion of the PCMS.

Processes to Initiate an Expansion EIS. The waiver approval means that expansion can be further analyzed under NEPA, and the Army has committed to prepare an EIS to evaluate expansion of the PCMS. This commitment was also made in the *PCMS Transformation DEIS*. As discussed in Section 1.1 of the *PCMS Transformation DEIS*, “[t]he Army is assessing the potential need for expanding the PCMS...Should a decision be made to expand the PCMS, it would be evaluated through a separate NEPA process.” Section 2.4.2 of the *PCMS Transformation DEIS* expands the discussion about expansion as a potential alternative to the PCMS Transformation Proposed Action.

The Army’s waiver request, its approval, and other early planning processes are in compliance with the requirements of the moratorium on major land acquisitions and Army NEPA regulations. As noted previously, the moratorium on major land acquisition prohibits the Army from initiating an NOI without the waiver approval. According to the Army’s implementing regulations for NEPA outlining the steps the Army must follow in the EIS process (32 CFR 651.45), the process begins with the NOI. The NOI “shall clearly state the Proposed Action and alternatives, and state why the action may have unknown and/or significant environmental impacts” [32 CFR 651.45(2)]. At this early stage of the planning process for an expansion EIS, neither the description of the Proposed Action nor the alternatives to expansion have been defined; therefore, the Proposed Action and alternatives cannot be “clearly stated” as required for issuance of an NOI.

As discussed above, the preliminary studies conducted by the Army focused on the need for expansion – not the decision to proceed with expansion or even the definition of the Proposed Action for expansion. The Army has “determined conceptually that the purchase of private lands and the transfer of public lands in areas surrounding and contiguous to the PCMS provided the best option for increased training.” (See U.S. Army, Major Land Acquisition Moratorium Request, February 7, 2007. The Army’s determination facilitated the request for the waiver, thus allowing the Army to initiate the NEPA process considering expansion.

The Army specifically recognizes that land acquisition “will take years,” and the Army “is approaching the effort with a detailed campaign plan that methodically addresses the process” (U.S. Army, *PCMS Land Use Requirements Study, Fort Carson, Colorado, April 12, 2005*). In the preliminary feasibility reports, the Army acknowledges that “[s]ubsequent acquisition will focus on acquiring contiguous parcels or portions of parcels based on available funding, willingness of sellers, and the ability of the land to assimilate and use the new land for training as quickly as possible” (U.S. Army, *PCMS Land Use Requirements, Fort Carson, Colorado, April 12, 2005*). The Army clearly is focusing on a process for defining whether expansion is needed and, if so, what the overall planning process will be for moving forward to define and evaluate a Proposed Action for expansion (e.g., if, how, when, and where expansion might occur).

Given the recent decision to proceed with development of a Proposed Action for expansion, the Army will conduct a separate environmental review under NEPA, including analysis of the impacts of that action on the Army’s mission and the resources that would be affected by such an action. The process of developing a Proposed Action and initial set of alternatives for land acquisition has not been accomplished. The Army’s initial reviews of the potential need for expanding the PCMS are pro forma activities conducted to evaluate the potential for such a Proposed Action – they do not constitute a commitment to such a

course of action nor do they provide the level of detail needed to define a Proposed Action for an EIS. The Army's approval of the waiver request to consider land acquisition triggered the need for a new EIS to assess the impacts of expansion. Although the decision has now been made to initiate an EIS to assess expansion, neither a Proposed Action nor a set of reasonable and feasible alternatives has been developed. Approval has been given only to begin real estate planning and initiate an EIS and environmental baseline study.

As noted in the waiver approval, members of Congress have introduced legislation focusing on purchases from willing sellers, and the Army has committed to working with willing sellers and developing a Proposed Action that is defined via phased acquisition. The Proposed Action identified by the Army and the alternatives to that Proposed Action will be evaluated in detail in an EIS that will include an analysis of social, economic, and environmental effects of the proposed expansion. The expansion EIS will also evaluate the cumulative effects that could result from expansion in combination with the transformation analyzed in the *PCMS Transformation DEIS*.

Expansion is Not Part of the PCMS Transformation Proposed Action

Expansion of the PCMS is not part of the Transformation Proposed Action. As stated in the *PCMS Transformation DEIS*, the Transformation Proposed Action incorporates modifications to training requirements in ways that best meet training needs (see Section 2.2.4.2) and can be implemented as a stand-alone action (i.e., troop realignment, training, and construction) that does not require expanding PCMS's boundaries. That is, land acquisition is not necessary or proposed to implement the Proposed Action in the *PCMS Transformation EIS*.

As discussed in Chapter 2.0 of the *PCMS Transformation DEIS* and in the Master Response below on the "Number of Alternatives Considered," the Transformation Proposed Action comprises modifications to the training mission in ways that best meet the Army's needs relevant to troop realignment, including modified training and construction to accommodate the mission. For the PCMS, these activities that comprise the Transformation Proposed Action can be implemented as independent, stand-alone activities within the existing PCMS boundary. That is, land acquisition for potential expansion is neither necessary nor proposed for implementing the Transformation Proposed Action because this Proposed Action can proceed independently of potential expansion.

Given the fact that the Transformation Proposed Action, as described above and in Chapter 2.0 of the *PCMS Transformation DEIS*, can proceed without expanding the boundaries of the PCMS, it is appropriate for the Army to analyze the impacts of the Transformation Proposed Action as described in the *PCMS Transformation DEIS*. The independent nature of the Transformation Proposed Action does not mean, however, that land acquisition will not be considered as a separate Proposed Action subject to evaluation in a separate EIS. (See "Update on Major Land Acquisition Conceptual Planning and Decisions" above.) The *PCMS Transformation DEIS* focuses on the Transformation Proposed Action of modified training and limited construction at the PCMS to best accommodate the Army's mission. Although the Army has conducted preliminary reviews of the potential merits of future land acquisition at the PCMS (see "Army Planning to Support Major Land Acquisition Waiver Request" above), the modified training and limited construction under the *PCMS Transformation DEIS* can occur independently of possible land acquisition. Expansion is not part of the PCMS Transformation Proposed Action, which considers the

stand-alone action of modified training and limited construction at the PCMS to accommodate transformation.

The DoD waiver does not authorize acquisition of lands to expand the PCMS— such a decision would not be made until after the NEPA process is complete and a ROD is signed. If expansion or other alternatives do not proceed (i.e., no ROD is signed), the Transformation Proposed Action for the *PCMS Transformation DEIS* could remain the course of action to meet long-term training needs and, therefore, is an action independent of possible expansion.

Expansion is Not an Alternative to the PCMS Transformation Proposed Action

The need for transformation as discussed in the *PCMS Transformation DEIS* is immediate. As discussed in Chapter 2.0 of the *PCMS Transformation DEIS*, transformation activities are mandated by the Base Realignment and Closure (BRAC) Program (and other Army initiatives) and will occur independent of potential expansion. Expansion is not a reasonable alternative to the Proposed Action for the PCMS transformation because the information for necessary analysis under NEPA cannot be gathered, categorized, and analyzed to support implementation of expansion in time to meet the training needs of the additional Soldiers arriving at Fort Carson who must train at the PCMS.

Expanding the PCMS is a complex issue requiring focused analysis and adequate public forums for considering alternatives. Developing the Proposed Action and alternatives for a separate EIS, describing and characterizing lands for potential expansion, and evaluating the impacts of expansion will likely be a lengthy process to ensure that analysis is thorough and that public input is considered and addressed. Because of the immediate need for implementing the transformation actions, expansion is neither a reasonable component of the *PCMS Transformation DEIS* Proposed Action nor a reasonable and feasible alternative to it.

The discussion of expansion in the DEIS under Section 2.4.2, “Alternatives Considered but Dismissed,” has been supplemented to reflect the waiver decision and clarify the rationale for not evaluating expansion as an alternative to the *PCMS Transformation DEIS*. (Also see the Master Responses, below, “Segmentation of the PCMS Transformation and Potential Expansion Actions” and “Number of Alternatives Considered.”)

Cumulative Analysis of the Separate Transformation and Expansion Actions

Numerous comments noted that expansion should be evaluated in the *PCMS Transformation EIS* as a reasonably foreseeable future action with the potential to contribute to cumulative environmental impacts. As discussed in Section 3.13 of the *PCMS Transformation DEIS*, past and present impacts of other actions on the PCMS site are part of the environmental baseline or included in the analysis of the Transformation Proposed Action evaluated in the *PCMS Transformation DEIS*. As discussed above in this Master Response, land acquisition for expansion is a future action that could occur, but the determination of if, how, when, and where such an expansion could occur is contingent on numerous studies, processes, and public discussions that are likely to require several years of consideration. The EIS for potential expansion has not yet been initiated, and a description of such a Proposed Action has not yet been defined.

For the purposes of the *PCMS Transformation EIS* cumulative analysis, the expansion action is at such a preliminary stage (i.e., no Proposed Action has been developed, no NOI to prepare an EIS has been published in the *Federal Register*, no EIS has been initiated) that effective cumulative analysis of such an action is not reasonable or feasible. Specifically, a Proposed Action has not yet been defined; and without defining a Proposed Action for expansion, it would be too early to speculate on what the impacts of expansion would be or how they might contribute to cumulative impacts when combined with the Transformation Proposed Action. The Army has indicated that it will prepare an EIS, but such environmental review and possible future implementation of an expansion alternative will be a long-term process. Because of the numerous steps and approvals that are required to implement a major land acquisition, the action is still speculative even though an EIS will be initiated.

As the expansion EIS is developed, the transformation activities at the PCMS will be evaluated as “other actions” in that EIS relevant to assessing cumulative impacts. The *PCMS Transformation DEIS* (see Section 3.13) has been clarified to note that any future EIS on expansion would include the PCMS transformation actions in the cumulative impacts analysis, but that the definition of a Proposed Action for expansion is so preliminary as to exclude meaningful analysis. Section 1.3.2 of the *PCMS Transformation DEIS* specifically acknowledges that “this EIS may be used as a basis on which to tier subsequent environmental documentation for currently unforeseen future actions proposed in the mission.” The *PCMS Transformation EIS* will be relied upon to provide impact analyses for the expansion EIS’s cumulative impact analysis.

Section 3.13 of the *PCMS Transformation DEIS* has been updated to reflect the waiver decision and include the rationale for not conducting a detailed cumulative analysis of the potential effects of transformation combined with expansion.

The *PCMS Transformation DEIS* Public Scoping Meetings and Expansion

The Army recognizes that many people in southeastern Colorado are concerned about the Army’s activities at the PCMS, including the issue of the potential for future expansion of the PCMS’s boundaries. The Army is sensitive to the large number of local landowners and residents who expressed this concern, including many long-time residents who live and work on ranches, many of which have been in their families for generations. The Army understands the pride of heritage of many residents, including ranchers and family members who value their way of life and are worried about changes that might occur if expansion of the PCMS proceeds.

As discussed in Section 1.4 of the *PCMS Transformation DEIS*, the Army conducted several scoping meetings to obtain both public and agency comments prior to initiating the analysis of the Transformation Proposed Action. The Army held a PCMS scoping meeting for agencies and continued to meet with several state and federal agencies individually during the scoping period to obtain input on the Transformation Proposed Action. During the preparation of the *PCMS Transformation DEIS*, the Army also coordinated closely with local, state, and federal entities to ensure that issues of concern and relevance to the Transformation Proposed Action were considered. The Army held three public meetings to obtain comments on the Transformation DEIS subsequent to its publication. Nearly 1,000 people attended the meetings. The *PCMS Transformation FEIS* provides responses to the issues raised during the review period, which was extended from November 27, 2006, to

February 16, 2007, in order to accommodate public requests for an extended review period and the opportunity to provide additional comments on the Transformation DEIS. Approximately 5,000 comments were received during the public comment period.

The Army understands the public's concerns with expanding the PCMS. As discussed above in preceding Master Responses, however, this does not mean that land acquisition in anticipation of potential expansion is part of the Transformation Proposed Action or that the *PCMS Transformation EIS* is flawed or deficient because it does not include expansion as part of the Transformation Proposed Action or other component of the Transformation EIS. The Transformation Proposed Action was developed to provide maximum flexibility to meet the Army's training needs and must move forward independent of the possible expansion. Congress has directed that two major organizations come to Fort Hood by September 2011. The new training needs at the PCMS will occur before expansion can be planned and analyzed. Inclusion of expansion in the *PCMS Transformation EIS* would not allow the Army to meet the BRAC-related requirements.

The expansion-related comments received on the *PCMS Transformation DEIS* provide a solid foundation for the scoping process for the expansion EIS and are helpful to the Army in determining the scope of the significant issues that will need to be addressed in an expansion EIS. Most of the oral and written comments have merit; and the Army will consider them as it moves forward with the expansion EIS. The Army will also provide notice to interested persons of future meetings and opportunities for input on the expansion EIS.

Additional information on the extended opportunity for the public to provide comments on the *PCMS Transformation DEIS* is discussed in the Master Response in Section H.1.5, "Requests to Extend the *PCMS Transformation DEIS* Public Comment Period."

H.1.2 Segmentation of the PCMS and the Fort Carson Transformation Proposed Actions

H.1.2.1 Summary of Comments

Numerous comments state that preparing separate EISs for the PCMS and Fort Carson Transformation Proposed Actions constitutes improper segmentation under NEPA.

H.1.2.2 Army's Response to Comments Regarding Segmentation of the PCMS and Fort Carson Transformation Proposed Actions

As many of the commenters note, NEPA regulations [40 CFR 1508.25(a)] require that an agency should analyze "connected," "cumulative," and "similar" actions in the same EIS.

- "Connected actions" are those that automatically trigger other actions that may require EISs, cannot proceed unless other actions are taken previously or simultaneously, or are interdependent parts of a larger action and depend on the larger action for justification.
- "Cumulative actions" are those that when viewed with other actions proposed by the agency have cumulatively significant impacts and, therefore, should be discussed in the same EIS.

- “Similar actions” are those that when viewed with other reasonably foreseeable or proposed agency actions have similarities that provide a basis for evaluating their environmental impacts together, such as common timing or geography.

The Army made a reasoned decision to prepare two EISs simultaneously for the PCMS and Fort Carson Transformation Proposed Actions.

Cumulative and Similar Actions

Because Fort Carson and the PCMS are not located in proximity to one another and do not contain common geography, resources, or communities, the Transformation Proposed Actions neither have the potential to result in cumulatively significant impacts nor have a basis for evaluating environmental impacts together in the same EIS (i.e., they are not cumulative or similar actions). The potential for the two Transformation Proposed Actions to result in cumulative impacts was discussed in both the Transformation DEISs (see Sections 3.13 in both DEISs). (Also see the heading “Cumulative Analysis of the Separate Transformation and Expansion Actions” in the Master Response, “Expansion of the PCMS,” above).

Connected Actions

Although there are overlapping time frames and related actions for both the Transformation DEISs, the Army prepared two separate Transformation DEIS documents in recognition of the different geographies and variations in potential impacts of the Transformation Proposed Actions at the two sites.

The impacts of transformation initiatives are different at the two sites because of the different functions and responsibilities between Fort Carson and the PCMS. These differences are discussed in detail in Chapters 1.0 and 2.0 of both Transformation DEISs. (See specific references below.) Fort Carson is a Garrison with extensive permanent infrastructure to address the operations and training administration and support, and quality of life needs of soldiers and their families. The PCMS is an austere and geographically separate augmentation facility for Fort Carson, providing a venue for training that is not possible at Fort Carson.

The Army determined that because Fort Carson and the PCMS are geographically separate and involve a divergent set of environmental and social issues, the Transformation Proposed Actions merit separate consideration and analysis. Preparing two separate EIS documents allows the Army to focus on disclosing the impacts of the separate sites and aids agency and public reviewers in assessing environmental impacts that could occur at the different sites. To further aid the understanding of the Proposed Actions and allow reviewers to read and comment on both DEISs if they chose to do so, the Army has prepared the documents concurrently, in a similar format, and provided extensive cross-references between the documents to facilitate review and an understanding of the differences in Proposed Actions and impacts between the sites. Approval of the separate Transformation Proposed Actions at the two sites is also anticipated to be concurrent.

The idea of preparing two Transformation EISs was presented during the scoping meetings, which is the appropriate venue (under 40 CFR 1501.7) for an agency to determine the scope and issues to be studied. Agency scoping meetings on the two documents were conducted at each installation. At each of these meetings, the Army presented the idea that separate

EISs would be prepared for the Transformation Proposed Actions at both Fort Carson and the PCMS. Additionally, scoping notices and meeting notices were prepared and advertised in numerous papers with general circulation. All scoping and meeting notices jointly publicized the PCMS and Fort Carson activities. No comments were received during the scoping period or at any other time during the preparation of the Transformation DEISs that expressed opposition to separate analyses of the Fort Carson and the PCMS transformation activities.

Most importantly, the reason CEQ regulations are directed at avoiding segmentation is to prevent an action from being broken into component parts where the impacts of the parts analyzed separately would be less than the whole. Such an argument would, in the case of the PCMS and Fort Carson, result in understating the impacts of the combined actions at Fort Carson and the PCMS. This, however, is not the case for the Transformation DEISs because environmental impacts resulting from implementing the Transformation Proposed Actions at the two sites are not understated. The extent and magnitude of impacts are different (in accordance with the functions of the two sites). Both Transformation DEISs fully disclose and discuss the impacts of the Transformation Proposed Actions for each site and cross reference each other extensively to facilitate the reader's understanding of the actions. The analysis of increased training is discussed comprehensively in each of the Transformation DEISs, and the differences in the types of training that occur at the two sites are explained throughout both documents. In addition, the cumulative impact assessment in each Transformation DEIS recognizes that the other Proposed Action is one that is subject to being evaluated as a cumulative action (see Sections 1.1 and 1.2 of both Transformation DEISs). Examples of these issues and their locations in the relative documents are noted below.

- “Fort Carson will be discussed throughout this EIS because of the interrelationship between personnel stationing and training needs at Fort Carson and the PCMS. A separate EIS is being prepared to assess environmental impacts of implementing the three major Army transformation programs on Fort Carson. Fort Carson is discussed in this EIS in instances where doing so provides context for alternatives at the PCMS.” (page 1-1 of the *PCMS Transformation DEIS*)
- “The PCMS, which is located approximately 150 miles (mi) southeast of Fort Carson, is discussed in this EIS because of the relationship between training activities at Fort Carson and the PCMS. A separate EIS is being prepared to assess environmental and socioeconomic impacts of programs proposed for the PCMS facility. The PCMS is discussed in this *Fort Carson Transformation EIS* in instances where doing so provides context for alternatives at Fort Carson.” (page 1-1 of the *Fort Carson Transformation DEIS*)
- “The PCMS would provide training for units or activities that cannot be accommodated on Fort Carson because of its limited size.” (page 1-2 of the *Fort Carson Transformation DEIS*)
- “The PCMS supports large training exercises that cannot be accommodated on Fort Carson because of its size limitations.” (page ES-2 of the *PCMS Transformation DEIS*)
- “The PCMS would provide a venue for large-scale (for example, company, battalion, and Brigade Combat Team [BCT]) maneuvers for new and existing troops stationed at

Fort Carson. Fort Carson would be responsible for housing troops and supporting the needs of the Soldiers and their dependents, including Soldiers involved in training activities at the PCMS.” (page 1-2 of the *PCMS Transformation DEIS*)

- “Fort Carson can support the land-area requirements of platoon and limited company maneuver operations but does not have the contiguous maneuver acreage to support doctrinal battalion- or BCT-level training. Training projections for Fort Carson (which are being evaluated in a separate EIS) establish that Fort Carson can meet platoon-level maneuver requirements, but most company and all battalion and BCT maneuver training will be supported by the PCMS.” (page 1-6 of the *PCMS Transformation DEIS*)
- “Fort Carson can support the land-area requirements of platoon and limited company maneuver operations but does not have the contiguous maneuver acreage to support doctrinal battalion- or BCT-level training. The PCMS was established as a satellite area to support these training needs.” (page 1-6 of the *Fort Carson Transformation DEIS*)
- “[T]ransformational activities at the PCMS are evaluated in a separate EIS for that action. The PCMS is discussed in this EIS in the context of the function of the PCMS in supporting training of troops that cannot be accommodated on Fort Carson.” (page 2-1 of the *Fort Carson Transformation DEIS*)
- “[T]he transformation activities at Fort Carson are evaluated in a separate EIS. Fort Carson is discussed in this EIS because the PCMS is considered as part of Fort Carson for command and administrative responsibilities. Fort Carson is also the home station for all of the AC units that train at the PCMS, and it supports training for smaller units on its ranges.” (page 2-1 of the *PCMS Transformation DEIS*)
- **“Training and Maneuvers.** Provide for increased training activity for existing and new units stationed at Fort Carson....The PCMS is projected to support the majority of maneuver training requirements in excess of platoon-level operations.” (page 2-16 of the *Fort Carson Transformation DEIS*)

Although several commenters assert that the impacts at Fort Carson and the PCMS are understated by preparing separate EISs, commenters have not provided any examples of where such understated impacts can be found in the Transformation DEISs. The Army has comprehensively considered environmental impacts associated with the Transformation Proposed Actions at both sites and considered the potential for cumulative impacts to occur from implementation of the actions. Therefore, no change to the environmental analysis in either Transformation DEIS is required.

Also see the Master Response, “Expansion of the PCMS,” above, and “Segmentation of the PCMS Transformation Proposed Action and Potential Expansion Action,” below.

H.1.3 Segmentation of the PCMS Transformation Proposed Action and Potential Expansion Action

H.1.3.1 Summary of Comments

In addition to the numerous comments received generally relating to expansion (see Section H.1.1), additional comments specific to the need to address expansion as a connected action to the Transformation Proposed Action have also been received.

Commenters cite Army planning documents, public statements, and media reports that document the Army's desire to expand the PCMS and argue that the expansion of the PCMS is a major federal action that needs to be considered as part of the Transformation Proposed Action or as an alternative in the Transformation DEIS. Others state that the Army is segmenting the training and associated construction for implementing transformation from the future expansion of the PCMS. Also see Master Responses, "Expansion of the PCMS," and "Number of Alternatives Considered."

H.1.3.2 Army's Response

As noted in the Master Response, "Expansion of the PCMS," the *PCMS Transformation DEIS* Proposed Action does not include land acquisition, nor does it commit the Army to a future action of expansion. The implementation of transformation initiatives can and will be implemented whether or not the Army receives approval to expand the PCMS at a future date. It is not known at this time if or when expansion could become an agreed-upon future project component for the PCMS until a ROD is signed indicating that the Army has made a decision to move forward with implementation of a preferred alternative of expansion (see 40 CFR Sec. 1506.1), and Congress authorizes the acquisition of property (10 U.S.C 2676). The Army has not made any irrevocable commitment of resources for expansion; transformation can and should occur independent of expansion (i.e., it has independent utility and, as noted previously, the needs for transformation are immediate), expansion is not dependent on transformation, and approval of transformation will not force expansion to occur. Although Section 2.3.4.1 of the *PCMS Transformation DEIS* recognizes that the PCMS contains insufficient land to train to doctrinal standards, it also acknowledges options for both the Garrison Commander and unit commanders to optimize training given land constraints.

Although the Army has now received approval to move forward with an expansion EIS, an environmental baseline study, and a Real Estate Planning Study, the Proposed Action and the initial set of alternatives for expansion have not been developed. Not enough detail on the nature, location, extent, and amount of such expansion or an analysis of the feasibility of potential training lands has been identified; therefore, it is premature to evaluate expansion impacts because of the lack of information. Because the Proposed Action for the expansion has not been defined and many steps are necessary for expansion to occur, the action is still speculative and cannot be reasonably evaluated in the Transformation DEIS. As noted in the Master Response, "Expansion of the PCMS" (Section H.1.1), expansion is not part of the Transformation Proposed Action, is not a reasonable alternative to the Transformation Proposed Action, and is not a reasonably foreseeable action that can be evaluated in the Transformation EIS.

As discussed above, the PCMS and Fort Carson actions are not connected actions under NEPA. In addition, the PCMS transformation and possible future expansion of the PCMS are not connected actions under NEPA. Transformation changes at the PCMS and expansion of the PCMS are not independent parts of a larger action. Rather, they have totally independent utility. As discussed above, planning for expansion began before the BRAC Commission's recommendations were released. The action was being considered well before transformation actions were directed by Congress and by other initiatives. At the same time, the BRAC Commission did not consider expansion of the PCMS in determining whether to send units from Fort Hood to Fort Carson. In fact, it determined that the move

would be appropriate even if training acreage at the PCMS were not included in the calculations. Transformation does not create the shortfall in training land that is the core of the need behind the proposal to expand the PCMS.

The Army recognizes that expansion is a critical issue for local residents. The action being evaluated in the *PCMS Transformation DEIS* (that is, facility construction and increased training frequency within the existing PCMS boundary) is separate from the possible future action to expand the PCMS's boundaries by procuring additional properties. Implementing the Transformation Proposed Action does not preclude or exclude future alternatives for other projects.

Please also refer to, "Expansion Is Not Part of the PCMS Transformation Proposed Action" in the "Expansion of the PCMS" Master Response in Section H.1.1.

H.1.4 Number of Alternatives Considered

H.1.4.1 Summary of Comments

Comments have been made that the Army did not consider a reasonable range of alternatives because it considered only the Proposed Action and the No Action Alternative. Other commenters state that the alternatives considered but not carried forward for detailed analysis (as described in Sections 2.4.1, 2.4.2, and 2.4.3 of this *PCMS Transformation FEIS*) should have been analyzed in detail in the *PCMS Transformation DEIS*.

H.1.4.2 Army's Response

This Master Response comprises three parts:

1. Description of the NEPA requirements for alternatives analysis under the CEQ regulations generally and BRAC actions specifically.
2. Clarification on what the Proposed Action includes and how it was developed to meet NEPA requirements, including meeting the Purpose and Need for the action, as described in Chapter 1.0 of this *PCMS Transformation FEIS*.
3. Discussion of the number of alternatives evaluated in the *PCMS Transformation DEIS*.

NEPA Requirements for Alternatives Analysis

The CEQ regulations implementing NEPA require that agencies preparing EISs shall adopt procedures to ensure that decisions are made in accordance with the policies and purposes of NEPA. For alternatives, the regulations require that "the alternatives considered by the decision maker are encompassed by the range of alternatives discussed in the relevant environmental documents and that the decision maker consider the alternatives described in the environmental impact statement" [40 CFR 1505.1(e)]. Furthermore, the CEQ regulations require that agencies assess in an EIS "all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" (40 CFR 1502.14).

The CEQ's NEPA regulations do not, however, prescribe a specific number of alternatives determined to be a reasonable range of alternatives. In Question 2 of the CEQ's "40 Frequently Asked Questions," the CEQ clarifies that "[w]hat constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case."

In the case of the *PCMS Transformation EIS*, Congress limited the scope of NEPA for BRAC actions to exempt stationing decisions from alternatives analysis under NEPA. Under the DoD's Base Closure and Realignment Act of 1990, NEPA shall apply to the DoD only "(i) during the process of property disposal, and (ii) during the process of relocating functions from a military installation being closed or realigned to another military installation after the receiving installation has been selected but before the functions are relocated." [Public Law 100-526, Section 2905 (c)(2)(A)(ii)] The PCMS Transformation EIS has been prepared in accordance with part (ii) of that law regarding relocating functions of a military installation. Under the Act, the DoD is not required to consider alternative military installations in the conduct of implementing NEPA. Section 2905 (c)(2)(B)(iii) of Public Law 100-526 states that "the Secretary of Defense and the Secretary of the military departments concerned shall not have to consider...military installations alternative to those recommended or selected." These provisions limited the alternatives that might otherwise have been considered. The BRAC Commission recommended that units move from Fort Hood to Fort Carson and also took into account the permanent stationing of the Brigade that move to Fort Carson from overseas. The BRAC Commission took into account the PCMS acreage in its independent analysis of whether the Fort Hood units should come to Fort Carson.

Mission Needs and Factors that Define the Proposed Action

It is important to preface the discussion of what comprises a reasonable range of alternatives by discussing the transformation objectives, as outlined by the Army's restrictions on implementing BRAC decisions. Because the realignment to Fort Carson is not subject to an alternatives analysis, it restricts the Army's options regarding phased or limited execution of the Transformation Proposed Action (although the timing of restationing is phased over the 5-year implementation period, as noted in Section 2.3 of the *PCMS Transformation DEIS*). The "reasonable range" of alternatives considered under a BRAC action can be developed consistent with the Purpose and Need, which is to implement a defined program; the range of alternatives to meet the Purpose and Need applies only to the spectrum of reasonable implementation scenarios of the prescribed action (i.e., the BRAC recommendations).

In the context of the restrictions on alternatives analysis under the BRAC Program and the need to respond to changing conditions (which are discussed in detail in Section 2.3 of the *PCMS Transformation DEIS* and summarized below), the Transformation Proposed Action was developed to accommodate maximum flexibility for implementation, even if installation commanders do not adopt the most intensive mission training strategy available to them. As discussed in detail in Section 2.3 of the *PCMS Transformation DEIS*, "[t]he Proposed Action incorporates the need to balance maneuver training, live firing, and environmental management to meet the Army's integrated goals of maintaining military training readiness and sustaining lands for continued use." The factors that influence the Transformation Proposed Action implementation (as discussed in detail in Section 2.3 of the *PCMS Transformation DEIS*) are Combat Readiness, Staged Restationing and Transformation of Units, and the Timing of Construction Projects. The first two factors (Combat Readiness and Staged Restationing) support the flexibility needed for the Army to implement the Transformation Proposed Action and the development of a single-action alternative. As a result, the Transformation Proposed Action accommodates the alternative ways in which the Army trains for readiness.

Regarding combat readiness, military commanders and land managers need to maintain flexibility in managing training needs to ensure combat readiness. Because training at the PCMS would occur at various frequencies and for varying periods, the Transformation Proposed Action must be defined in a way that maximizes the ability of commanders and managers to vary the training and the landscape conditions to meet combat readiness, as described in Section 1.2 of the *PCMS Transformation DEIS*. Specific training scenarios would only be known after training needs are evaluated in the real-world context of identified needs (based on when troops are realigned to Fort Carson during the implementation period) and the assessment of land conditions and sustainability. On the basis of the need for maximum flexibility, the Transformation Proposed Action includes the potential that an intensive level of training could occur over broad geographic areas or not at all. The “worst-case” condition is bounded by the Army’s requirements to sustain training lands for continued use and its need to balance training requirements and land sustainability as described in Chapter 1.0.

The Transformation Proposed Action maximizes training and the need to sustain the training areas for continued use. Under the Transformation Proposed Action, the Garrison Commander, with input from the G-3; Director of Public Works; Directorate of plans, training, and mobilization Range Division; and Directorate of Environmental Compliance and Management, would approve training schedules at the PCMS to maximize troop readiness. It is recognized that maximizing troop readiness under the Transformation Proposed Action must be balanced with land use sustainability. Examples of decisions that could be made to address land constraints include reducing the size of the areas used for training (that is, maneuver boxes), reducing the duration of training exercises, alternating unit readiness by training less than all of the four BCTs, or a combination of these. All these optional ways of meeting the Purpose and Need are incorporated into the description of the Transformation Proposed Action.

On the basis of the need to meet mission readiness goals and to consider sustainability, the Transformation Proposed Action describes training activity as a process by which the Army would monitor and respond to changing conditions to sustain the land for training and provide maximum troop readiness. That process is characterized by incorporating flexibility required to accomplish mission training and balance land use sustainability in the definition of the Transformation Proposed Action. A comprehensive Transformation Proposed Action that encompasses the full range of ways in which the mission could be achieved is more realistic and reflective of the way that transformation can and will be implemented. Defining separate alternatives that would address component features of the Transformation Proposed Action would compromise the Army’s ability to meet its mission needs and address sustainability; doing so would either be redundant of the Proposed Action description or would not meet the defined Purpose and Need. The selection of a single preferred alternative could result in a range of unsatisfactory options for meeting the Army’s mission requirements. For example, selecting an alternative defined by limited training and support facilities could preclude a viable way to achieve the Army’s mission. Conversely, selecting a training alternative that prescribed greater intensity of training activities than required at a given time could result in unnecessary environmental impacts. Artificial creation of alternatives in this situation would not serve the public or the Army well.

Other Alternatives Considered

Other alternatives considered by the Army but determined to be not feasible are described in Sections 2.4.1, 2.4.2, and 2.4.3 of the *PCMS Transformation DEIS*. Also see “Expansion Is Not an Alternative to the PCMS Transformation Proposed Action” in the “Expansion of the PCMS” Master Response [Section H.1.1] for additional discussion of expansion as an alternative to the PCMS Transformation Proposed Action.

Section 2.4.1, “Train Troops at Other Locales,” addresses the potential of training troops at other locations. Numerous comments suggest this is a reasonable alternative and should be considered in the Transformation DEIS. Most of the comments on this issue, however, focus on a comparison of training at an expanded PCMS (which is not part of the Transformation Proposed Action – see H.1.1, “Expansion of the PCMS” above) with training at other locations. That is, the comments state that rather than expanding the PCMS boundary through land acquisition, the Army should consider training at other sites in the United States. The Transformation Proposed Action, however, is to increase training within the existing PCMS boundary – it is not to expand the boundaries of the PCMS. In addition, training outside the home station (rather than maximizing the potential for training at the existing PCMS) was determined not to be feasible because no other locations have sufficient capacity to support visiting Soldiers, and the costs and logistics with regular troop and equipment transport outside the home station are unmanageable. Also, as noted in the “NEPA Requirements for Alternatives Analysis” above, permanent stationing of troops at a location other than Fort Carson was not considered in accordance with the Base Closure and Realignment Act. Section 2.4.1 of the *PCMS Transformation DEIS* has been modified to address why other training locations proposed by commenters are not feasible.

Section 2.4.2 discusses expanding the PCMS boundaries via land acquisition. This alternative was dismissed from detailed consideration for the reasons explained in the “Expansion Is Not an Alternative to the PCMS Transformation Proposed Action,” also see the “Expansion of the PCMS” Master Response (Section H.1.1) for additional discussion.

Section 2.4.3, “Training Scenarios Based on Deployment Conditions,” represents a set of options to vary training scenarios based on deployment conditions. As the Army proceeds with transformation planning, the total unit strength might vary throughout the implementation period, and Fort Carson Soldiers will continue to be deployed overseas. On the basis of these variables, the Army does not have a firm timetable for when units will return and train at the PCMS. The Transformation Proposed Action assumes that all units are training at their home station; however, this situation might not materialize for several years, depending on the frequency of operational deployments. When this situation does occur, the PCMS would not be able to support the training load required, and the Army would have to make decisions to balance the need to maximize training and support combat readiness. Adding incremental training scenarios as alternatives would not be reasonable because doing so would be redundant of the defined Transformation Proposed Action, which has been determined to accommodate the required mission-ready flexibility. (Also see “Mission Needs and Factors that Define the Proposed Action” above.)

No additional alternatives were suggested by commenters during scoping or the review of the *PCMS Transformation DEIS*.

H.1.5 Requests to Extend the *PCMS Transformation DEIS* Public Comment Period

H.1.5.1 Summary of Comments

The Army received several requests from members of the public and elected officials to extend the *PCMS Transformation DEIS* public comment period. Verbal requests were made at the public hearings, and written requests were received in the form of e-mail, individual letters, and form letters.

H.1.5.2 Response to Comments on Extending the Public Comment Period

The DEIS was released for public review on October 13, 2006. The public comment period on the *PCMS Transformation DEIS* was 45 days (from October 13 to November 27, 2006), which is in accordance with NEPA regulations [40 CFR 1506.10(c)]. In response to public and elected officials' requests, the Army subsequently extended the public comment period an additional 45 days (to January 11, 2007). On February 2, 2007, in response to requests by elected officials, the Army announced another extension of the comment period for the *PCMS Transformation DEIS*. The additional extension was made because severe winter weather in southeastern Colorado could have prevented local residents from sending comments to the Army before the close of the second comment period. The comment period for the *PCMS Transformation DEIS* ended on February 16, 2007. The Army has determined that both the original and the extended comment periods were sufficient for the public to review the *PCMS Transformation DEIS*.

H.2 Form Letters

In all, 3,307 form letters were received in response to the *PCMS Transformation DEIS*, including 10 expansion opposition form letters, 137 letters requesting an extension of the DEIS comment period, and 3,160 individual expansion opposition statements. Copies of the three form letters, one a letter in opposition to PCMS expansion (Exhibit H-1), the second a form letter requesting an extended DEIS comment period (Exhibit H-2), and the third an individual statement of opposition to the PCMS expansion (Exhibit H-3), are presented below along with the Army's response to each.

EXHIBIT H-1

Robin Renn
PCMS NEPA Coordinator
Directorate of Environmental Compliance and Management
1638 Elwell St., Building 6236
Fort Carson, CO 80913-4000

Dear Ms. Renn,

In addition to the many that already have, I am writing to formally oppose the United States Army's Pinon Canyon Expansion plan in Southeastern Colorado. Please record my concerns, comments, and statements attached, as they relate to the Pinon Canyon issue.

The Pinon Canyon Expansion plan will have only a negative impact on this area. You will force hundreds of families out of their homes, thus forcing them to give up their cattle ranches. This will surely destroy their livelihoods. Your plan will displace entire communities, including the towns of Kim and Thatcher.

Your plan will also include acquiring portions of the Apishapa and Purgatoire Rivers, which can have only a negative impact on the already diminished water supply in Colorado. Water supply is a very controversial and arbitrated matter in Colorado already. Your plan also includes the acquisition of Comanche National Grassland, Vogel Canon and Picket Wire Canon, which is the site of important dinosaur tracks, bone digs, ancient rock art and Colorado settlements. All of these things are invaluable and irreplaceable historical artifacts which the public should always have access to, and of which the Army has no interest in preserving.

Lastly, given the state of the economy for the middle working class, I'm sure you have a few willing sellers. They are far outweighed by the opposition, however. Just because the authoritarian Supreme Court has ruled that Eminent Domain allows you to acquire property at *minimal cost after condemnation*, does not make it ethical, moral, justifiable or even honorable. These are characteristics the United States Army should continue to uphold, rather than destroying an entire American community.

Response: The Army notes the commenter's opposition to the potential future expansion of the PCMS. Please refer to the Master Response regarding "Expansion of the PCMS," presented in Section H.1.1 of this *PCMS Transformation FEIS*. All individual copies of this opposition statement have been retained in the Administrative Record and will be provided to Army representatives responsible for scoping the future EIS for expansion of the PCMS.

EXHIBIT H-2

Attn: Robin Renn
PCMS NEPA Coordinator
Directorate of Environmental Compliance and Management
1638 Elwell St., Building 6236
Fort Carson, CO 80913-4000

Dear Ms Renn,

The PCMS Draft Environmental Impact Statement released on or about October 12, 2006, fails to properly assess the expansion alternative leaving a significant shortfall in available time for the public to consider it. This Draft EIS does not assess environmental, social and economic impacts of that alternative and fails to adequately assess cumulative impacts. These inactions are especially damaging considering the EIS comment period will be closed three days before the November 30, 2006 release of Congressionally required information regarding economic and environmental impacts of an expansion.

At least ninety additional days need to be provided to properly review and assess the DEIS and other information that will be available after November 30, 2006. Then, at least three more public hearings should be scheduled along with at least four hours of time allotted at each location for specific public input. To restrict the public hearing process as it is now, allowing only two hours for the Army's presentation, the orientation period and public comment is distressingly inadequate for the considerable public interest this topic has generated. For Congress to have the necessary information from the public it represents there will need to be significantly more time and consideration for the public comment and input period.

Response: The *PCMS Transformation DEIS*, released on October 13, 2006, provided a 45-day public comment period (from October 13 to November 27, 2006), which is in accordance with NEPA regulations [40 CFR 1506.10(c)]. In response to public and elected officials' requests, the Army subsequently extended the public comment period for the *PCMS Transformation DEIS* by an additional 45 days (to January 11, 2007). Additionally, on February 2, 2007, in response to requests by elected officials, the Army announced another extension of the comment period for the *PCMS Transformation DEIS*. The additional extension was made because severe weather in southeastern Colorado could have prevented local residents from sending comments to the Army before the close of the second comment period. The comment period for the *PCMS Transformation DEIS* ended on February 16, 2007. The Army has determined that both the original and extended comment periods were sufficient for the public to review the *PCMS Transformation DEIS*.

The Army provided these comment period extensions despite the fact that potential future expansion of the PCMS is not part of the Proposed Action for the PCMS Transformation DEIS. The release of the referenced "November 30, 2006 Congressional required information" has no bearing on the *PCMS Transformation DEIS* because it relates entirely to the potential future expansion of the PCMS. Refer to the Master Response regarding "Expansion of the PCMS," presented in Section H.1.1 of this *PCMS Transformation FEIS*.

Individual Statement of Opposition to Pinon Canyon Maneuver Site

I wish to document my position against the expansion of the Army's Pinon Canyon Maneuver Site (PCMS) in Las Animas County, Colorado. There is more than adequate space already owned by the Department of Defense, with over twenty five million acres managed by them. The Army has over fifteen million of those twenty five million acres and they cannot justify more.

Name: _____
Print please

Address: _____

Signed: _____

Date: _____

Response: The Army notes the commenter's opposition to the potential future expansion of the PCMS. Please refer to the Master Response regarding "Expansion of the PCMS," presented in Section H.1.1 of this *PCMS Transformation FEIS*. All individual copies of this opposition statement have been retained in the Administrative Record and will be provided to Army representatives responsible for scoping the future EIS for expansion of the PCMS.

Copies of each of the individually received form letters are retained for the Administrative Record for this EIS but are not reproduced in total in this Transformation FEIS. This is in accordance with the CEQ's regulations implementing NEPA [40 CFR Sec. 1503.4(a)(5) and (b)].