

Los Alamos County Parks, Recreation & Open Space Division

Los Alamos
**OPEN SPACE
MANAGEMENT
PLAN**

May 2015

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VISION STATEMENT AND EXECUTIVE SUMMARY

Vision Statement

The Los Alamos County Open Space Management Plan provides a guiding framework for effective stewardship of the county's outstanding open space resources by identifying a County Open Space System and by suggesting projects to restore or maintain ecosystem health and to provide outdoor recreations experiences while maintaining flexible long-term strategies that adapt to changing biotic and abiotic conditions so that residents and visitors of Los Alamos can revel in their surroundings through the 21st century and beyond.



Pueblo Canyon is a core of Los Alamos Open Space

Executive Summary

As environmental conditions change due to wildfire, climatic changes, and increasing human impacts, Los Alamos County must actively manage its natural and cultural resources on 4,000 acres of open space.

The open space and wildlands of Los Alamos County are important because of their aesthetics, watershed protection, wildlife habitat, recreational use and contribution to the quality of life in Los Alamos. These woodlands, canyons, and forests are also an integral part of the county's infrastructure and like other types of infrastructure such as roads, utilities, and buildings, require attention and maintenance to promote longevity and proper function. Forests and grasslands are important for flood control and local temperature regulation; healthy forests provide protection from wildfire; clean, open drainages provide locations to replenish groundwater supplies; and, well-managed landscapes create vistas that provide a welcoming backdrop to the town.

Defining open space and actively managing it addresses several goals stressed in the Los Alamos County Council's *20-Year Strategic Leadership Plan*. Protecting open space enhances "Quality cultural and recreational amenities" by maintaining the scenic and recreational qualities of the County. Clearly identifying open space parcels is part of the goal for "Well-planned commercial and residential growth." Outlining management strategies addresses the goal of "Enhancing environmental quality and sustainability" through protection of natural and cultural resources and wildland fuel reduction.

The Los Alamos County Open Space Management Plan is intended to provide an outline for active stewardship of Los Alamos County natural areas and to identify a contiguous open space system that is managed in a consistent manner and that provides corridors for outdoor recreation, wildlife movement, ecosystem processes, and wildland fuel management. Elements of the plan provide continuity of guidance to County staff for the next twenty years. It recognizes the County's rich ecological, geographic, and cultural resource heritage and the values placed on these lands by Los Alamos County residents.

Part 1.

Open Space Management Strategies

- Strategy 1. Designate a Los Alamos County Open Space System that formally recognizes existing open space to protect and preserve the community's recreational, cultural and natural resources and to promote recreational use by residents and visitors**
- Strategy 2. Retain Los Alamos' special character of open and scenic vistas across a natural and memorable landscape; and retain opportunities for solitude, inspiration and renewal within the landscape**
- Strategy 3. Provide effective environmental stewardship for the protection of natural resources through careful monitoring of existing conditions, documentation of changes that occur, restoration projects, and adaptive management techniques that address detrimental changes**
- Strategy 4. Provide for the protection of historic and cultural resources by maintaining an accurate inventory, monitoring sites annually, developing a protection plan for threatened resources, and implementing projects as necessary**
- Strategy 5. Provide effective stewardship for the open space that surrounds the County Trails Network that protects natural and cultural resources while inviting use by residents and visitors**
- Strategy 6. Provide stewardship for neighborhood open space so that it continues to keep residents living here and attracts new people to make Los Alamos their home**

Part 2.

Managing Open Space – Management Units

Part 2 of the Plan divides county-owned lands into six ecologically-based management units and summarizes current conditions and past management activities in each unit as a basis for recommendations for future management actions.

Ponderosa Pine Management Unit

1. Maintain healthy forest conditions in ponderosa pine stands through continued active management of pine forests.
2. Monitor changing conditions in ponderosa pine forests that are the result of drought, increasing temperatures, and insect activity.
3. Reduce erosion damage and sediment transport caused by stormwater runoff from urbanized areas.
4. Maintain wildlife habitat and corridors in fuel mitigation project areas.
5. Maintain a map of known locations of sensitive plant species and monitor populations yearly.

Canyons Management Unit

1. Manage all forest stands for improved forest health and to protect adjacent housing areas from wildfire with a fire management plan that combines mechanical and hand thinning, piling and burning, and broadcast burning.
2. Because wildland fighting ability is reduced by the inaccessibility of many of the canyons, develop better access to the management unit by establishing new and connecting existing trails.
3. Monitor and if necessary continue forest restoration efforts in the upper watersheds of School, Walnut, Pueblo, and Rendija canyons.
4. Protect sensitive species within the canyon through continued monitoring and adaptive management techniques.
5. In Pueblo and Rendija canyons, protect tent rocks from damage from erosion and human use.
6. Work closely with Los Alamos National Laboratory (LANL) to minimize sediment and contaminant transport in Pueblo and Bayo canyons.

Mesatop Management Unit

1. Use adaptive fuel reduction techniques to manage woodlands in a manner that permits containment of wildfires to individual mesa tops.
2. Control erosion and sediment transport from areas of exposed soils across the mesa tops.
3. On Kwage Mesa, control runoff from the utility road.
4. Establish baseline conditions for cultural sites and monitor the sites for potential erosion damage.

Western Perimeter Management Unit

1. Maintain low fuel density for protection of adjacent housing.
2. In areas altered by stand-replacement fire, re-establish ponderosa pine forest at historic stem densities.
3. Continue monitoring the effects of mastication debris on re-establishment of ground cover.

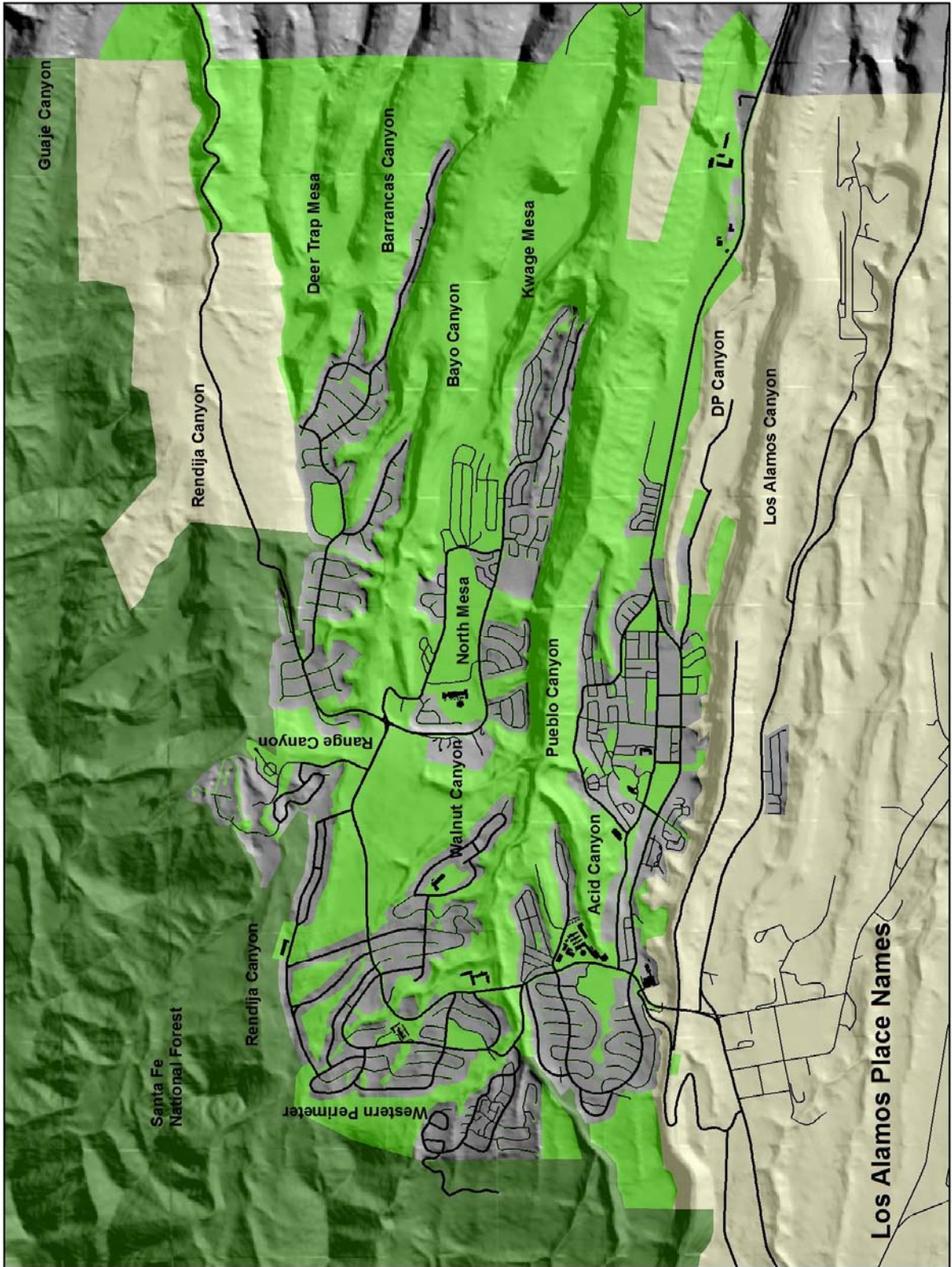
White Rock Canyon Management Unit

1. Ensure adequate stewardship of the White Rock Canyon Archeological District through effective monitoring of cultural resources.
2. Reduce soil loss along the rim and on the flats within the canyon by re-establishing 60% ground cover and reducing erosion potential by 40 percent.
3. Protect viewpoints and vistas along the canyon rim, especially at Overlook Park, the Kimberly Cul-du-Sac, and the Red Dot Trailhead.
4. Monitor and protect habitat for helleborine orchids, grama grass cactus, Cardinal flower, and Springer blazing star.
5. Eliminate feral cattle in the canyon not only on County land, but on all jurisdictions
6. Remove trash from below Overlook point and develop methods to discourage additional illegal dumping.
7. Reduce threat of fire to homes adjacent to open space along Meadow Lane, Kayenta, Joya Loop, Rover Boulevard, Glenview drive and court, and Kimberly Lane.
8. Discourage the use of painted dots and arrows as navigational aids on the Red Dot and Blue Dot trails.
9. Because of their value to wildlife and endemic flora, maintain an inventory of springs located in the canyon.

Guaje/Lower Rendija Management Unit

1. Control vehicle access to reduce erosion potential.
2. Respect the traditions of local Pueblos and protect cultural resources.
3. Protect viewpoints and vistas.
4. Reduce arroyo downcutting and re-establish riparian zones.
5. Implement fuel reduction along the foot of Barranca Mesa.

Map 1. Los Alamos Place Names



INTRODUCTION

Los Alamos County, New Mexico's smallest, occupies 109 square miles between the Rio Grande and the Jemez Mountains in north-central New Mexico. Despite its small size, the County holds a population of more than 18,000; this number is significantly increased by about 8,000 each working day as employees from surrounding communities commute to jobs at Los Alamos National Laboratory. The County holds two population centers: White Rock, sitting on the west rim of White Rock Canyon, and the larger "Townsite" that is located at the foot of the Jemez Range west of town.

The communities of Los Alamos and White Rock are located on an area of the Pajarito Plateau long recognized for both its natural beauty and its numerous and significant archeological sites. Between 1900 and 1920 there were fourteen congressional bills submitted to Congress recommending that a large part of the Pajarito Plateau be included in a National Park. In 1916 a small part of that original area was protected within Bandelier National Monument.

The Los Alamos County Open Space Management Plan is intended to provide an outline for active stewardship of Los Alamos County natural areas and to designate a contiguous open space system that is managed in a consistent manner and that provides corridors for outdoor recreation, wildlife movement, ecosystem processes, and wildland fuel management. Elements of the plan provide continuity of guidance to County staff for the next twenty years. It recognizes the County's rich ecological, geographic, and cultural resource heritage and the values placed on these lands by Los Alamos County residents.



White Rock Canyon from Overlook Park

The value that the community places on open space is most easily seen in two ways. For residents, trails are the way they actively use open space. In the 2012 Community Survey, 87% of the respondents stated they had used the trail network in the previous year, and 57% said they used the trail network 12 or more times per year. More difficult to quantify is the value residents place on living on the edge of open space. One out of every seven homes in Los Alamos and White Rock are "perimeter lots" that are bordered by County-owned open space or the Santa Fe National Forest. Homes

that border open lands typically sell for more than equivalent houses on the opposite side of the street that do not border open lands.

OUTSTANDING NATURAL AND CULTURAL FEATURES IN LOS ALAMOS COUNTY

Natural Resources: The sweeping range of elevation in Los Alamos County creates a continuum of ecosystems and a surprising biodiversity. Spruce-fir, mixed-conifer and ponderosa pine forests provide the backdrop for significant viewsheds, attractive recreation opportunities for the County Trail Network, and function as important components of watersheds. Groundwater infiltration is focused on riparian areas. Local botanists have identified more than 900 plant species found within the County boundaries. About 130 bird species nest in the County, and the canyons and mesas are home to about 40 reptile and amphibian species and 70 kinds of mammals, including mule deer, elk, black bear, red, grey and kit fox, coyote, ringtail, and mountain lion. The County provides habitat for at least five threatened or endangered species.



Cardinal flower in White Rock Canyon

Vistas: The striking beauty of the Pajarito Plateau and its backdrop of the Sierra de los Valles, the eastern portion of the Jemez Mountains, is often cited as the most significant reason for choosing to live in Los Alamos. Vistas encompass the tuff cliffs formed by the eruptions of the Valles caldera, the Rio Grande rift, White Rock Canyon, and the Sangre de Cristo and Jemez mountains.

White Rock Canyon: Carved by the Rio Grande through lava oozed from the Caja del Rio volcanic field on the east bank of the river and the orange tuffs of the Valles Caldera eruptions, the canyon is a geologic masterpiece created by hot rock, landslides, and the mighty river. Averaging 1,000 feet deep from rim to river, the canyon lies on County open space and offers spectacular vistas, rugged terrain, and a chance for solitude unmatched in the County. Those features alone would be enough to designate the place as special, but White Rock Canyon hosts four rare plant species, is the northernmost extent of the range of about 20 plants, is frequented by at least three endangered

species, and most importantly, is listed on the National Register of Historic Places (the only canyon in the United States to enjoy such a designation).



White Rock Canyon

Tent Rocks of Pueblo Canyon: Standing in ranks on the lower slopes of Pueblo Canyon, rock sentinels with stone heads and conical bodies keep watch over the canyon floor. A creation of an unusual combination of geology, the photogenic rock towers have lured visitors to the canyon for more than a century. In the early twentieth century, the rock towers were a tourist destination and were featured in National Geographic Magazine. Known variously as hoodoos, stone tents, or tent rocks, the formations are found only in a handful of locations around the world. Tent rocks in Pueblo Canyon are composed of welded volcanic ash spewed from a massive eruption of the Valles Caldera about 1.2 million years ago.



Tent Rocks in Pueblo Canyon circa 1915

Los Alamos Reservoir: First impounded by the Los Alamos Ranch School in the 1920s, the Los Alamos Reservoir has long served as a family destination for picnicking, hiking, and fishing. The reservoir has been dramatically altered by post-Cerro Grande and Las Conchas fire runoff. The area has been closed to public access for most of the past 14 years. Although the County owns the dam, the reservoir is located within the Santa Fe National Forest, but the land is expected to be purchased by the County in the near future.



The Los Alamos Reservoir has been severely impacted by two wildfires

Camp May and Surrounding Areas: Camp May is a County park located near the crest of the Sierra de los Valles. The park and the nearby Cañada Bonita on the Santa Fe National Forest encompass montane grasslands that are a unique feature of the Jemez Mountains. The park provides camping and picnicking, and is adjacent to Pajarito Mountain ski area. Together these places provide a starting point for hiking, cross-country skiing, and mountain biking in the County's highest easily accessible terrain.



Cañada Bonita

Cultural Resources: Los Alamos County stretches across the Pajarito Plateau on a landscape that in the early 1900s was proposed as a National Park to protect the thousands of cultural resource sites found here. About 150 cultural sites have been



Petroglyph in White Rock Canyon

identified on county open space. These sites include multi-story pueblos, small room blocks, game pits, lithic scatters, shepherd shelters and corrals, and rock art sites.

Deer Trap Mesa sites: Deer Trap Mesa connects to Barranca Mesa by a narrow rock bridge. An Ancestral Pueblo game pit, also known as a deer trap or eagle trap, sits in the only break in the cliffs. From the pit, an ancient foot trail heads eastward, passing by small room blocks of the hunters and farmers who used the mesa top.



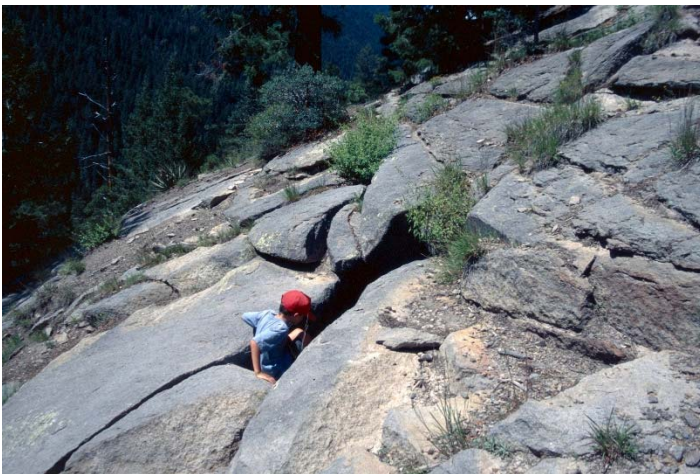
Ancestral Pueblo trail on Deer Trap Mesa

Natural Arch: In the Santa Fe National Forest, on the north wall of Rendija Canyon lies a small natural arch punched through the volcanic rocks of the Sierra de los Valles. Easy to spot from the canyon floor but not easy get to, the arch is a popular destination for hikers. A short and rugged trail leads to the arch, and visitors can climb through the arch and view Los Alamos from the other side.



View through the natural arch

Cave of the Winds: Located on the Santa Fe National Forest about a mile from town, the Cave of the Winds is another favorite destination for a short hike close to town. The cave, difficult to find for first-time visitors, is entered through a narrow slot on a flat slab of rock. Once inside, there is room to stand, and a short narrow passage to explore.



Cave of the Winds

Los Alamos County Trail Network: The 60 miles of maintained trails on County open space create a significant recreational resource for County residents and visitors. The 2012 Los Alamos Community Survey reported that over half of County residents use the trail network at least once per month and 4 out of 5 residents with children used the network at least once per month.



Hikers, walkers, birdwatchers, runners, mountain bike riders, and equestrians use the Los Alamos Trail Network

Neighborhood Open Space: Residents of Los Alamos are connected with the community's open lands. One in seven houses in the County are on perimeter lots that border open space. About 95 percent of County residents live within a seven minute walk of County open space. This creates outstanding recreational opportunity for all residents. Many cite as an important attraction of living in Los Alamos is the ease of access to natural areas and trails. For many, neighborhood open space is a critical factor in the choice to live in Los Alamos.

This preliminary inventory of outstanding features should be expanded over time with input from open space users.

OPEN SPACE MANAGEMENT PLAN VISION STATEMENT

The Los Alamos County Open Space Management Plan provides a guiding framework for effective stewardship of the county's outstanding open space resources by identifying a County Open Space System and by suggesting projects to restore or maintain ecosystem health and to provide outdoor recreations experiences while maintaining flexible long-term strategies that adapt to changing biotic and abiotic conditions so that residents and visitors of Los Alamos can revel in their surroundings through the 21st century and beyond.

Part 1. Open Space Management Strategies

DEFINING OPEN SPACE

Strategy 1. Designate a Los Alamos County Open Space System that formally recognizes existing open space to protect and preserve the community's recreational, cultural and natural resources and to promote recreational use by residents and visitors

"Open Space" consists of areas of an undeveloped character where development is restricted or that are set aside for natural or cultural resource protection and dispersed recreation. Included are undeveloped natural lands with trails, cultural and historic sites, significant habitat supporting ecosystem health, wildlife habitat, areas managed for community wildfire protection, riparian areas, and significant viewsheds.

Terrain, fire impacts, and a huge percentage of Federal land ownership create limits on land available for residential, commercial, and recreational uses in Los Alamos County. Land use planning is critical to clearly define appropriate uses for County-owned land parcels, protect lands available for recreation, and to provide opportunities for development. The most basic outcome of the implementation of this plan would be the formalizing of a County-wide open space system that provides long-term protection of the community's most valued natural and recreational landscapes. (See Appendix 2 for a History of Open Space Land Use Planning in Los Alamos.)

Suggested Action 1. Identify a contiguous open space system that is managed in a consistent manner and that provides corridors for outdoor recreation, wildlife movement, ecosystem processes, and wildland fuel management.

The Open Space System should protect and preserve certain parcels of undeveloped land that contain significant wildlife habitat or corridors, cultural resources, trails, or are areas for flood or wildfire protection. The system should align with the land uses defined on the Land Use Map that is part of the Comprehensive Plan Update.

The Open Space Specialist should work with Community and Economic Development staff to define parcels of County land for the Planning and Zoning Commission and the County Council to consider that are appropriate to remain undeveloped land for the Land Use Map section of the Comprehensive Plan Update. During this process, the County should consider dividing several parcels in two and designate one section open space, the other park, for example

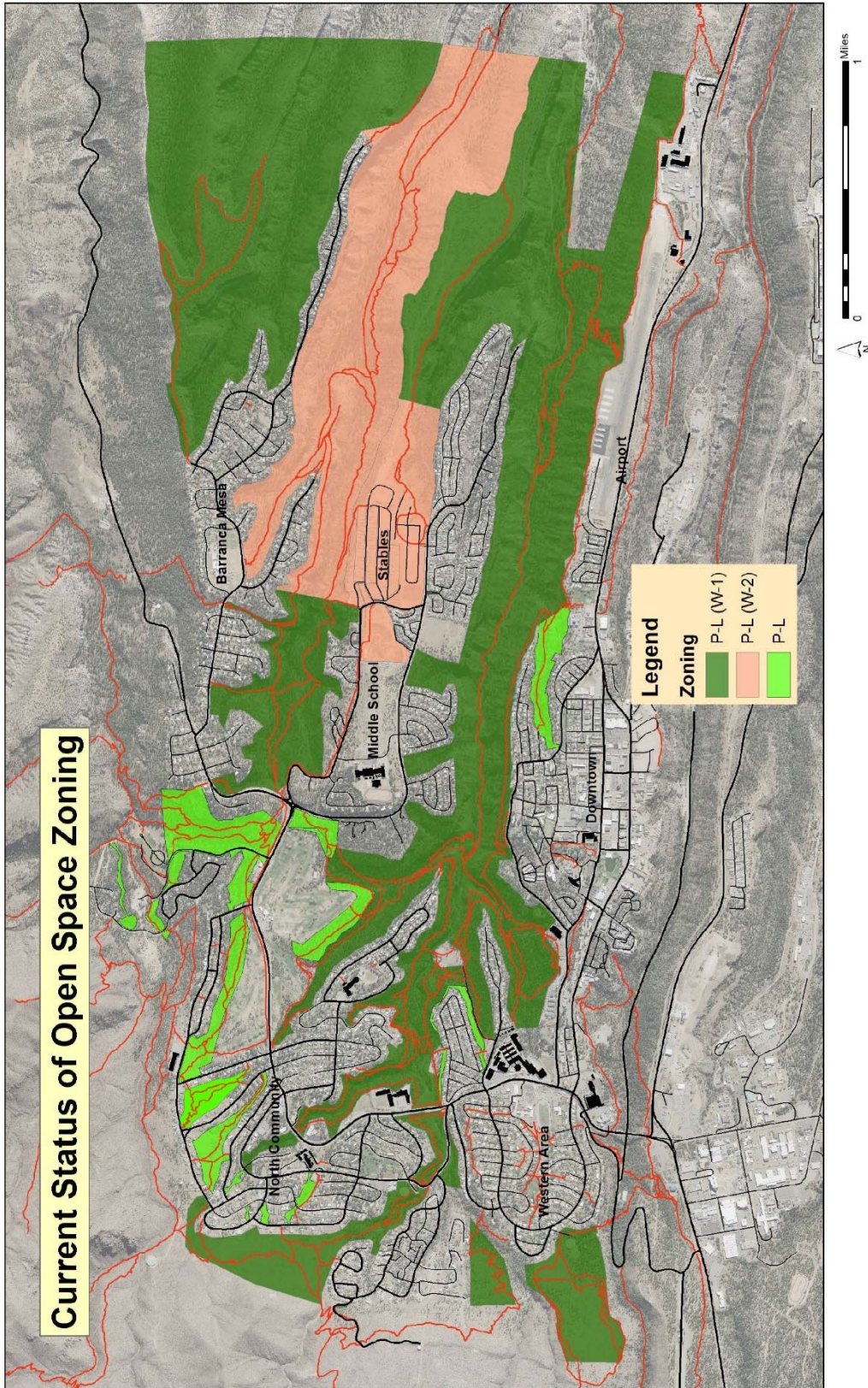
- Kwage Mesa parcel, the west half hold the stables area, the east part is open land with the Kwage Mesa Trail
- The north section of the golf course parcel holds the Woodland Trail and should be included in the Open Space System
- The open space area in Overlook Park holds several trails and should be included in the Open Space System

Also during this process, the County should identify an acceptable method to improve the protection of the contiguous nature of the open space system on three critical, publicly owned land parcels:

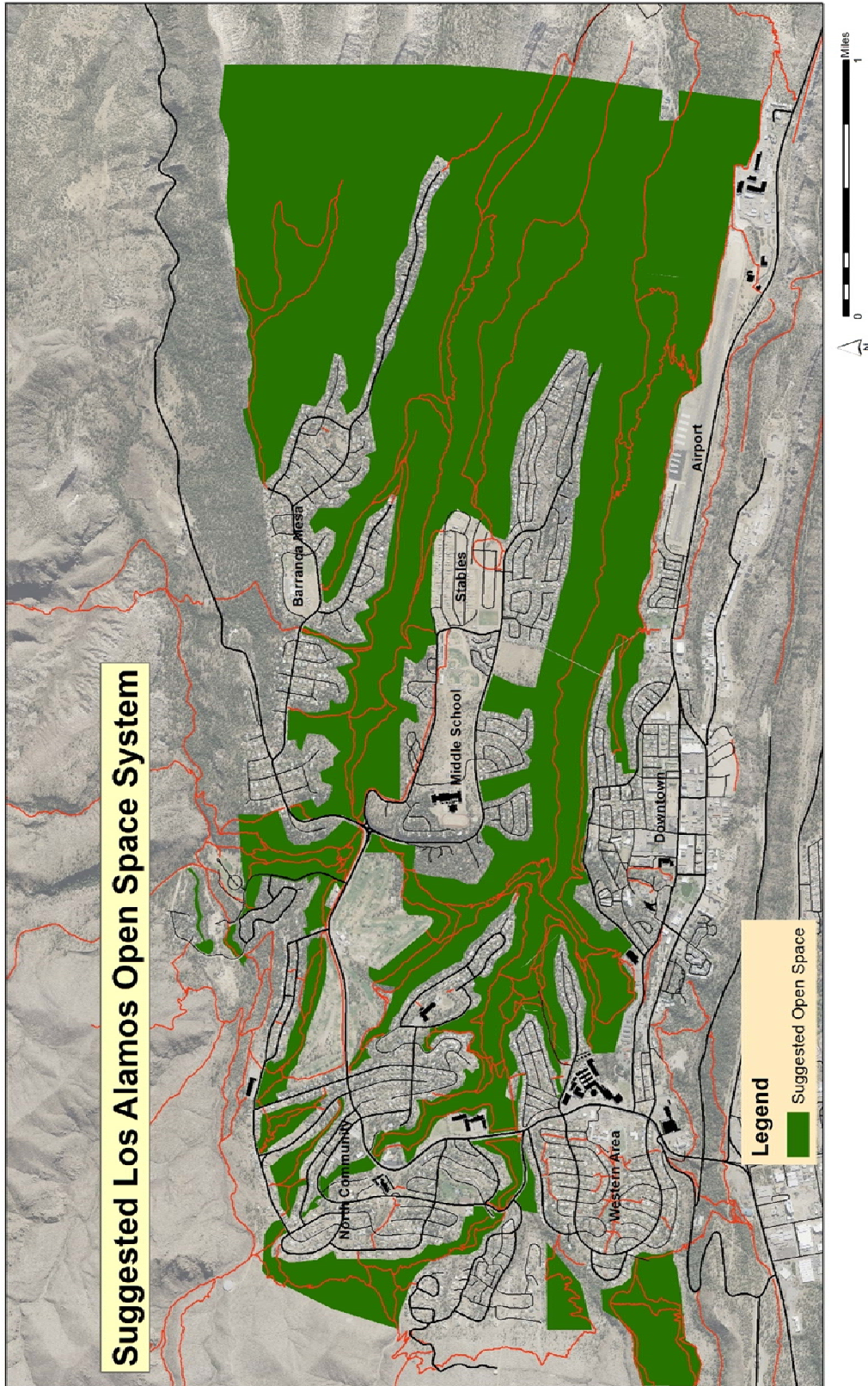
- White Rock Canyon
- Graduation Canyon
- Range Road Tract

During the process, land currently used as open space should be managed as such until any changes in land use are completed.

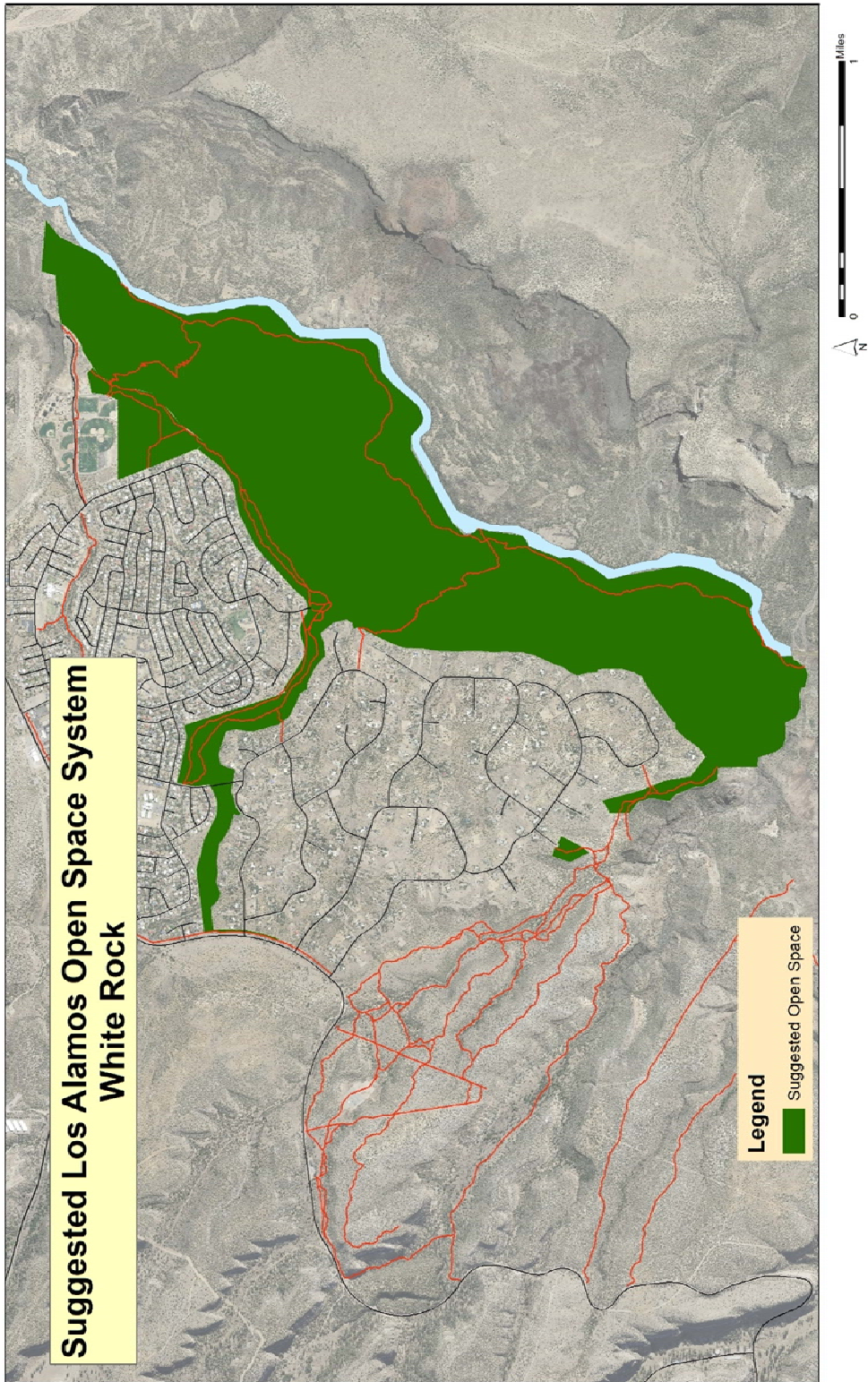
Map 3. Current Status of Open Space Zoning



Map 2. Suggested Open Space System



Map 4. Suggested Open Space System, White Rock



Suggested Action 2. Indicate the Los Alamos County Open Space System on all County maps so it is clearly identified visitors, residents, and County staff.

- Clear visualization of the Open Space System would be a powerful tool for both drawing residents to utilize open space and making it easy for visitors to find and enjoy open space and trails. County trail maps and brochures should be revised to show open space. In addition, maps of the Open Space System should be provided to each County department and division to provide a reference to identify potential impacts of projects and actions on open space and trails.

Suggested Action 3. Establish standards so that lands will be developed with sensitivity to community open space objectives when they are adjacent to or significantly affect other lands that have these values.

Suggested Action 4. Develop a standard procedure for including the Open Space Specialist in the early stages of County Utilities, Public Works, and Capital Improvement construction projects to identify and address potential impacts to open space and trails. Work to create standard operating procedures for post-construction restoration.

- The Interdepartmental Review Committee regularly meets to review potential impacts of projects on private land, but there is not a regularly followed similar procedure for County projects. The Open Space Specialist should attend meetings of the Utilities-Public Works-Engineering Project Coordination Committee and follow up with project managers when projects may impact open space.
- As increasing post-construction requirements are implemented by Federal entities such as the Environmental Protection Agency, Utilities, Public Works, and other divisions involved in construction should develop coordinated standards for restoration of open space and other public lands following construction.

SIGNIFICANT VISTAS AND VIEWPOINTS

Strategy 2. Retain Los Alamos' special character of open and scenic vistas across a natural and memorable landscape; opportunities for solitude, inspiration and renewal

The natural vistas of the landscape of Los Alamos County form the backdrop of daily life within the community. The views offered by the surrounding canyons, mesas, and mountains are an integral part of residents views from living rooms or offices, their daily commute, and their visits to open places. Often taken for granted but for many residents the scenery around the community is a positive, constantly uplifting part of life in Los Alamos.

Vistas are land areas that are delineated by geographic features. Key vistas are areas of a significant scenic quality that are visible by a large number of residents and visitors from key viewpoints.

Protection of vistas is approached from two directions. Primary is protection of the landscape of key scenes or backdrops. These landscapes are natural landforms that remain are not impacted by structures, roads, and other man-made features. Vistas open up at specific locations within the community. Observers enjoy these landscapes from key viewpoints, and the significant viewpoints are identified.

Vistas are defined by both high and low points of the topography. Key high landforms which frame the primary viewsheds in Los Alamos County are the Sierra de los Valles of the Jemez Mountains, Guaje Ridge, the Sangre de Cristo Range, the system of finger mesas pointing east (Otowi Mesa, Kwage Mesa, North Mesa, Barranca Mesa, Deer Trap Mesa), and Guaje Mountain.

More confined within the County are basin-type vistas defined by canyons and arroyos. Significant low-lying landforms are the White Rock Canyon, Pueblo Canyon, Bayo Canyon, Los Alamos Canyon, Barrancas Canyon, Rendija Canyon, and Guaje Canyon. White Rock Canyon, with the Rio Grande at the bottom, is a visual resource of significant value.

Vista protection is suggested to a part of the review process for new construction, particularly when there are possible impacts to one of the five important viewpoints listed in Table 1 and described below. This could be accomplished on a case-by-case basis as part of community review of proposed projects.

LOCATION	DESCRIPTION
Ashley Pond	Central outdoor gathering place for residents
Anderson Overlook	Popular roadside visitor stop with mesa views
White Rock Canyon Overlook	Isolated canyon with Rio Grande
Los Alamos Nature Center	Building designed to maximize views from windows
Deer Trap Mesa Points	Viewpoint into Barrancas and Rendija Canyons

Table 1. Important Viewpoints in Los Alamos County

LOCATION	DESCRIPTION
Sierra de los Valles	Backdrop to Los Alamos
Sangre de Cristo Range	The eastern skyline of Los Alamos
Lower Canyons	Natural landscape backed by the Sangre de Cristos
White Rock Canyon	Isolated canyon with Rio Grande
Lower Los Alamos Canyon	Wide canyon with attractive views from downtown
Caballo Mountain	Prominent summit
Chicoma Peak	Prominent summit
Ashley Pond	Central vista in downtown
Guaje Ridge	Long ridge backdrop to North Community
Guaje Mountain	Prominent summit
Pajarito Mountain	Prominent summit visible from all over the County

Table 2. Vistas in Los Alamos County

NATURAL RESOURCES

Strategy 3. Provide effective environmental stewardship for the protection of natural resources through careful monitoring of existing conditions, documentation of changes that occur, restoration projects, and adaptive management techniques that address detrimental changes.

- Protect native vegetation, wildlife and cultural resources through appropriate planning, monitoring, and on-the-ground projects.
- Designate habitat patches as core areas on the basis of their importance to wildlife and work to maintain connections among core patches
- Use an updated version of the 2004 Invasive Species Management Document to monitor and control threatening non-native species on open space. (www.losalamosnm.us/parks/trails/Documents/Los%20Alamos%20County%20Invasive%20Species%20Plan.pdf)
- Develop and implement clean-up and restoration programs of public lands. Include trash removal projects at traditional illegal dumping spots, and seek ways to prevent illegal dumping on open space.
- Implement systems and programs in which the County, volunteers, and community groups can work together on managing, funding, and interpreting the open lands system.
- Engage young people, schools, residents, and businesses in providing stewardship of the open lands system as an educational and civic resource in which they can take pride through involvement and responsible action.
- Establish definitions of permitted uses, level of access, and protective restrictions on County open space.
- Continue to participate in regional, multi-jurisdictional discussions and planning for land and trail management through the East Jemez Resource Council, the Los Alamos National Laboratory Trails Working Group, and similar collaborative groups.

Suggested Action 1. Protect and enhance wildlife habitat in the County

- Inventory and monitor core habitat areas on the basis of their importance to wildlife and work to maintain connections among core patches.
- Maintain lists of plants and animal species found in Los Alamos County.
- List threatened and endangered species found within the County, map their locations yearly.

- Map and restore wetland areas.
- Working with other local jurisdictions, develop committees to work together to designate habitat and to determine appropriate activities within the habitat for each of the five federally listed species. Seek approval of these species plans from the United States Fish and Wildlife Service.

Suggested Action 2. Monitor and improve conditions on open space with regard to soil erosion, vegetative cover, water quality, and air quality

- Document changes to the landscape through repeat photography.
- Utilize community volunteers for projects that reduce erosion on open space.

Suggested Action 3. Prioritize restoration projects and seek grant funding for implantation of the projects

- Continue clean-up and restoration programs on County lands.
- Engage young people, schools, residents, and businesses in providing stewardship of the open lands system as an educational and civic resource in which they can take pride through involvement.

Suggested Action 4. Monitor and moderate impacts from construction projects

- Develop and implement County standards for minimizing impacts during and after construction. Document conditions before projects begin and create a plan to avoid damage to natural features.
- Continue implementation of staging area documentation and evaluation.
- Insure proper re-seeding and habitat restoration is included as part of construction projects.

Suggested Action 5. Actively manage service roads located on open space that are used by County staff and others with the goal of reducing erosion, runoff, and unnecessary vegetation removal

- Inventory and map service roads and open space and evaluate their current condition, purpose, and primary users.
- Work with primary users groups to determine which, if any, roads can be closed off and rehabilitated.
- Prioritize projects based on which roads have the most impacts on open space and work with primary users to develop mitigation projects.

Legal Protections of Natural Resources

Federal:

- National Environmental Policy Act of 1969 (NEPA): Requires substantial environmental review of projects at least partially funded by federal funds.
- Endangered Species Act of 1973 (ESA): Prohibits “taking” of endangered species or destroying their habitat without mitigation measures.
- Migratory Bird Treaty Act of 1918 (MBTA): Protects all native birds, including nestlings and eggs in an active nest. Regulates timing of habitat alteration such as tree thinning to outside of the bird breeding season, which on the Pajarito Plateau is generally May to July.
- Bald and Golden Eagle Protection Act of 1940: Protects eagles and eagle habitat.
- National Pollutant Discharge Elimination System Permitting System, Part of the Clean Water Act of 1972: Requires erosion control methods for all construction projects over one-quarter acre.

State:

- New Mexico Wildlife Conservation Act: Requires recovery plans for listed native species.
- New Mexico Endangered Plant Species Act: Promotes conservation and enforcement of laws related to list native species.

Scientific Name	Common Name	Potential to occur
Amphibians		
<i>Plethodon neomexicanus</i>	Jemez Mountains Salamander	Known to occur Federal Endangered Species
Birds		
<i>Falco peregrines</i> spp. <i>anatum</i>	American Peregrine Falcon	Known to occur
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Known to occur
<i>Accipiter gentilis</i>	Northern Goshawk	Known to occur
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Known to occur Federal Threatened Species
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Known to occur
<i>Vireo vicinior</i>	Gray Vireo	Known to occur
Mammals		
<i>Myotis ciliolabrum</i>	Western Small-footed Myotis Bat	High
<i>Myotis volans</i>	Long-legged Bat	High
<i>Euderma maculatum</i>	Spotted Bat	High
<i>Corynorhinus townsendii</i>	Townsend's Pale Big-eared Bat	High
<i>Nyctinomops macrotis</i>	Big Free-tailed Bat	High
<i>Bassariscus astutus</i>	Ringtail	Known to occur
<i>Vulpes vulpes</i>	Red Fox	Known to occur
<i>Zapus hudsonius</i> spp. <i>luteus</i>	New Mexico Meadow Jumping Mouse	Moderate Federal Endangered Species
Plants		
<i>Lilium philadelphicum</i>	Wood Lily	Known to occur
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Greater Yellow Lady's Slipper	High
<i>Delphinium sapellonis</i>	Sapello Larkspur	Known to occur
<i>Mentzelia springeri</i>	Springer Blazing Star	Known to occur

Table 3. Sensitive Species Potentially Occurring in Los Alamos County (Based on data from Los Alamos National Laboratory, Los Alamos County records, and eBird.org)

See Part 2 of the Open Space Management Plan for resource-specific management goals and strategies for the six management units on Los Alamos County Open Space.

To implement the principles of adaptive management to meet rapidly changing conditions, Part 2 of this plan will be revisited and evaluated by December 1 of each year. Specific strategies for managing the six units will be revised as conditions warrant.

HISTORICAL AND CULTURAL RESOURCES

Strategy 4. Provide for the protection of historic and cultural resources by maintaining an accurate inventory, monitoring sites regularly, developing a protection plan for threatened resources, and implementing projects as necessary

Suggested Action 1. Maintain accurate records of known cultural resources

- Coordinate with the State Historic Preservation Office (SHPO) to maintain a database of known cultural resources.
- Develop coordination with SHPO to update the list annually.

Suggested Action 2. Develop a protection, restoration, and monitoring strategy for the County's historical, cultural, and archaeological sites on open space

- Develop a monitoring protocol for cultural resources on open space.
- Develop a prioritization plan for cultural resources in need of protection.
- Define for all project managers the responsibilities of the County for communicating construction plans with the State Historic Preservation Office and the steps required for compliance with the Section 106 of the National Historic Preservation Act.
- Revisit sites at least every three years to document their current condition.

Suggested Action 3. Establish protocols for communication with neighboring Pueblos for management of cultural resources

- Develop a communication chain for reporting incidents involving disturbance of cultural resources.
- Coordinate with Pueblos to develop a list of culturally sensitive sites on County-owned land.

Suggested Action 4. Establish protocols for maintenance of historic trails that continue to serve as part of the Los Alamos County Trail Network

- Clearly define historic trails on maps and on trail signage.
- Develop accepted techniques for trail maintenance on historic road and trails.

Legal Protections of Cultural Resources

Federal: The federal government is responsible for the identification of historic resources through the National Register of Historic Places. The National Register identifies and evaluates properties of national, state and local historic significance. A listing on the National Register provides support for preservation of the resource and requires federal agencies to protect and preserve any resource with their ownership. In addition, through the National Historic Preservation Act, the federal government is a primary source of funding for state and local government preservation programs.

The National Environmental Policy Act (NEPA) also obligates government agencies to prepare an environmental impact statement that include evaluation of potential impacts on cultural resources for any project on federal land or that uses federal funding.

State: New Mexico utilizes federal funds to maintain its State Historic Preservation Office (SHPO). SHPO maintains records, disperses preservation grants, and consults with governments and land owners on the appropriate actions for preservation of historic and cultural resources. The office acts as the local resource for protection of historic and cultural resources. It also maintains of State Register of Historic Properties.

County: As a division of the State of New Mexico, Los Alamos County is required to protect known cultural and historic resources on County land. In addition, the County has adopted a Historic Preservation Plan that establishes an outline for protection of local historic resources.

Lists of Cultural Properties

The State Historic Preservation Office through its Archeological Records Management Section maintains an ever-growing list of cultural resources within New Mexico. Each site has a unique identification number that formerly was assigned by the Laboratory of Anthropology. Data for each site includes its geographic coordinates, the approximate size of the site, and its character (for example structural, lithic, petroglyphs). The records in Santa Fe may include detailed drawing, maps, photographs, descriptions or scientific reports on each site. Because of the sensitive nature of these sites, access to these data is restricted. To more effectively manage the sites, the County Open Space Specialist has been granted access to the records and keeps copies in a secure location.

Critical historic and cultural resource sites are identified on the National Register of Historic Places and the State of New Mexico List of Cultural Properties. Los Alamos County also has a number of locally significant historic sites that are listed below.

Resource Name	Location	Owner	Listed
Bandelier CCC Historic District	Bandelier National Monument	National Park Service	5/28/1987
Bayo Road	Bayo Canyon	Los Alamos County	11/7/2003
Chupaderos Canyon Small Structural Site	Santa Fe National Forest	National Forest Service	11/7/1990
Chupaderos Mesa Village	Santa Fe National Forest	National Forest Service	11/7/1990
Grant Road	Upper Rendija Canyon	Los Alamos County	1/14/2004
Guaje Water/Soil Control Site	Santa Fe National Forest	National Forest Service	11/7/1990
Guaje Site	Santa Fe National Forest	National Forest Service	12/7/1982
Los Alamos Scientific Laboratory	Central Avenue	Los Alamos County	10/15/1966
Lujan Road	Bayo Canyon	Los Alamos County	1/12/2005
Pajarito Springs Site	White Rock Canyon	Los Alamos County	12/6/1982
White Rock Canyon National Historic Site	White Rock Canyon	Los Alamos County	5/18/1990
White Rock Canyon National Historic Site	White Rock Canyon	Los Alamos County	5/28/1992

Table 3. National register of historic places sites in Los Alamos County

Resource Name	Location	Owner	Listed
Bandelier National Monument	Bandelier National Monument	National Park Service	5/21/1971
Beanfield Mesa Road	Beanfield Mesa	National Forest Service	4/11/2003
Beanfield Notch Road	Santa Fe National Forest	National Forest Service	6/13/2003
Camp Hamilton Road	Pueblo Canyon	Department of Energy	6/13/2003
Gonzales Road	Bayo Canyon	Los Alamos County	6/13/2003
Ranch School Trails	Los Alamos County	Los Alamos County	6/13/2003
Homestead Crossing	Pueblo Canyon	Los Alamos County	6/13/2003
Los Alamos Canyon Bridge	Los Alamos Canyon	Department of Energy	5/9/1997
Los Alamos County Historical Museum and Archives	Los Alamos County	Los Alamos County	2/9/1973
Los Alamos Ranch School	Los Alamos County	LAC and private	5/23/1969
Los Alamos United States Post Office	Central Avenue	USPS	10/10/2003
Mesa Public Library	Central Avenue	Los Alamos County	11/18/1994
Pond Cabin	Pajarito Canyon	Department of Energy	5/12/1989
Ranch School Trail	Pueblo Canyon	Los Alamos County	6/13/2003
Roybal Road	Bayo Canyon	Los Alamos County	6/13/2003

Table 5. New Mexico registered cultural properties in Los Alamos County

Resource Name	Type of Resource	Listing or Owner
White Rock Canyon Petroglyphs	petroglyph	National Historic Register
Townsite Ruin	structure	Los Alamos County
Deer Trap Mesa Trail	trail	Los Alamos County
Otowi Mesa Trail	trail	Los Alamos County
Red Dot Trail, Pajarito Springs Trail	trail	Los Alamos County
River Trail	trail	Los Alamos County
Beanfield Mesa Line Cabin (site)	structure	Santa Fe National Forest
Grant Cabin (site)	structure	Santa Fe National Forest
Hopper Cabin (site)	structure	Los Alamos County
Lujan Cabin	structure	private
Romero Cabin	structure	Los Alamos Historical Society
Bayo Canyon Trail	trail	Los Alamos County
Blue Dot Trail	trail	Los Alamos County
Buckman Crossing and Road	trail	Santa Fe National Forest
Deadmans Trail	trail	Department of Energy
Dot Grant Trail	trail	Los Alamos County
Duran Road	trail	Department of Energy
Homestead Crossing	trail	Los Alamos County
Mattie Brook Trail	trail	Department of Energy
North Bayo Bench Trail	trail	Los Alamos County
Pajarito Trail	trail	Santa Fe National Forest
Quemazon Trail	trail	Los Alamos County
Ojo la Jara	natural feature	Santa Fe National Forest
Roybal Stock Pond	structure	Los Alamos County
White Spring	natural feature	Los Alamos County
Guaje Canyon Dam and Pipeline	structure	Santa Fe National Forest
Guard House	structure	private
MP Picnic Grounds	structure	Department of Energy
Rec Hall, Performing Arts Center	structure	Los Alamos County
WAC Dorm, now the Unitarian Church	structure	private
Water Canyon water system	structure	Santa Fe National Forest
Armstead Spring	natural feature	Santa Fe National Forest
e=mc2	petroglyph	Department of Energy
Bradbury House	structure	private
Guard Tower	structure	Department of Energy
Lustron	structure	private
Camp Hamilton and Trail	structure	Los Alamos County
Breakneck Trail	trail	Department of Energy
Los Alamos Bench Trail	trail	Department of Energy
Pueblo Canyon Trail	trail	Los Alamos County
Ranch School Trail	trail	Los Alamos County
Douglas Pond	structure	Los Alamos County
Los Alamos Reservoir	structure	Los Alamos County
Cañon de Valle Trail	trail	Santa Fe National Forest
Ashley Pond	natural feature	Los Alamos County
Fuller Lodge	structure	National Historic Register
Guest Cottage	structure	Los Alamos County
Chief Mechanic's House	structure	private
Power House	structure	Los Alamos County
Spruce Cottage	structure	private
Arts and Crafts Building	structure	private
Master Cottage #1	structure	private
Master Cottage #2	structure	Los Alamos Historical Society
Master Cottage #3	structure	private
Ice House Site	structure	National Historic Register
Anniversary Trail	trail	Department of Energy
Los Alamos Canyon Road	trail	Department of Energy
Evacuation Route #3	road	Santa Fe National Forest
Mortendad Cave	petroglyph	Department of Energy
Femaville Site	site	Los Alamos County
Los Alamos Post Office	structure	USPS
US Forest Service telephone line	structure	Santa Fe NF, County

Table 6. Historical sites in Los Alamos County

TRAIL STEWARDSHIP

Strategy 5. Provide effective stewardship for the open space that surrounds the County Trails Network that protects natural and cultural resources while inviting use by residents and visitors

The Los Alamos County Trail Plan provides a detailed outline for the management of trails on County land. That plan is coupled with the Trail Management Plan, and the Los Alamos County Trail Standards to provide effective stewardship of the Los Alamos Trail Network. This plan should be restructured in 2015 as a Community Trail Plan that is a framework for taking the trail network to a level that attracts additional users. The goals of the Trail Policy Plan are summarized below (see Map 5, page 32).

Suggested Action 1. Maintain and protect the Los Alamos Trail Network

- Provide opportunities for non-motorized recreation and transportation through a network of trails with historic, aesthetic, and recreational value.
- Work with community members to maintain and protect the Trail Network.

Suggested Action 2. Continue to expand and enhance the Trail Network

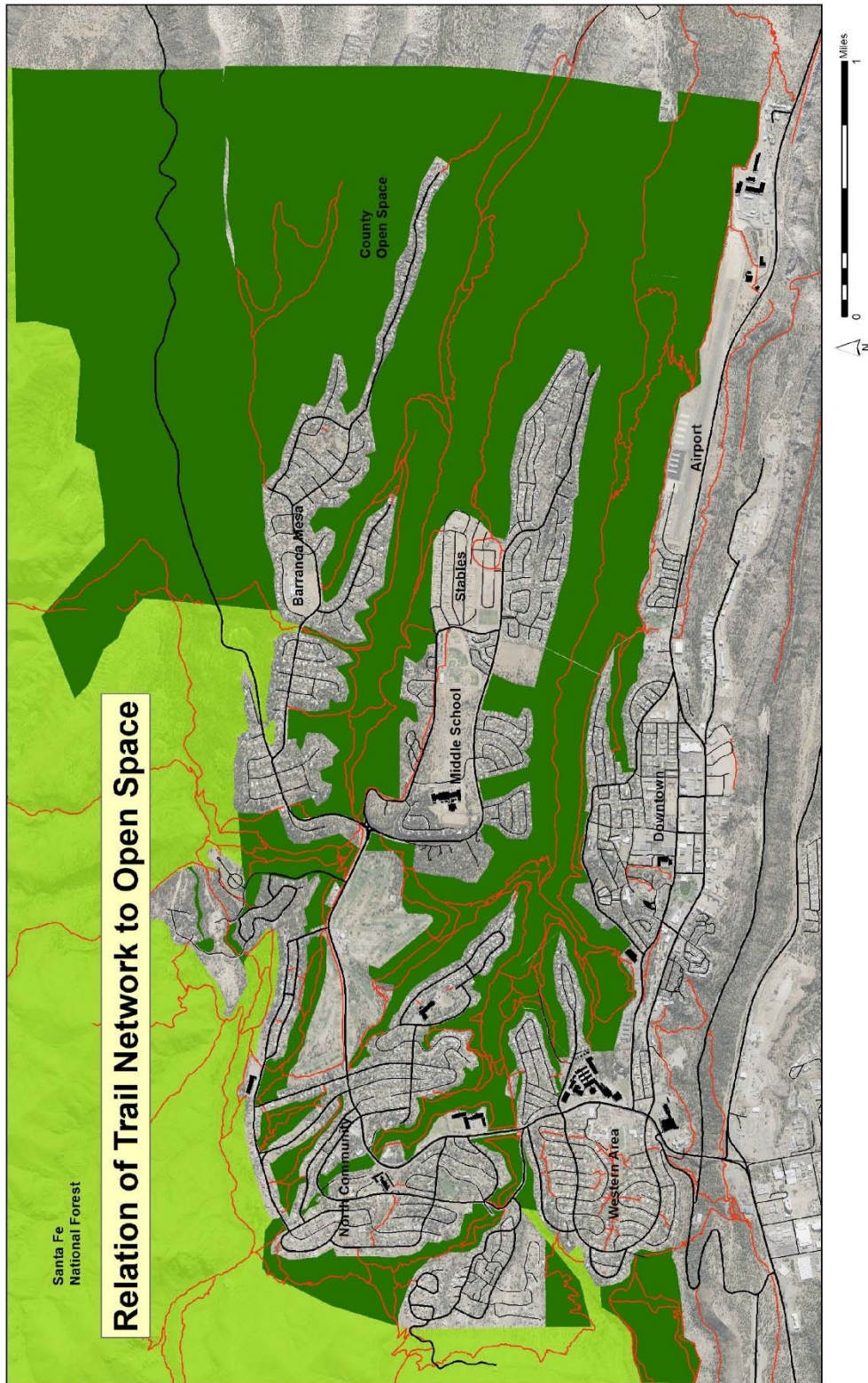
- Develop and regularly update a Community Trail Plan that provides a framework for the continued enhancement of the County Trail Network.
- Design new and redesign old trails that are safe, attractive, convenient, efficient, comfortable, maintainable, sustainable, and welcoming.

Suggested Action 3. Foster community knowledge of and support for the Trail Network.

- Provide for continuing community involvement with the Trail Network.
- Educate the public on the beneficial use of the Trail Network through maps, brochures, web sites and other means.



Map 5. Relationship of the Trail Network to Open Space



NEIGHBORHOOD OPEN SPACE

Strategy 6. Provide stewardship for neighborhood open space so that it continues to keep residents living here and attracts new people to make Los Alamos their home

Most residents of Los Alamos are connected with the community's open lands. One in seven houses in the County are on perimeter lots that border open space. About 95 percent of County residents live within a seven minute walk of County open space. This creates outstanding recreational opportunity for all residents. Many cite as an important attraction of living in Los Alamos is the ease of access to natural areas and trails. For many, the open space in their neighborhood is a critical factor in the choice to live in Los Alamos.

It is often a house's location that brings the first reaction from potential buyers. Anecdotal evidence suggests that houses on perimeter lots sell at substantially higher price than houses across the street.

Residents regularly use the recreational land adjacent to their home. It is the open space that residents visit most often, usually by walking or cycling from their homes. (In the 2012 Community Survey, about 20 percent of residents reported that they use their neighborhood open space at least five times a week.) It is where residents go for convenient exercise, to walk their dogs, or to unwind from the work day.

Every neighborhood in Los Alamos and White Rock has nearby open space. Because residents use that adjacent open space more frequently than others around town, they often feel a personal attachment to it. They treat it as an extension of their home and are often vocal in their opposition to changes in their personal open space areas. Residents often report that their favorite open space or trail is the one right out their backdoor. As examples, residents of the Western Area feel a personal attachment to the Quemazon/Satch Cowan Trail Area; in White Rock, the White Rock Canyon Rim south of the ballfields in Overlook Park is a special place to many residents.

Suggested Action 1. Identify the characteristics of neighborhood open space and quantify its value to the community

- Identify the features of neighborhood open space that are valued by trail users and homeowners.
- Use the characteristics to define and map neighborhood open space.
- Quantify the impact on property values of living adjacent to open space.

Suggested Action 2. Explore avenues for protecting the values of neighborhood open space

- Work to maintain or obtain easements that connect residents living on interior lots to their neighborhood open space.



Part 2: Managing Open Space

Part 2 of the Open Space Management Plan details resource-specific management goals and strategies for the six management units on Los Alamos County Open Space. The units are based on six distinctive plant communities found over a vertical mile of elevation range from the Rio Grande to the summits of the Sierra de los Valles (see Map 6, page 36).

- Ponderosa Pine Management Unit
- Canyons Management Unit
- Mesa Top Management Unit
- Western Perimeter Management Unit
- White Rock Canyon Management Unit
- Lower Rendija/Guaje Management Unit

The strategies in this section will be guided by the principles of adaptive management. This requires frequent monitoring of the effectiveness of management actions. If monitoring shows a strategy is not achieving its desired objective, the strategy will be modified to meet changing conditions. As an example, if climate conditions no longer support the establishment of ponderosa pine seedlings, alternative revegetation strategies must be developed.

To implement the principles of adaptive management to meet rapidly changing conditions, Part 2 of this plan will be revisited and evaluated by December 1 of each year. Specific strategies for managing the six units will be revised as conditions warrant.

Map 6. Open Space Management Units



PONDEROSA PINE MANAGEMENT UNIT

Narrative

The Ponderosa Pine Management Unit is located in shallow canyons, mid-canyon benches, and scattered mesa-top pine stands in and around the townsite. Specific sites include Woodland Canyon from Arizona Avenue to Rendija Canyon, the south border of the Los Alamos Golf Course, the benches of Pueblo Canyon, and other sites bordering other canyons (see Map 7, page 38).

These ponderosa pine stands are at the boundary of the foothills of the Sierra de los Valles and the finger mesas of the Pajarito Plateau. Because they are adjacent to neighborhoods in Los Alamos, they are critical parts of neighborhood open space parcels and are heavily visited by trail users, with many individuals using them on a daily basis. Residents take a great personal interest in these stands, calling them their dog walks, playgrounds, and sanctuaries.

Ponderosa pine dominates the ecosystem here. On these relatively dry sites, Douglas fir is rare. The understory is comprised of Gambel oak, mountain mahogany, and Fendler's barberry. Ground cover is a mix of grasses and forbs, with mountain muhly, little bluestem, and pine dropseed dominant.

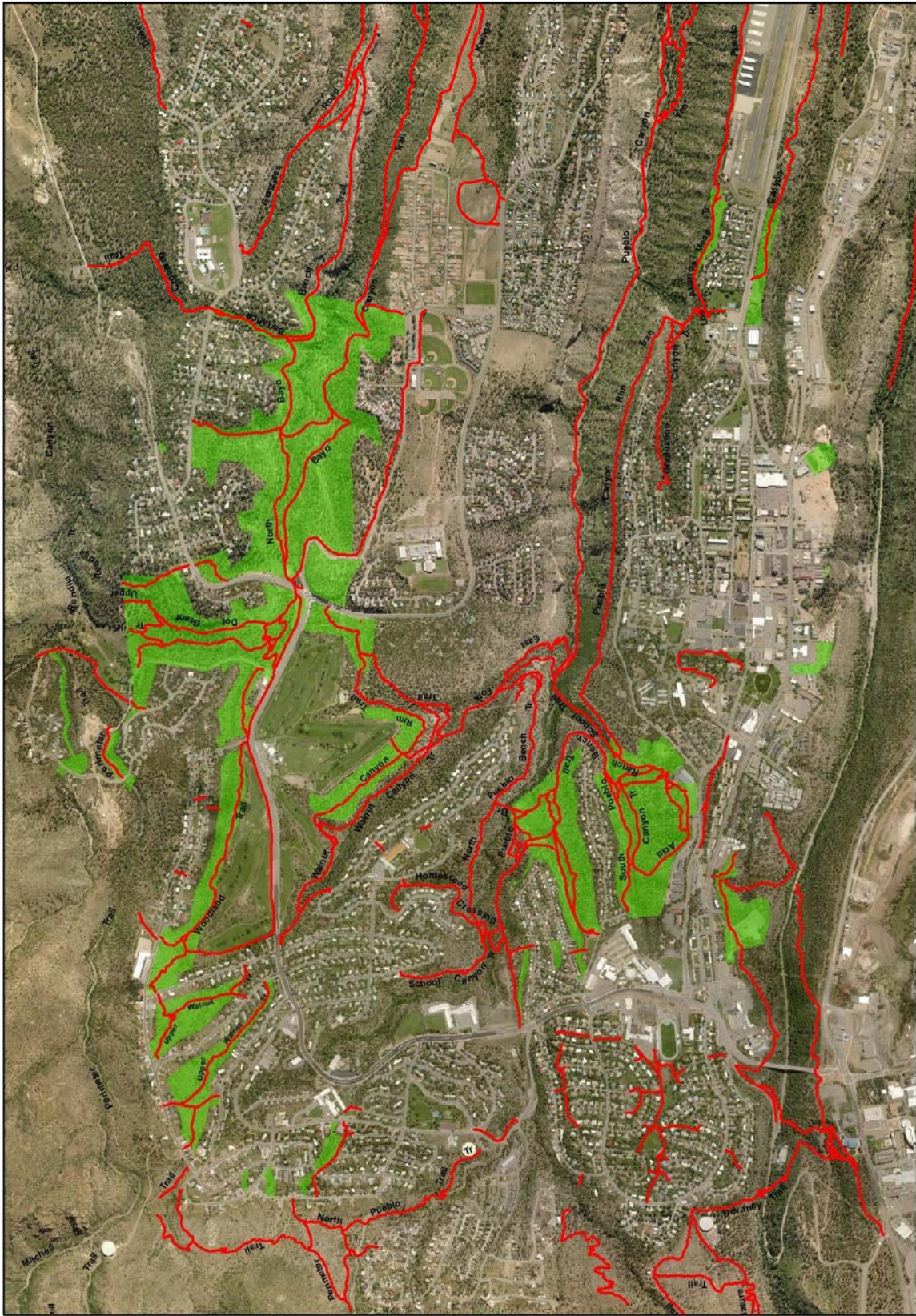


About two ponderosa pines per acre are marked with fire scars

Prior to 1900 high frequency low intensity surface fires characterized fire regimes in ponderosa pine forests. Fire history records suggest overgrazing in the late 19th and early 20th centuries suppressed previous surface fire regimes throughout the Jemez. Prior to 1900 the ponderosa pine type saw a fire regime with mean fire return intervals between 5 and 15 years. Frequent surface fires favored a grassy under story and kept the pine density and fuel accumulation in check. Livestock grazing reduced the grassy surface fuels resulting in de facto fire exclusion, which was followed by institutionalized fire suppression.

The most obvious effects of fire exclusion on local ponderosa pine forests, including the County forests, have been increases in tree densities and fuel loadings and a decrease in under story herbaceous vegetation. Historical tree densities in the ponderosa pine forests probably seldom exceeded 100 trees per acre and fuel accumulations seldom over a few tons per acre. The changes in forest structure and fuel accumulations over the past hundred years have made these forests susceptible to rapid and undesirable landscape change principally from crown fires (witness the La Mesa, Dome, Cerro Grande, and Las Conchas fires) but also from insect and disease outbreaks.

Map 7. Ponderosa Pine Management Unit



Ponderosa Pine Management Unit

Legend
Ponderosa Pine
Los Alamos Trail Network

Following the Cerro Grande Fire in 2000, the Federal Emergency Management Agency provided funding for a County fuel mitigation project. Between 2002 and 2005, about 1,200 acres of ponderosa pine forests on County-owned land received treatment. Using mechanized methods, the forest stand densities were generally reduced from as high as 4,000 stems per acre to between 80 and 120 stems per acre. Ladder fuels were also removed. Starting in 2005, prescribed burning has furthered wildland fuel reduction through broadcast and pile burn operations. Through 2012, broadcast burn operations have covered 100 acres, and pile burning has reduced dead and down material fuel loads on about 600 acres.

In terms of ecological health, the goals of active forest management in ponderosa pine forests are to maintain historic tree density, to re-establish a natural ground cover, and to provide for wildlife habitat and corridors. Mechanical and hand thinning operations can meet the goal for stand density, but ground cover and wildlife habitat objectives are dependent on the use of fire. Despite the vigorous treatments already accomplished, there remains a thick layer of duff—mostly pine needles—covering almost all forested acres. The duff, as deep as 6 inches in many locations, ties up vital nutrients and inhibits the establishment of understory and ground vegetative cover. The most effective way to invigorate the natural cover is to burn off the duff layer.

Upper Bayo Canyon and its tributary forks represent the largest contiguous ponderosa pine forest on County open space. The headwaters area is relatively flat with open, grassy pine stands throughout. After flowing about a quarter mile, the canyon suddenly deepens, splitting the flats into two benches. Small tributary canyons enter from both the north and south, and these stands are generally patches of mixed conifer forest. As the benches thin out to the east, the vegetation shifts to species more adapted to drier conditions, and juniper takes over at the eastern tips.

The Rendija Canyon and its major tributary from the townsite, Woodland Canyon, are located along the northern perimeter of Los Alamos. Rendija Canyon is a tributary of Guaje Canyon and drains the southern face of Guaje Ridge. Woodland Canyon borders housing on the street for which it was named and the Los Alamos County Golf Course.

The upper Rendija watershed was in the high burn severity area of the Cerro Grande Fire. The combination of steep slopes and lack of vegetative cover produced high-volume flooding in 2000 through 2003. To stabilize flows, the Santa Fe National Forest planted 500 coyote willow poles in the spring of 2007. Even though only a few acres of the upper watershed were re-burned, the willow stand was cut back following the Las Conchas Fire in a mistaken effort to protect Maple Drive. The willows grew back, but the Rendija corridor was channelized following flooding in September 2013 and the willows were all removed.

The upper quarter mile of Woodland Canyon burned completely during the Cerro Grande Fire, but the rest of the canyon was outside the fire perimeter. All standing dead trees were removed from the burned area of Woodland Canyon in early 2001. Fuel mitigation was completed on all the county-owned sections of the management unit in 2003 and 2004 and thinning reduced stand density to about 100 trees per acre.

The character of Walnut Canyon changes north of Diamond Drive. The main drainage branches into two shallow basins covered with open ponderosa pine stands. This open space is bordered by housing and streets of North Community.

Summary of Current Conditions

Ecosystem Health

- Bark beetle mortality in ponderosa
- Most stands have a tree density of between 80 and 120 trees per acre
- Thick duff layers inhibit understory and ground cover regeneration
- Opened stands are subject to windthrow
- Stormwater flows incise deep channels when stands are adjacent to developed areas

Fire History

- Historic fire return interval 7 to 10 years
- Fire has been generally excluded for 130 years
- Some stands burned during the Cerro Grande Fire

Previous restoration work

- Fuel mitigation project thinned most pine forests between 2003 and 2006

Management Objectives and Strategies

1. Objective: Maintain healthy forest conditions in ponderosa pine stands through continued active management of pine forests.

Strategies:

- Maintain ponderosa pine stem density at historic levels of between 50 and 100 trees per acre through continued thinning operations.
 - Identify remaining unthinned stands through field surveys and GIS mapping.
 - Thin stands using historic patterns of “clumpiness:” trees are not evenly spaced but left in clumps of 6 to 10 trees where the clumps are spaced 100 to 150 feet from other clumps.
 - Remain sensitive to the needs of homeowners at the interface by addressing visual and sound screening in addition to fuel loads.



Historic ponderosa pine forests were open, grassy stands with about 50 to 100 trees per acre

- Manage ladder fuels in all pine stands to reduce the likelihood of ground fire transitioning to crown fire.
 - Use annual field surveys and GIS mapping to identify pine stands where ladder fuels are less than nine feet from ground level.
 - Remove ladder fuels on at least 5 acres per year prioritized by the Wildfire Hazard Zones identified in the Community Wildfire Protection Plan.
- Continue the removal of dead and down woody debris from thinned pine stands through cut, pile, and burn operations.
 - Use annual field surveys and GIS mapping to identify pine stands where significant large-diameter woody debris remains.
 - In coordination with the Los Alamos Fire Department, reduce large-diameter fuel loads to 10 tons per acre on 25 acres per year through pile burn operations.

- Leave at least 5 large-diameter logs per acre to provide wildlife habitat, perches, and shelter



Forest health in ponderosa pine forest should be maintained with prescribed fire

- For improved nutrient cycling in forest stands, reduce duff layer through prescribed burning.



Thick duff, mostly composed of pine needles, inhibits the growth of understory species in ponderosa pine stands

- Use annual field surveys and GIS mapping to identify pine stands where understory growth is inhibited by thick accumulations of duff.
- Prioritize the areas where reduced forest health prevails by the seriousness of the stand conditions.
- In coordination with the Los Alamos Fire Department, prepare for and implement broadcast burn operations on 20 acres.

2. Objective: Monitor changing conditions in ponderosa pine forests that are the result of drought, increasing temperatures, and insect activity.

Strategies:

- Maintain target levels of fuel loads by monitoring and removing windthrow in thinned ponderosa pine stands.



Increased windthrow—felling of live pines by high winds—is a common occurrence in thinned pine stands

- Monitor significant windthrow areas through field surveys and GIS mapping.
- Remove 80 percent of the windthrow when fuel loads exceed 10 tons per acre.
- Manage insect- or drought-killed snags with a balance between fuel reduction needs and wildlife habitat considerations
 - Monitor stands of significant tree kill through field surveys and GIS mapping.
 - Remove snags as necessary but always leaving at least 5 snags per acre for wildlife habitat.
 - Every five years, monitor overall forest density, crown, and ground cover using aerial photographs and ground repeat photography.

3. Objective: Reduce erosion damage and sediment transport caused by stormwater runoff from urbanized areas.

Strategies:

- Using school students and youth volunteers, create water controls along urban runoff channels and use the opportunity to teach about watersheds, erosion, and the effects of urbanization on adjacent open space.
 - Establish stormwater wetlands where appropriate.
 - Review development and construction plans as related to stormwater effects on open space.
 - Where possible, utilize dead and down tree material for erosion control.
4. Objective: Maintain a map of known locations of sensitive plant species and monitor populations yearly.

Strategy:

- Conduct annual survey of known and former locations of populations of wood lily and gramagrass cactus.

CANYONS MANAGEMENT UNIT

Narrative

The Canyons Management Unit is the core of the Los Alamos County Open Space System (see Map 8, page 46). It is the most contiguous area of County-owned open space, extending from the eastern county boundary and connecting to the foothills of the Sierra de los Valles through other management units, and covers more than 3,000 acres. It provides wildlife their major corridor through the county; it is home to a least one threatened and endangered species; it holds rock formations so unique that they were once featured in National Geographic Magazine; and the views of the canyon system from vista points along the rim are one of the defining characteristics of living in Los Alamos.

Lower Pueblo Canyon lies at the end of a six-square mile watershed that heads near the rim of the Valles Caldera. Tributary canyons to Pueblo include School, Walnut, and Acid canyons. The Bayo Canyon drainage is confined to the area between Barranca and North mesas. To the north lay Rendija Canyon and its major tributary, Barrancas Canyon. These major canyons are bordered by steep walls of Bandelier tuff that range from 100 to 400 feet in height.

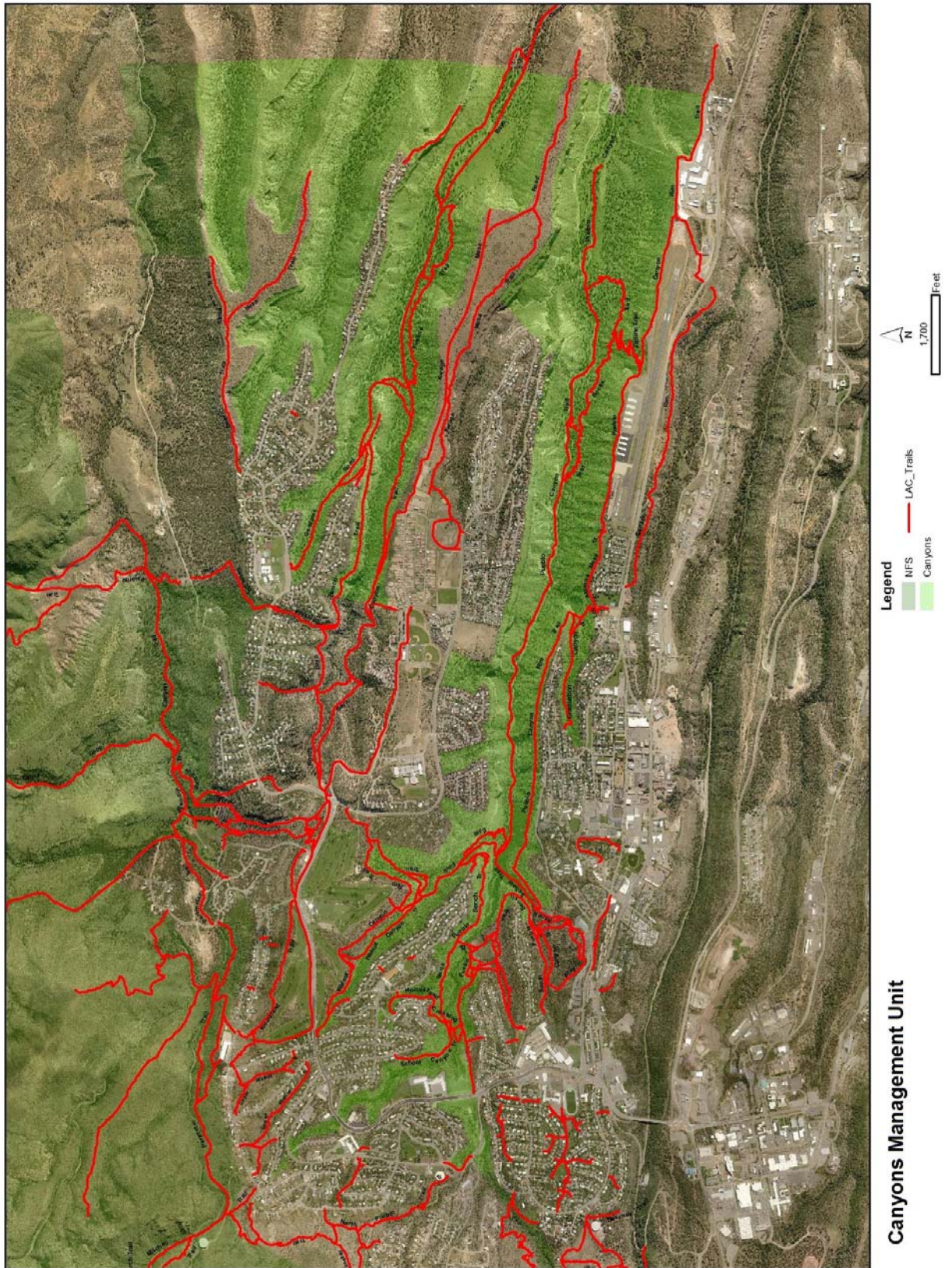
Stream channels wind through the canyon bottoms, but all are ephemeral. However, the lower portion of Pueblo Canyon receives perennial flow from an outfall at the Los Alamos Wastewater Treatment plant. Post-fire flooding after the Cerro Grande and Las Conchas fires affected flow patterns in the lower canyon that include channel incision, the development of headcuts, and channel migration. Rendija Canyon saw major flood events after Cerro Grande, but the other canyons were unaffected by the Cerro Grande and Las Conchas fires.



Bayo Canyon holds magnificent stands of mature ponderosa pine

Rocky, south-facing slopes of the canyons support sparse populations of piñon, juniper, and oak; north-facing slopes and the canyon floodplains, are covered with ponderosa pine forest. The upper canyon reaches, and the upper north-facing slopes, also hold thin to dense stands of Douglas fir. Many of the piñon populations in the canyons were killed by the early 2000s bark beetle infestation. The pine stands contain old-growth, orange-trunked ponderosa more than 200 years old. Because the stream channels are incised,

Map 8. Canyons Management Unit



old-growth cottonwoods are rare, as is willow along the banks. In the area below the treatment plant outfall, the floodplain supports dense reed canarygrass.

The canyons are major wildlife habitat and corridors for large mammals such as mule deer, black bear, mountain lions, and grey fox. The riparian zone supports many species of wildlife including raccoons, Abert's squirrels, and coyotes. Birdlife is plentiful, including wood warblers, flycatchers, and Red-tailed Hawks. Active Peregrine Falcon nesting sites are located in the canyons.

Pueblo and Bayo canyons were home to the Ancestral Pueblo culture. Otowi Pueblo and others, as well as numerous cavate cliff dwellings, are located within the management unit and on adjacent San Ildefonso Pueblo lands.

Low levels of contaminants, including plutonium, are present in pockets throughout Pueblo Canyon. Most of the plutonium is bound to stable sediment and is not mobile as long as the sediment remains in place. Erosion control is a critical feature of land management along the Pueblo channel. A former Los Alamos National Laboratory test firing site and radiochemistry lab is located in Bayo Canyon. Radioactive materials are present in the soil around the lab site. The area is fenced off and concrete monuments identify the area with the highest levels of contamination. The Bayo Canyon Trail formerly passed through the site, but trail users are now directed around the area.

Standing in ranks on the lower slopes of Pueblo Canyon, rock sentinels with stone heads and conical bodies keep watch over canyon floor. A creation of an unusual combination of geology, the photogenic rock towers have lured visitors to the canyon for more than a century. Known variously as hoodoos, stone tents, or tent rocks, the formations are found only in a handful of locations around the world.



Tent rocks are found in Pueblo and Rendija canyons

Tent rocks in Pueblo Canyon are composed of welded volcanic ash spewed from a massive eruption of the Valles Caldera about 1.2 million years ago. A mixture of pulverized rock and hot gases flowed down from the rim of the volcano like liquid, spreading a layer of fused ash—tuff—up to 200 feet thick. Subsequent rainstorms moved assorted sized chunks of lava from above and deposited them on top of the ash. A stream draining the east face of the volcano gradually

carved a deepening canyon out of the deposits. In the depths of Pueblo Canyon, the erosion-resistant lava boulders offered protection to the much softer tuff layer below. As

the softer material eroded away, the caprocks of lava were left balanced on columns of tuff. Where the caprock remains in place, the formation takes on the appearance of a cloaked human figure. Other caprocks gave up their precarious perch, leaving behind teepees of tuff that give the features their name.

In the first two decades of the twentieth century, the tent rocks were one of the popular tourist destinations in northern New Mexico. Visitors taking the long, rough road from Santa Fe to Bandelier National Monument often enjoyed a side trip to Otowi Pueblo and the tent rocks upstream of the site. Photos of the tents were featured in *The Ethnogeography of the Tewa Indians* by the Smithsonian Institution's John Peabody Harrington.

Walnut Canyon is a mid-reach tributary of Pueblo Canyon. For a mile above the confluence with Pueblo, Walnut Canyon and its East Fork are steep-walled and about 150-feet or more deep. The East Fork narrows into a small canyon that drains the east half of the Los Alamos County Golf Course.

Dense ponderosa pine filled the upper basins at estimated densities up to 800 stems per acre. These stands carried crown and ground fires during the Cerro Grande fire. Remaining stands of pine were thinned in 2004, mostly with mechanical treatments that left about 40 stems per acre. By 2005, the pine stands in the upper basins had a lush understory of native grasses.

The main stem of Walnut Canyon supports thick mixed conifer forest. Areas with slopes less than 30 percent were thinned, some by mechanical means, others by hand. The upper canyon is very narrow and dense stands of ponderosa pine and Douglas fir remain intact. The north facing slope offers habitat to plants not often found at these elevations.

The County-owned portion of School Canyon is only a mile long, but the history, habitat, and plant communities within the canyon are diverse. The upper watershed of this Pueblo Canyon tributary is on the Santa Fe National Forest and County open space and drains the area of Burnt Mountain between Pueblo and Rendija canyons. Below Arizona Avenue the canyon quickly deepens into a ravine. Mixed conifer forest dominates the canyon walls above Diamond Drive. Below Diamond the canyon remains deep but the bottom broadens. Reed canarygrass covers the floodplain, and willows are abundant where the floor meets the slopes.

The School Canyon drainage has the highest percentage of urbanized area of all the upper tributaries of Pueblo Canyon. As a result, stormwater runoff often has a high peak volume. This results in deep stream entrenchment of the riparian area in the lower portion of the canyon.

The canyon and its small southern tributary are a major wildlife corridor between the central canyons and Western Perimeter of Los Alamos. Mule deer frequently cross Diamond Drive to continue to follow the canyons up or down stream.

The head of Barrancas Canyon lies between Deer Trap Mesa and the Los Pueblos finger of Barranca Mesa, and the canyon and heads east to meet Guaje Canyon. It holds thick

stands of ponderosa pine on the north-facing slopes and piñon-juniper stands of the south-facing side of the canyon. Loose pumice soils throughout the canyon are an easy target for stormwater runoff and the canyon is laced with deep erosion channels.

Summary of Current Conditions

Ecological Health

- 100 percent high burn severity in upper watersheds from Cerro Grande Fire
- Rapidly changing riparian zones in Rendija Canyon, Pueblo Canyon
- Piñon mortality in lower sections
- Overstocked pine and mixed conifer forest in narrow canyon reaches

Fire History

- Spotty fires, all human caused, in the Range Road area
- Fire scars on a beetle-killed ponderosa pine indicate spreading surface fires in the Range Road area in 1910 and 1880

Management Objectives and Strategies

1. Objective: Manage all forest stands for improved forest health and to protect adjacent housing areas from wildfire with a fire management plan that combines mechanical and hand thinning, piling and burning, and broadcast burning.

Strategies:

- Adjacent to housing areas in upper Walnut, School, and Woodland canyons, maintain ponderosa pine stem density at historic levels of between 50 and 100 trees per acre through continued thinning operations.
- Actively manage forest stands in the canyon bottoms using prescriptions similar to those in the Ponderosa Pine Management Unit: thin to 50 to 100 trees per acre, manage ladder fuels, pile and burn excessive dead and down fuel loads.
- On north-facing slopes, continue to use hand-thinning techniques to reduce the density of Douglas fir.
- Assess and treat mixed conifer stands in narrow tributary canyons using a prescription that takes into account the high soil moisture conditions in the tributaries.
- Maintain adequate cover for wildlife in all treatments.

2. Objective: Because wildland fighting ability is reduced by the inaccessibility of many of the canyons, develop better access to the management unit by establishing new and connecting existing trails.

Strategies:

- Actively maintain existing trails in Pueblo, Bayo, Rendija, School, and Walnut canyons to provide continued easy access for fire crews.
- Construct new trails where they could also function as firelines.



The health of the upper canyon watersheds depends heavily on the regeneration of ponderosa pines

3. **Objective:** Monitor and if necessary continue forest restoration efforts in the upper watersheds of School, Walnut, Pueblo, and Rendija canyons.

Strategies:

- Continue to monitor seedling survival ratings across the unit.
- If survival rates fall below a density of 50 to 100 trees per acre, utilize volunteers to plant additional seedlings.

4. **Objective:** Protect sensitive species within the canyon through continued monitoring and adaptive management techniques.

Strategies:

- Coordinate with active sensitive species monitoring projects to assess current status of the species.
- When necessary, continue to limit mechanized equipment in the canyons from March 15 to August 15.

5. **Objective:** In Pueblo and Rendija canyons, protect tent rocks from damage from erosion and human use.

Strategies:

- Monitor the conditions of major tent rock clusters with repeat photography.
- Minimize vehicle traffic along roads to protect tent rocks.
- If necessary, construct runoff diversions to stabilize tent rocks susceptible to erosion damage.

6. Objective: Work closely with Los Alamos National Laboratory (LANL) to minimize sediment and contaminant transport in Pueblo and Bayo canyons.

Strategies:

- Continue coordination of resources and data with LANL environmental staff on flow data, wetlands status, and existing and future stormwater controls.
- As funding permits, re-establish riparian vegetation in the channel, including cottonwood and willow.
- Develop and enforce stormwater management regulations for the urbanized areas of the upper watershed.

MESA TOP MANAGEMENT UNIT

Narrative

The Mesa Top Management Unit is a discontinuous collection of finger mesas separated by deep canyons. The fingers of rock extend out from the mountain front of the Sierra



Ball pincushion cactus is only found in the Mesa Top Management Unit

de los Valles to the east. Together with other mesas on other jurisdictions to the north and south, the unit makes up the eastern ends of the elevated portions of the Pajarito Plateau.

Prominent mesas on Los Alamos County open space are Los Alamos, Kwage, Deer Trap, and the eastern extension of Guaje Ridge (see Map 9, page 53).

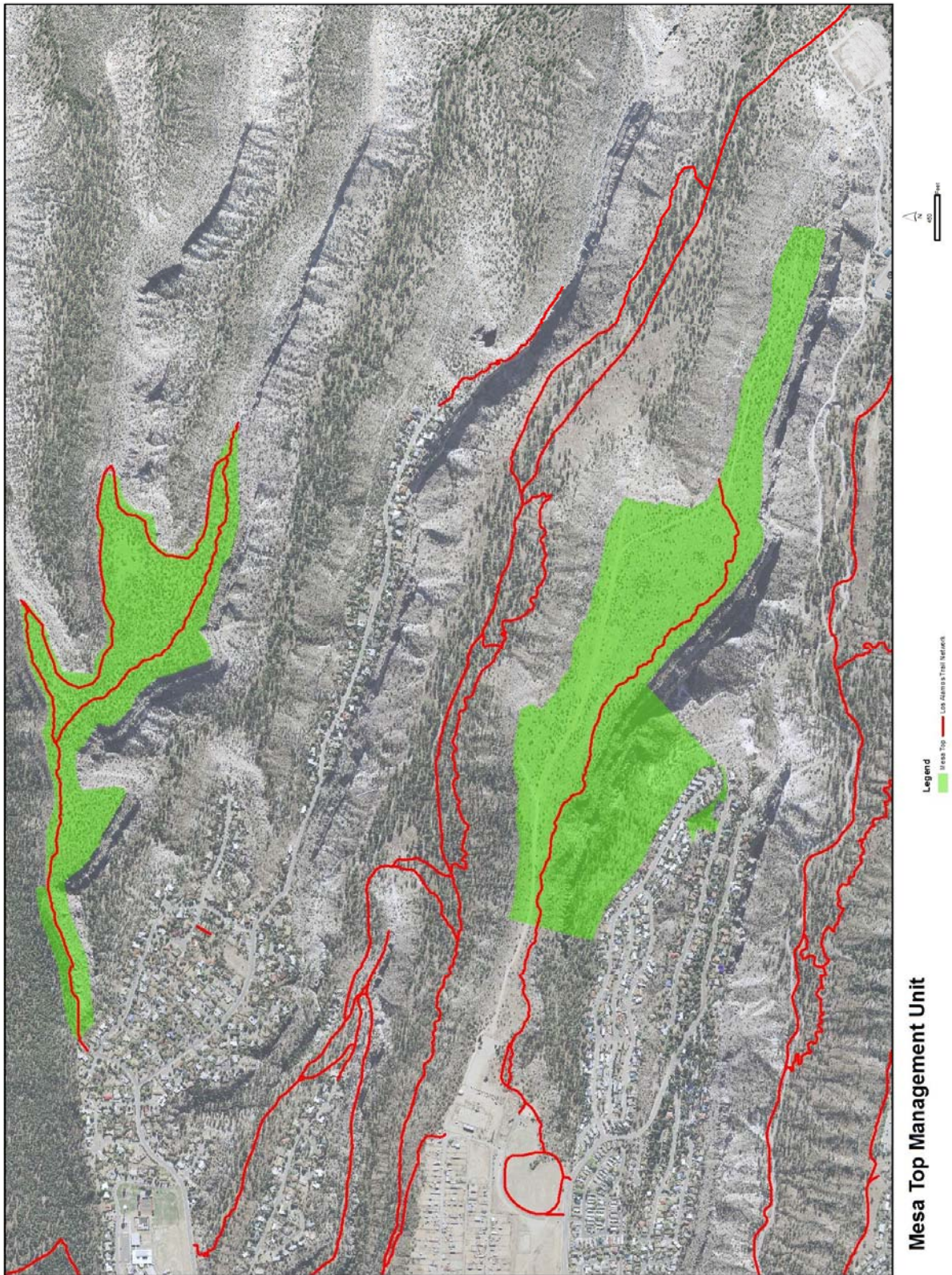
The mesa tops gently slope to the east from the foothills of the Sierra de los Valles. The adjacent

canyons, carving deeply into the volcanic tuff of the Pajarito Plateau, have left the mesas isolated and bordered by orange cliffs. The mesa tops typically lie 300 feet above the canyon floors. As a result, vistas along the mesas and particularly at their tips are superb. The viewsheds of the mesa tops encompass the surrounding canyons, adjacent mesas, the Rio Grande Valley, the Sierra de los Valles, and the Sangre de Cristo Mountains. Bedrock on all the mesa tops is composed of tuff. The terrain is rocky with thin soil on the flats.

Much of the terrain is covered with piñon-juniper woodland and one-seed juniper grasslands. Small patches of ponderosa pine forest are found in alcoves of the mesas. Ground covers include grasses such as blue grama, galleta, *Aristida* sp., and sideoats grama. Big sagebrush is the dominant shrub species.

Due to the level nature of the terrain, most of the mesa top landscape in Los Alamos County is developed. Urbanization has not extended to Deer Trap Mesa, Kwage Mesa, and the tip of Otowi Mesa. When the Atomic Energy Commission transferred ownership of North Mesa to Los Alamos County in 1972, a deed restriction dedicated the eastern half as open space for parks and recreation. Condition D of the Quitclaim Deed states, "The condition that the conveyed premises shall be used and maintained in perpetuity for the public purpose set for in the program of utilization and plan...in the event the conveyed premises cease to be used for said public purposes, right, title and interest in and to all or any portion of said premises, in its then existing condition, shall revert at the option of the Grantor to the Grantor."

Map 9. Mesa Top Management Unit



Deer Trap Mesa retains Preservation Status, PL (W-2), under the County Code. Kwage Mesa is zoned PL (W-1).



Blue grama covers about 40 percent of the mesa tops

During the drought of the late 1990s and early 2000s, much of the canopy and ground cover on the mesa tops was lost. Bark beetles infested and killed about 95% of the mature piñons. Reduced precipitation stressed native grasses and reduced their number. As a result, areas of exposed soil have increased. Rills and gullies have developed; old trails have channelized runoff and created deep ruts. The main trail on the south edge Kwage Mesa is

severely eroded and focuses water in deepening channels. Sediment transport into the adjacent canyons has increased.

Lop-and-scatter treatment of dead piñon is an effective treatment for providing surface roughness, moisture retention, and seedling establishment. The fuel mitigation project on Kwage Mesa provided material for lop-and-scatter on the west end of the mesa, and on the east end, trees were masticated and the chips left on site.

When the land exchange and purchase agreement between Los Alamos County, San Ildefonso Pueblo, and the USDA Forest Service is finalized, the extensive mesa top between the confluence of Rendija and Guaje Canyons will become part of this management unit.

Summary of Current Conditions

Ecosystem Health

- Bark beetle mortality in piñon up to 95 percent
- Piñon seedling recovery is dramatic
- Reduced canopy and ground cover
- Increased soil erosion
- Erosion from utility road on Kwage Mesa

Fire History

- Estimated fire return interval of 50 to 100 years
- No recorded fires in management unit

Previous restoration work

- Lop-and-scatter treatment completed on west half of Kwage Mesa
- Fuel mitigation project removed standing dead piñon and some juniper through mastication in the spring of 2005



Using a Hydro-ax, crews ground up beetle-killed piñons and scattered the material as effective ground cover

Management Objectives and Strategies

1. Objective: Use adaptive fuel reduction techniques to manage woodlands in a manner that permits containment of wildfires to individual mesa tops.

Strategies:

- Establish study plots on both Deer Trap and Kwage mesas to evaluate long-term changes in stand density.
 - Every five years, monitor both piñon and juniper mortality within study plots. Use the data to establish thinning prescriptions for the next five years.

- Every five years, monitor piñon seedling density in study plots and use the data to determine if seedling reduction measures are necessary.



After the bark beetle die-off in 2002, piñon seedlings have re-established in great numbers

2. Objective: Control erosion and sediment transport from areas of exposed soils across the mesa tops.

Strategies:

- Construct one-rock dams on major gullies.
- Reconstruct Kwage Mesa Trail to control erosion and sediment transport along the trail.
- Use natural materials to fill in developed ruts.
- As piñon mulch from the mastication process degrades, increase live ground cover to 60% by designating annually five acres to be treated with native grass seed.

3. Objective: On Kwage Mesa, control runoff from the utility road.

Strategies:

- Close utility road down to a double track, add water bars, and other water control structures.
- Focus trail users on the north rim of the mesa by constructing a new trail along the rim.

4. Establish baseline conditions for cultural sites and monitor the sites for potential erosion damage.

Strategies:

- Record baseline conditions with photographs and written records.
- Work with the State Historic Preservation Office to establish a Site Watch program for monitoring cultural sites.

WESTERN PERIMETER UNIT

Narrative

The Western Perimeter Management Unit is located along the border between the townsite and the Santa Fe National Forest. Lands along the foot of the Sierra de los Valles were held by the Atomic Energy Commission and its successors until the early 1990s. The Western Perimeter Tract was transferred to Los Alamos County and divided into tracts, some considered for development, others designated as open space (see Map 10, page 59).



The Cerro Grande Fire killed most of the trees along the Western Perimeter of Los Alamos, and in 2003 the standing dead snags were masticated. The area is now a shrub-dotted grassland.

Dense ponderosa pine stands covered the rolling hills of the tract. Whipped by high winds, these stands supported an intense crown fire on the afternoon and evening of May 10, 2000. About 90 percent of the forest on the Western Perimeter experienced stand replacement. The fire consumed virtually all the ponderosa pine from the Quemazon Trail to the Mitchell Trail.

Because of its proximity to and visibility from the town, the Western Perimeter has been the focus of much post-Cerro Grande fire restoration work. Fuel mitigation projects removed and ground the standing burned trees from most of the tract. Large diameter and length wood chips remain scattered across the surface. Some standing snags over 16 inches in diameter were left standing. About 8,000 ponderosa pine seedlings were planted in the area from 2000 to 2004. About 2,000 aspen seedlings have been planted in the more mesic sites along the tract. With support from a Clean Water Act Section 319(H) grant, in 2002 students from Los Alamos schools rolled and distributed about

125,000 seed balls laden with native grass and wildflower seeds in the area between the Mitchell Trailhead and North Pueblo Canyon and near the Quemazon Trailhead.

Despite the severity of the burn in the area, the tract remains important wildlife habitat. Mule deer are common in the unit, and elk occasionally wander in from the hills above. As aspen stands rejuvenate and spread, elk may become more common. Small mammals such as cottontails, Abert's squirrels, and bobcats are recolonizing the area. However, ample opportunity exists to enhance wildlife habitat through plantings.

As the new plant community evolves, it is important to carefully monitor the changing conditions and manage the wildland fuels on the parcels. The fire regime, formerly a high intensity crown fire through ponderosa pine, has been altered to a low-intensity, fast-moving grass and shrub fire. Fuels adjacent to homes should be managed appropriately.



Because of the disturbance in the plant community from the Cerro Grande Fire, the Western Perimeter has been invaded by a large number of invasive species. The spread of these plants should be held in check through continuing aggressive mechanical treatments and the known locations of invasives monitored each year.

The tract holds Los Alamos County network trails that link to trails in the Santa Fe National Forest. The Perimeter Trail traverses through or above the entire tract. The trail is segmented and in some places disconnected from other nearby trail by canyons or private land. As land or resources become available, these disjointed trail segments should be connected.

Cheatgrass is one of many invasive species found on the Western Perimeter

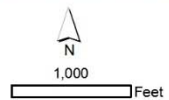
Map 10. Western Perimeter Management Unit



Western Perimeter Management Unit

Legend

- NFS
- Western Perimeter
- LAC_Trails



Summary of Current Conditions

Ecological Health

- Stand replacement fire left few trees
- Fuel mitigation treatment left large chips that may interfere with stand recovery
- Invasive species are common in the burned area

Previous Restoration Work

- Removal of standing snags
- Mulching of standing snags
- Ponderosa and aspen seedlings planted to increase ground cover
- Seed balls with native plant seeds scattered on 50 acres

Management Objectives and Strategies

1. Objective: Maintain low fuel density for protection of adjacent housing.

Strategies:

- Monitor ground cover establishment and use fire behavior modeling to determine thresholds for high risk of fire spread.
- When high-risk thresholds are reached, implement a prescribed burning program that maintains below threshold fuel loads.
- Using field surveys and GIS, map pockets of large-diameter fuels and include pile burning in prescribed fire plans.

2. Objective: In areas altered by stand-replacement fire, re-establish ponderosa pine forest at historic stem densities.

Strategies:

- Continue to monitor seedling survival ratings across the unit.
- If survival rates fall below a density of 50 to 100 trees per acre, utilize volunteers to plant additional seedlings.

3. Objective: Continue monitoring the effects of mastication debris on re-establishment of ground cover.

Strategies:

- Annually evaluate ground cover on at least ten 100-meter transects in the unit.
- Monitor depth of masticated material along the same transects.
- If ground cover falls below 60%, re-seed five acres of the affected areas with native seed every year.

WHITE ROCK CANYON MANAGEMENT UNIT

Narrative

White Rock Canyon is one of the jewels of Los Alamos County Open Space. Carved by the Rio Grande through lava oozed from the Caja del Rio volcanic field on the east bank of the river and the orange tuffs of the Valles Caldera eruptions, the canyon is a geologic masterpiece created by hot rock, landslides, and the mighty river. Averaging 1,000 feet deep from rim to river, the canyon offers spectacular vistas, rugged terrain, and a chance for solitude unmatched in the County. Those features alone would be enough to designate the place as special, but White Rock Canyon hosts rare four plant species, is frequented by at least three endangered species, and most importantly, is listed on the National Register of Historic Places, the only canyon in the United States to enjoy such a designation (see Map 11, page 63).



The Rio Grande threading through White Rock Canyon

Basalt—the stuff of fluid lava flows—dominates the rock walls of the canyon. Varying from black to brown to almost purple, the hard, pock-marked rock forms sheer cliffs near the rim. Below the canyon edge, the soft underlying mudstone of the Santa Fe Formation creates a slick surface for slipping rock. Massive slump blocks have rotated toward the river, slicing off tons of canyon wall as they slid. The remaining boulder piles make any travel in the canyon as difficult a journey as one finds anywhere.

White Rock Canyon is a natural and cultural resource of national significance. The presence of abundant flowing water creates distinct habitats within the canyon. The riparian zone along the Rio Grande supports plant and animal communities found nowhere else within the County, and the numerous springs in the canyon provide additional riparian habitat. Special features of these areas are the presence of Bog

orchids and Helleborine orchids, potential nesting areas for the endangered Southwestern willow flycatcher, and roosting sites for Bald eagles.

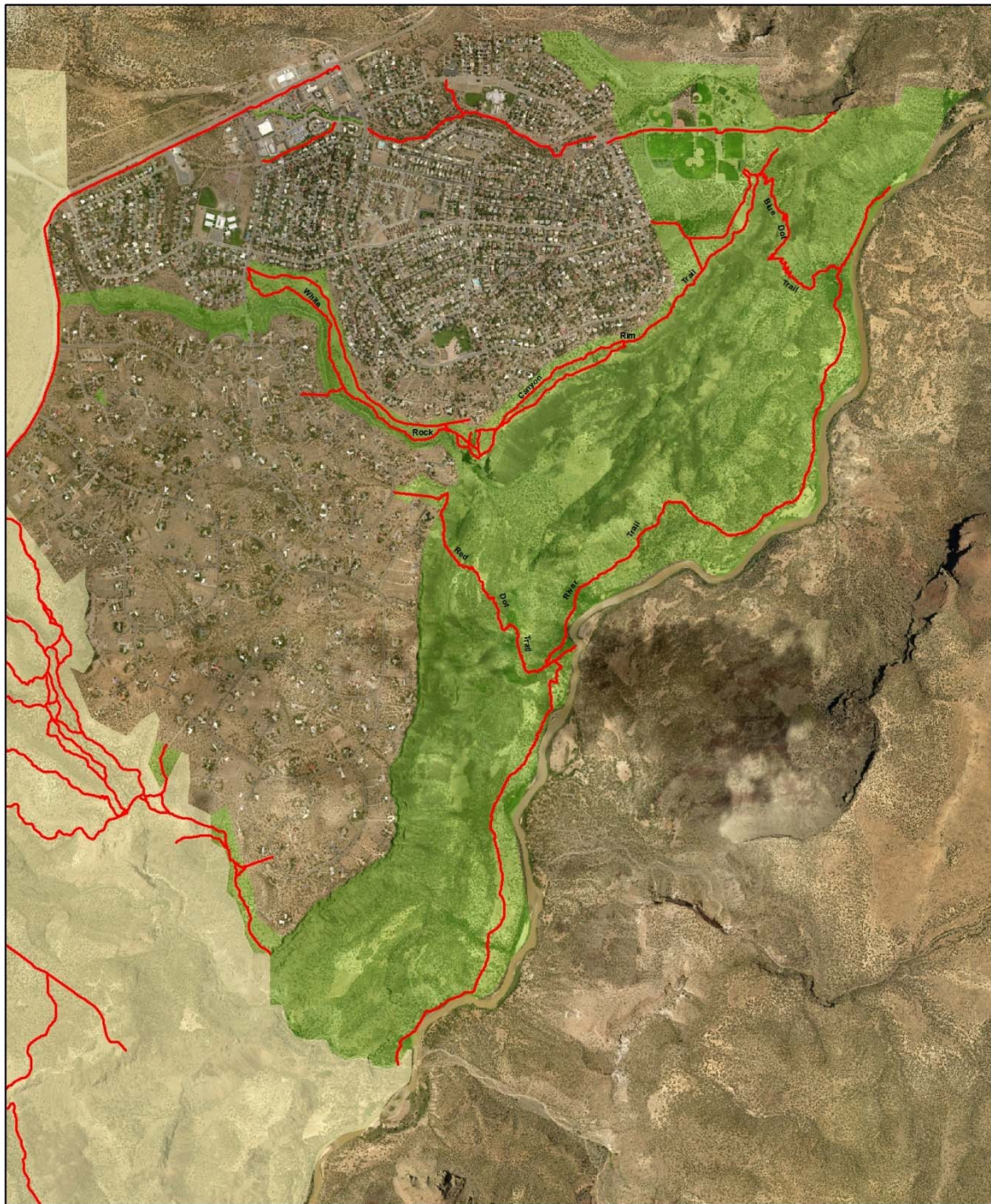


The rocks in White Rock Canyon are decorated with thousands of petroglyphs

Soil blown and washed in from above accumulates behind the basalt ramparts. The Ancestral Pueblo residents of the large villages of the Pajarito Plateau put this soil to use, dry farming some of the terraces and on others building extensive canal systems to irrigate their fields. Left behind are the rock-lined canals, block terraces, and magnificent petroglyphs in profusion. Hundreds of horned serpents, elk, kachinas, spirals, bejeweled ladies, and others are scratched or pecked onto the rocks. About 100 petroglyph sites are located in the canyon and more than 1,000 individual art works are found in these sites. A few painted pictographs are also found in the canyon. This collection of ancient artwork led to the canyon's listing on the National Register in 1990.

White Rock open space extends west from the rim of White Rock Canyon through White Rock along Pajarito Canyon. The components of this portion of the unit are the White Rock Canyon rim, the Pajarito Canyon corridor from White Rock Canyon to New Mexico Highway 4, and the Cañada del Buey corridor from the main canyon to Sherwood Boulevard. The area provides abundant recreational opportunities for residents of White Rock and visitors to Overlook Park and White Rock Canyon. The Santa Fe National Forest manages the east side of the canyon Across the Rio Grande. To the south is the Department of Energy's White Rock Canyon Preserve, which is turn is bordered on the south by Bandelier National Monument. All land owners hold a valuable piece of the of the overall nature of the canyon.

Map 11. White Rock Canyon Management Unit



White Rock Canyon Management Unit

Legend
White Rock Canyon — Los Alamos Trail Network
LANL

N
990
Feet



Pajarito Springs is one of several springs whose outflow cuts through the lower portion of White Rock Canyon

The rim itself is rocky and supports only thin soils. From Overlook Park to Pajarito Canyon, open space extends from the canyon rim to housing in White Rock. This area is about 300 feet wide and provides a buffer between the canyon and the town. South of Pajarito Canyon, private property extends to the canyon rim.

The flat plain was prime grazing land from the eighteenth century to the late 1930s. It was part of the Ramon Vigil Land Grant, and perhaps settled as early as 1720. The land grant was heavily grazed by sheep, especially under the ownership of Frank Bond, who purchased the grant for winter range in 1918. The effects of grazing are evident in erosion pedestals, especially at the base of old juniper trees where as much as 18 inches of soil loss is evident.

Much of the rim is covered with exposed basalt and low-density stands of piñon-juniper woodland. This area was hit hard by bark-beetle infestations in 2001 and 2002, with about 90 percent mortality in piñon saplings and trees. Canopy cover was reduced by about 50 percent. Tree density has dropped from about 300 stems per acre to less than 100 stems.

Big sagebrush is a common co-dominant, often forming pure stands on disturbed areas. Other shrubs include four-wing saltbush and skunkbush. Snakeweed, an indicator of past intense grazing, covers about 10 percent of the area. Prickly pear cactus is common in the understory, and cane cholla is scattered throughout the woodlands. Isolated colonies of the state-listed sensitive species gramagrass cactus are located along the rim. Ground cover averages 30 percent. Native grasses are plentiful, but encroachment

by *Aristida* sp. is occurring throughout the area. Ring muhly is a common grass on the flats. In wet places along the Rio Grande and in Pajarito Canyon, Fremont cottonwoods grow to massive sizes.

The Pajarito Canyon corridor extends west from the White Rock Canyon rim and divides the high-density housing of White Rock with the low-density developments of La Senda and Pajarito Acres. The canyon varies from a width of 200 feet down to about 50 feet. The canyon ends in a spectacular pouroff about 300 feet high. Segments of the canyon see perennial flow. The riparian area along the canyon bottom creates a well-watered habitat amid the dry plains of the canyon rim. Fremont cottonwood, netleaf hackberry, box elder, and coyote willow form a dense canopy and understory. Jointed goatgrass is found in patches in the canyon bottom.



Geometric patterns are common in the petroglyphs in Pajarito Canyon

Pajarito Canyon holds many important petroglyph panels from the White Rock Canyon Rim to New Mexico Highway 4. Some panels hold as many as 450 individual artworks. Geometric patterns often dominant the panels, but other common themes are deer, turkeys, and Awanyu.

Summary of Current Conditions

Ecosystem Health

- Presence of endangered plant and animal species requires habitat monitoring
- Illegal and recreational dumping over the canyon edge in Overlook Park has resulted in a proliferation of trash along the canyon edge
- Renegade cattle are present along the Rio Grande
- Beetle mortality in some piñon stands at 98 percent
- Elevated juniper stem density from lack of competition
- Reduced canopy and ground cover
- Soil loss is severe along the White Rock Canyon Rim and in the canyon
- Beaver in the Rio Grande have affected cottonwood stands

Management Objectives and Strategies

1. Objective: Ensure adequate stewardship of the White Rock Canyon Archeological District through effective monitoring of cultural resources.

Strategies:

- Protect structural and petroglyph sites from erosion and vandalism.
 - Develop and maintain a vigorous SiteWatch program for the most significant sites.
 - Maintain a photo database of important sites for continued monitoring.
 - Establish erosion controls around sites that show signs of significant soil loss.
- 2. Objective: Reduce soil loss along the rim and on the flats within the canyon by re-establishing 60% ground cover and reducing erosion potential by 40 percent.

Strategies:

- Reduce the proliferation of trails on the rim by developing and implementing a White Rock Rim and Canyon Trail Plan that identifies important trail segments for improvement and unnecessary trail segments for removal from the trail network.
- Use aerial photos to map extensive areas of soil loss along the rim as target areas for lop-and-scatter treatment with dead piñons. Treat at least five acres per year.
- Re-establish ground cover in areas treated with lop-and-scatter by sowing appropriate native grass seed.
- Use field surveys and GIS to catalog locations of problematic runoff from the rim into the canyon. Develop and implement simple rock water controls in two drainages per year.
- Perform trail repairs on trail segments that become rutted or that conduct water from the rim into the canyon.



Soil loss is severe in areas along the White Rock Canyon Rim

3. Objective: Monitor and protect habitat for helleborine orchids, grama grass cactus, Cardinal flower, and Springer blazing star.

Strategies:

- Using GIS, accurately map the extent of the populations of each of the four sensitive species in the canyon.
- Monitor the population areas bi-annually to document habitat damage, habitat change, and population size.
- Monitor spring outflow using Los Alamos National Laboratory data.



Helleborine orchids

4. Objective: Eliminate feral cattle within the canyon not only on County land, but on all jurisdictions

Strategies:

- Document damage to riparian zones, orchid habitat, spring outflow areas, and other locations from cattle.
- Coordinating with other agencies, develop and implement a cattle removal plan.

5. Objective: Remove trash from below Overlook point and develop methods to discourage additional illegal dumping.

Strategies:

- Seek the assistance of appropriate volunteer groups to utilize their skills to remove some of the trash. Groups who teach and stress safety-conscious rock climbing would be valuable, as would high-angle rescue exercises with the Los Alamos Fire Department.
- Apply for grant funding to contract with a crane operator to assist with removing large, heavy trash from the base of the cliff.
- Place vehicle barricades further back from the cliff at two access points.

6. Objective: Reduce threat of fire to homes adjacent to open space along Meadow Lane, Kayenta, Joya Loop, Rover Boulevard, Glenview drive and court, and Kimberly Lane.

Strategies:

- Maintain a break in fuel continuity along the county-private property lines.
- On the rim between housing and the canyon, maintain piñon density of 30 to 60 stems per acre; decrease juniper density to 50 stems per acre.
 - Monitor piñon seedling density after five and ten years to evaluate the need for thinning.
 - Thin junipers to a density of around 50 stems per acre.

7. Objective: Discourage the use of painted dots and arrows as navigational aids on the Red Dot and Blue Dot trails.

Strategies:

- As outlined in the Trail Signage Plan, provide official trail signage at critical junctions within the canyon.
- Rework sections of trail to more clearly define the correct path

8. Objective: Because of their value to wildlife and endemic flora, maintain an inventory of springs located in the canyon.

Strategies:

- After acquiring data of known spring from Los Alamos National Laboratory, conduct an on-the-ground survey to locate additional springs.
- In conjunction with LANL monitoring efforts, monitor spring outflow annually.

LOWER RENDIJA/GUAJE MANAGEMENT UNIT

Narrative

As of 2015, the Lower Rendija/Guaje Management Unit is not County-owned land, but two parcels within the canyon have been slated to transfer or sale to the County for ten years. A 900-acre parcel is scheduled to be transferred from the Department of Energy to Los Alamos County in 2015; two smaller parcels of land are currently owned by the USDA Forest Service and purchase by the County is being negotiated as part of the San Ildefonso-Santa Fe National Forest-County of Los Alamos land settlement package (see Map 12, page 72).



Lower Rendija Canyon holds some spectacular stands of ponderosa pine

The Lower Rendija/Guaje Management Unit has the potential to be a recreational area to Los Alamos County residents and visitors from around the region. It is currently the most isolated of the open space parcels in the County and the terrain, vegetation, and character make the parcels ideally suited to dispersed recreation. Traditional uses of the landscape are hiking, horseback riding, mountain biking, and unsanctioned use by motorized vehicles. Recreational users are attracted by the isolation, the rugged and undeveloped nature of the topography, and the stunning views of the canyons and mesas of the Pajarito Plateau.

The Rendija area holds varied terrain ranging from canyon bottoms with incised channels to sloping mesa tops cut with sharp drainages. The eastern mesa tops average



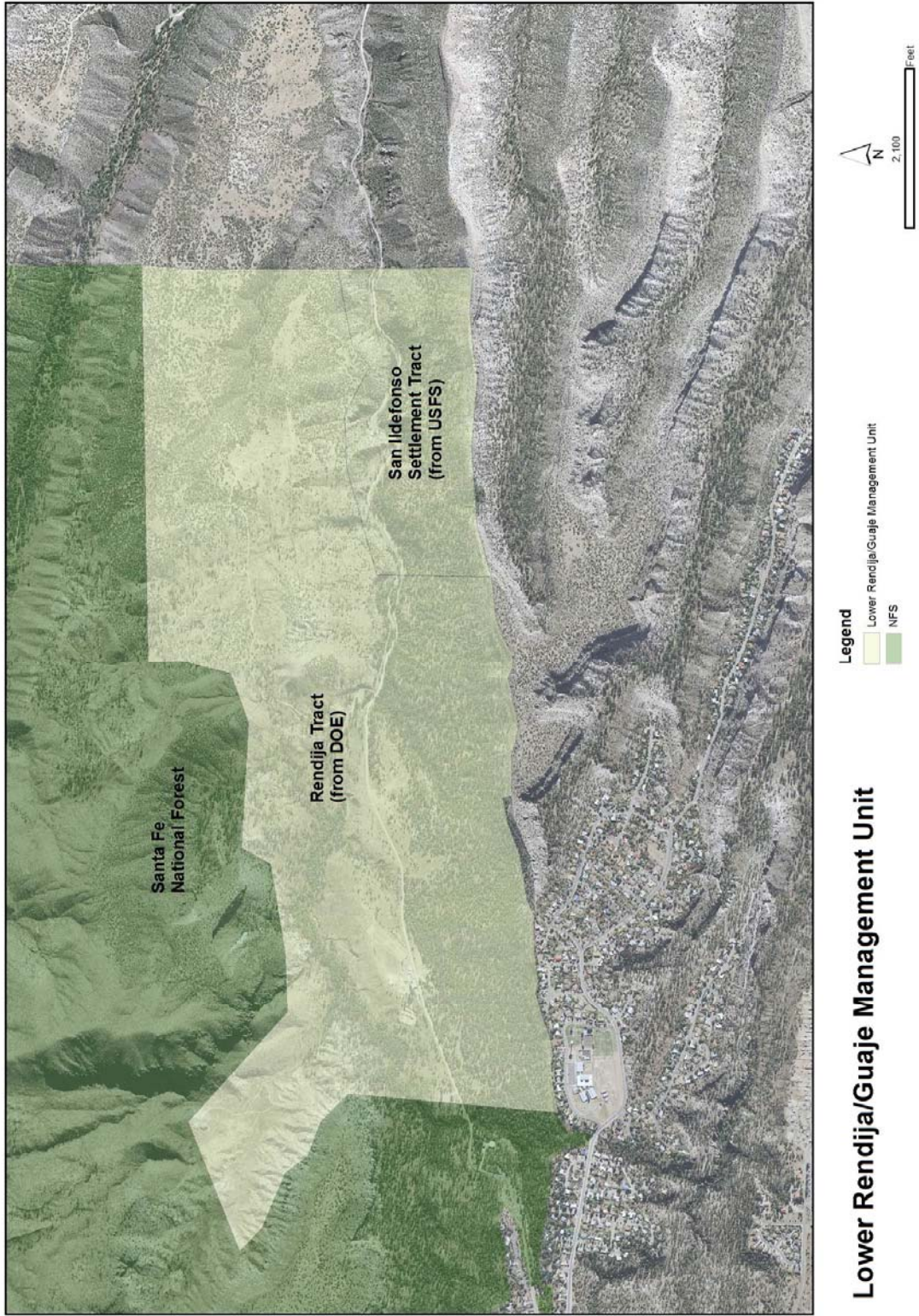
The mesa between Rendija and Guaje canyons is covered with highly disturbed stands of piñon and juniper

6,900 feet and slope gently to the east. Within the area, the Rendija canyon bottom drops from 7,000 feet to 6,300 feet.

The topography and the area's location in the transition zone from foothills to plateau combine to create a variety of plant communities in the Lower Rendija/Guaje Management Unit. The mesa tops are covered with piñon-juniper woodlands with a sparse understory of grasses. More than 90 percent of the piñons were killed during the bark beetle infestation of the early 2000s; only isolated large individual piñons remain. Juniper stands hold as many as 200 stem-clumps per acre. Understory shrubs in the woodland are dominated by big sagebrush, some snakeweed, and scattered mountain mahogany. Carruth wormwood and false tarragon make up over half of the ground cover. Common grass species are sand dropseed, blue grama, and some little bluestem. The majority of these species are non-native. Combined with piñon die-off, the changes to vegetation over the last fifty years have left much of the soil exposed and subject to erosion.

Ponderosa pine dominates the north-facing slopes and canyon bottoms in the Rendija Canyon area. The pine stands in the northwestern portion of the area were burned in the Cerro Grande fire. These forest stands have been replaced by monotypic grasslands of slender wheatgrass, a native species seeded immediately after the fire to stabilize soil and permit the natural reintroduction of native species. Small patches of planted ponderosa pine seedlings are found in the burned area, but this portion of the canyon will remain grasslands for many years. In contrast, the area south of the canyon bottom along the foot of Barranca Mesa holds ponderosa pine stands ranging from 200 trees to

Map 12. Lower Rendija/Guaje Management Unit



more than 1,000 trees per acre. All stands are characterized by closed canopies, thick accumulations of pine needles and duff, and sparse or absent ground cover. The overstocked forest is a result of intensive livestock grazing from 1880 to 1940 and active



Forest openings on the slope directly below housing on Barranca Mesa are being filled with ladder fuels in the form of Douglas fir

fire suppression continuing to the present. These forest areas pose an increased risk of crown fire from ignitions during drought conditions. Because of the steep slopes leading to the mesa top, this long unmanaged forest is a high fire hazard area.

Isolated pockets of riparian vegetation are found along the arroyo in the canyon bottom. Occasional old-growth narrow-leaf cottonwoods dot the canyon, and small, isolated thickets of coyote willow are located in moist areas in the drainage. Downcutting of the arroyo due to post-fire peak flows and a series of intense rainstorms since 2005 have destabilized the banks and in many case have lowered the water table below the root zone of the riparian species.

Summary of Current Conditions

Ecosystem Health

- Illegal dumping along the access roads creates hazards
- Off-road vehicle traffic has created erosion problems throughout the area
- Beetle mortality in some piñon stands at 98 percent
- Non-native plants dominate and have crowded out native species
- Ponderosa pine stands south of the canyon bottom are often 10 times more dense than historic levels, presenting a fire risk and an unbalanced ecosystem

Management Objectives and Strategies

1. Objective: Control vehicle access to reduce erosion potential.

Strategies:

- Work with the Los Alamos Police Department to develop vehicle access regulations and enforce the regulations.
- Maintain photo database of important sites for continued monitoring.

2. Objective: Respect the traditions of local Pueblos and protect cultural resources.

Strategy: Maintain a vigorous SiteWatch program for the most significant sites.

3. Objective: Reduce arroyo downcutting and re-establish riparian zones.

Strategy: Use a combination of channel stabilization techniques and riparian plantings to reduce peak flow and bank erosion.

4. Objective: Implement fuel reduction along the foot of Barranca Mesa.

Strategy: Reduce forest stands to 100 to 150 mature pines per acre through mechanic thinning, pile burning, and broadcast burns.



Many stands on the north-facing slope of Rendija Canyon need fuel reduction work

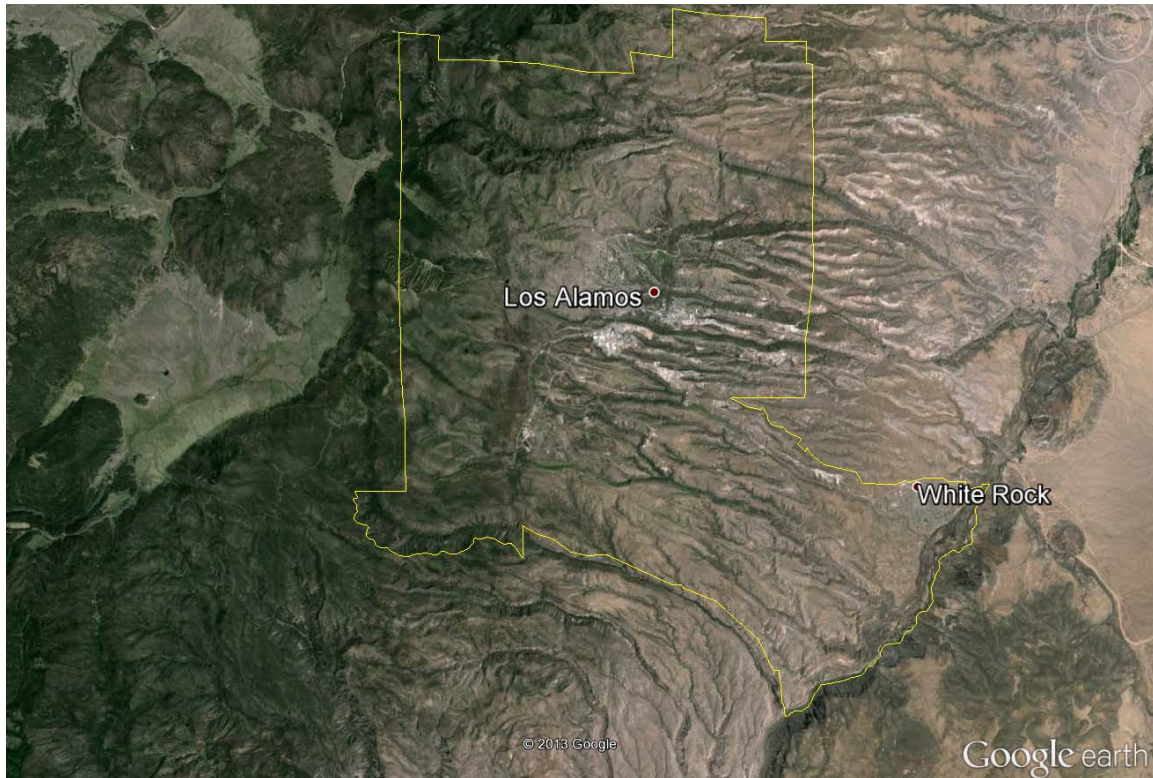
APPENDIX 1. BACKGROUND: LANDSCAPE, VEGETATION, FAUNA, AND HUMAN HISTORY

Landscape: Topography and Geology

To the west of Los Alamos lie the Jemez Mountains, a majestic mountain range accumulated by hundreds of volcanic eruptions over the last 16 million years. The initial eruptive sequences created a mountain range about 40 miles in diameter and perhaps 12,000 feet high. The sticky lavas of the initial sequence of eruptions formed overlapping mounds of rhyolite and dacite. The Sierra de los Valles, the range of rounded peaks that form the backdrop to the County, are such a series of domes.

The most recent eruptions of the Jemez range created the distinctive topographic layout of Los Alamos County. The Pajarito Plateau is comprised of a series of finger mesas separated by deep canyons carved into soft volcanic rock called tuff. The rock was deposited in massive beds during the later phase of eruptions of the volcanoes to the west. Eruptions about one million years ago resulted in the formation of the Valles caldera, a 12-mile wide volcanic crater.

Because of the relative soft nature of the volcanic tuff, the rills that drained to the east from the elevated domes of the Sierra del los Valles quickly eroded into significant canyons. Water flowing through major drainages scoured out the tuff, creating 400-foot deep gorges bordered by sheer walls. The lower portions of each canyon have broad, flat floors. Nearer the foothills, the canyons are narrow and rocky.



Los Alamos County from rim to river

Between the canyons, steep-sided mesas formed, reaching out from the mountain foothills toward the Rio Grande. Most Los Alamos neighborhoods are built on these narrow mesas. The disjointed, linear arrangement of housing creates an unusually high proportion of homes located along the perimeter of forest or woodland. One out of seven homes border forested lands owned by the Incorporated County of Los Alamos, the Santa Fe National Forest, and Los Alamos National Laboratory.

Volcanoes to the east of the County were instrumental in establishing the topography of White Rock. Eruptions from dozens of small volcanic vents in the Cerros del Rio on the east side of the Rio Grande in the area of the Caja del Rio plateau created a massive pile of dark, hard basalt. This rock is formed from viscous, slow-moving lava flows. The flows covered about 100 square miles, damming the Rio Grande and creating level plains on the present west side of the river. White Rock sits on one of these plains, about 1,000 feet above the Rio Grande and 1,000 feet below the finger mesas of the Townsite.

Although the lava flows of the Cerros del Rio flowed west and dammed the Rio Grande, the river downcut through the basalt to flow freely again. Over millions of years, rockfalls, block slumping, and lateral stream erosion widened the river-cut gorge to form White Rock Canyon. One of a series of 1,000-foot gorges along the river in New Mexico and Texas, White Rock Canyon is a major topographic feature in the County.

Vegetation

The ecosystems found in Los Alamos County are a direct consequence of the volcanic topography. Temperature and moisture are the two principal factors that influence the location and extent of vegetation communities. These environmental factors are affected by variations in landscape characteristics like slope, aspect (the direction a site is facing), and elevation. In general, conditions are cooler and wetter as elevation increases. Also, due to solar angles and shading, north and east facing slopes are cooler and wetter than south and west facing slopes. The effect of these differences on vegetation is especially noticeable in the canyons in and around Los Alamos. Average annual precipitation in the townsite is about 20 inches, with approximately half of that amount falling as rain during the summer "monsoon", and the other half falls as snow in the winter months.



Locally, the cooler, wetter north aspects of the canyons (the south canyon walls) have a comparatively dense mixture of shrubs and conifers, including plentiful young Douglas fir and white fir intergrading with older ponderosa pines and some limber pine. Unlike ponderosa pine, the invading firs are shade tolerant

species. Also, as these species do not shed their lower branches through time, they are prone to spread ground fires into tree crowns. As ponderosa pines became denser over the last century due to the absence of fire, they provided more favorable conditions for Douglas fir and white fir to establish. Tree densities are highest and ladder fuels most abundant on these slopes. Fire exclusion and climate variability helped drive this shift in ecosystem composition and structure.

Although they are conduits for cold air drainage at night, canyon bottoms are generally warmer than north-facing slopes during the growing season. There is sufficient moisture to support ponderosa pine and other conifer species as well as a mix of deciduous trees and shrubs, including some riparian (streamside) species.

The highest elevations on Pajarito Mountain support a *Spruce-Fir forest*. *Mixed conifer forests* are found in the Sierra de los Valles from about 8,000 to 9,500 feet. This forest type also dominates the north-facing slopes of the major canyons of the Pajarito Plateau. The tree canopy is comprised of Douglas fir and white fir, with lesser numbers of ponderosa pine and aspen. The understory supports species such as Rocky Mountain maple that require moist, shady conditions. *Ponderosa pine forests* dominate the elevation of the Townsite (from about 6,800 to 8,000 feet) and are also found in lower elevations along canyon bottoms. The tree canopy is almost exclusively made of ponderosa pine; the understory supports a variety of shrubs like Gambel oak, and a ground cover dominated by bunch grasses. Following massive wildfires in 2000 and 2011, the middle elevation slopes west of Los Alamos are covered in a new plant community best described as *Oak shrublands*. With the larger trees burned away, the vegetation in this area is dominated by small trees—oaks, New Mexico locusts, aspen—that dot an open grassland. Found here are as many as 50,000 ponderosa pine saplings planted following the Cerro Grande fire to jumpstart the return of the pine forest. *Piñon-juniper woodland* dominates the area of White Rock. This vegetation community is comprised of scattered piñon and juniper, both low-growing trees, and bunch grasses in the understory.

Because of the 5,000-foot range of elevations, the east-west draining canyons, the mountains, and the unique White Rock Canyon, more than 900 species of plants have been identified with the County boundary (comparable with the much larger Santa Fe County, and more than one quarter of the 3,800 species found in New Mexico).

Several protected plant species are found within the County. The wood lily, a resident of moist woods, is on the New Mexico Endangered Species List. Rare Helleborine orchards are found in riparian zones at lower elevations. Other rare plants are the grama grass cactus and Springer's blazing star, both found in piñon-juniper woodlands, and Sapello larkspur in meadows near the summits of the Sierra de los Valles.

Fauna

Along with its diverse plant communities, the fauna of Los Alamos County is comprised of a large number of species. The County is home to several species of frogs, toads, and salamanders, dozens of reptile species, about 130 nesting bird species, and more than 50 types of mammals. Mule deer are common in all neighborhoods of Los Alamos, including downtown. Coyotes frequent the canyons and mesas, and black bear and mountain lion are both common around the Townsite.

Five federally-listed species of threatened or endangered animals live in the County, the Mexican Spotted Owl, Southwestern Willow Flycatcher, Yellow-billed Cuckoo, the New Mexico Meadow Jumping Mouse, and the Jemez Mountains Salamander. At least 15 other Sensitive Species are likely to be found in the County (see Table 3, page 38).

Human History

Intertwined with the natural landscape of Los Alamos County is a long history of three cultures that lived on the land. The County is rich in both cultural and historical resources that spin tales of farmers, hunters, educators, and scientists in a mix that is quite unique to the County.

Under all jurisdictions, the County holds more than 2,000 cultural resource sites listed with the State Historic Preservation Office's Archeological Records Management Section. The sites date from more than 1,000 years before the present to those associated with the Manhattan Project in the 1940s. These encompass hunter campsites, small farmer roomblocks, Ancestral Pueblo villages with 400 rooms, thousands of petroglyphs, historic cabins built by homesteaders in the early 20th century, and the facilities of the Los Alamos Ranch School for Boys.

The myriad cultural resources are protected by both Federal and State laws. Thus, one important function of the open space is to provide protection for the more than 150 sites on County-owned property.

APPENDIX 2. HISTORY OF OPEN SPACE LAND USE PLANNING IN LOS ALAMOS

1960s: Land Disposal from the Atomic Energy Commission: Prior to 1963, private land did not exist within the County boundaries. All land was owned by three Federal agencies: the Atomic Energy Commission (AEC), the United States Forest Service, and the National Park Service. This unusual pattern of land ownership was a direct result of the establishment of the Manhattan Project's Site Y at Los Alamos in 1942. To maintain secrecy at the site, all surrounding parcels of land were taken by the Army Corps of Engineers to further the war effort. This included the Los Alamos Ranch School for Boys, dozens of homesteads on the Pajarito Plateau, and lands within the Santa Fe National Forest and Bandelier National Monument. When Los Alamos grew and established permanent facilities, the AEC saw benefits in selling housing to private owners and transferring land and infrastructure to the local government. The process of disposal of AEC housing and infrastructure was completed by 1968.

As part of the disposal process, the AEC deeded certain lands to the County of Los Alamos with restrictions on their use. The recreation areas on North and Kwage mesas, including the North Mesa Horse Stable Area, fall in this category. The deed restriction specifies that the land will be used for recreational purposes only and that any other use would result in a retraction of the deed and the land would revert to Federal ownership.

1970s: Zoning Categories PL, PL (W-1), and PL (W-2): In order to effectively plan for the County's development, the County Council adopted three zoning classifications for County-owned parcels. Two overlay districts, W-1 and W-2, were added to the zoning district Public Lands (PL). The overlay districts recognized the significance of the natural resources of the County to residents and visitors and offered a layer of protection for these lands.

From the Los Alamos County Development Code, Section 16

Code of Ordinances Definition for Scenic Open Lands District (W-1): The W-1 scenic open lands district is intended to maintain, protect and preserve the scenic and environmental quality, open character and the natural recreational value of undeveloped land.

Typical activities and structures that are permitted on open space are:

- Hiking
 - Running
 - Mountain biking
 - Dog walking
 - Equestrian
 - Rock climbing
 - Off-trail exploring on foot
 - Orienteering
 - Geocaching
 - Flood control
 - Nature study
 - Wildlife habitat improvements
 - Existing infrastructure
 - Future infrastructure improvements with a restoration component
- Code of Ordinances Definition for Recreation Wilderness District (W-2): The W-2 recreation wilderness district is intended maintain, protect and preserve the scenic and environmental quality, open character, and natural recreational value of undeveloped lands; and to accommodate public and private recreational uses of an open nature.

W-2 lands are developed to accommodate outdoor recreation activities and public infrastructure such as team sports, dog training, walking and jogging, children's playgrounds, picnicking, stabling domestic animals, and other forms of active and passive recreation. Included in this classification are parks, golf courses, playgrounds, tot lots, shooting ranges, and hard-surfaced pathways:

- Playlots
- Stables
- Public parks
- Golf courses
- Multi-use trails
- Athletic fields
- Dog parks
- Campgrounds
- Nature centers
- Ski areas
- Parking associated with recreational use

Code of Ordinances Definition for Public Land District: P-L intended accommodate local government and school district uses and structures, designed to support community needs and the public health, safety and welfare. Included in the district are roads, streets, public buildings and schools, airports, areas that provide storm water control and aquifer recharge, floodplains, steep slopes, unstable areas, and areas where public utilities are located.

1980's: Ordinances 252 and 254: In 1980, the County Council adopted two land use ordinances. Ordinance 252 identified 25 parcels and placed them within a special land preservation status (see Map 13, page 84):

Los Alamos County Ordinance 252: An Ordinance for Establishing a Land Preservation Status for Certain Public Lands

Section 1. The following undeveloped public lands are hereby designated and included within a special land preservation status:

(The ordinance lists the legal descriptions of the 25 parcels.)

Section 2. Every five (5) years the public lands listed in Section 1 shall be reviewed for their continued inclusion within the special land preservation status designation.

Section 3. The public lands listed in Section 1 shall remain undeveloped in their present designation unless removed from inclusion in the special land preservation status by ordinance. Consideration of the removal of any public lands from inclusion in the special land preservation status cannot be made unless done during the review period mentioned in Section 2.

Section 4. The Council may at any time include other undeveloped public lands in the special land preservation status.

Los Alamos County Ordinance 254: An Ordinance for Establishing a Land Preservation Status for Certain Developed Public Lands

Section 1. The following public lands are hereby designated and included within a special land preservation status for parks, recreation and other public facilities:

(The ordinance lists the legal descriptions of the 46 parcels.)

Section 2. Every five (5) years the public lands listed in Section 1 shall be reviewed for their continued inclusion within the special land preservation status designation.

Section 3. The public lands listed in Section 1 shall be retained for parks, recreation or other public facilities in their present designation unless removed from inclusion in the special land preservation status by ordinance. Consideration of the removal of any public lands from inclusion in the special land preservation status cannot be made unless done during the review period mentioned in Section 2.

Section 4. The Council may at any time include other developed public lands having parks, recreation or other public facilities in the special land preservation status.

1990's: Western Perimeter Tract: In the late 1980s, the Department of Energy declared certain lands along the western perimeter of the Townsite as surplus. The County generated a master plan for the area that included lands for development and for recreation. Three tracts were designated for recreation and access to the Santa Fe National Forest. The remaining track was to be sold for private development (Quemazon Communities).

Through the Federal Land to Parks Program, in 1995 the Department of Interior signed a Quitclaim Deed that transferred the three parcels to the County. The deed included conditions that the parcels remain public land:

This property shall be used and maintained for the public purpose for which it was conveyed in perpetuity...

The Grantee shall, within 6 months of the date of conveyance, erect and maintain a permanent sign or marker near the principal point of access to the conveyed area indicating that the property is a park or recreation area and has been acquired from the Federal Government for use by the general public.

In the event that there is a breach of any of the conditions and covenants herein contained by the Grantee, its successors and assigns, whether caused by the legal or other inability of the Grantee, its successors and assigns, to perform said conditions and covenants, or otherwise, all right, title and interest in and to the said premises shall revert to and become the property of the Grantor at its option which in addition to all other remedies for such breach shall have the right of entry upon said premises, and the Grantee, its successors and assigns, shall forfeit all right, title, and interest in said premises and in any and all of the tenements, hereditaments and appurtenances there unto belonging...

2000s: Open Space Advisory Groups, New Mexico First Town Hall: An effort to develop a revised comprehensive plan for Los Alamos County began in 1998. As part of the planning process, the County Administrator appointed an Open Space Advisory Committee. The Advisory Committee was established in May of 2000, was directed by Council to undertake a study that would result in...

"...an open space plan for Los Alamos County (that) would identify land, including acreage to be transferred from the Department of Energy (DOE), that is most important to the community and its natural habitat and provide for its long-term protection. A well-designed open space land plan would also help respond to housing and economic development needs by identifying areas suitable for controlled development."

This committee, and the subsequent Open Space Task Force, spent two years developing a Draft Los Alamos County Open Space Plan. The plan was received by the County Council, but the Council asked County staff to develop a land use map as a co-strategy for open space management (see Map 14, page 85).

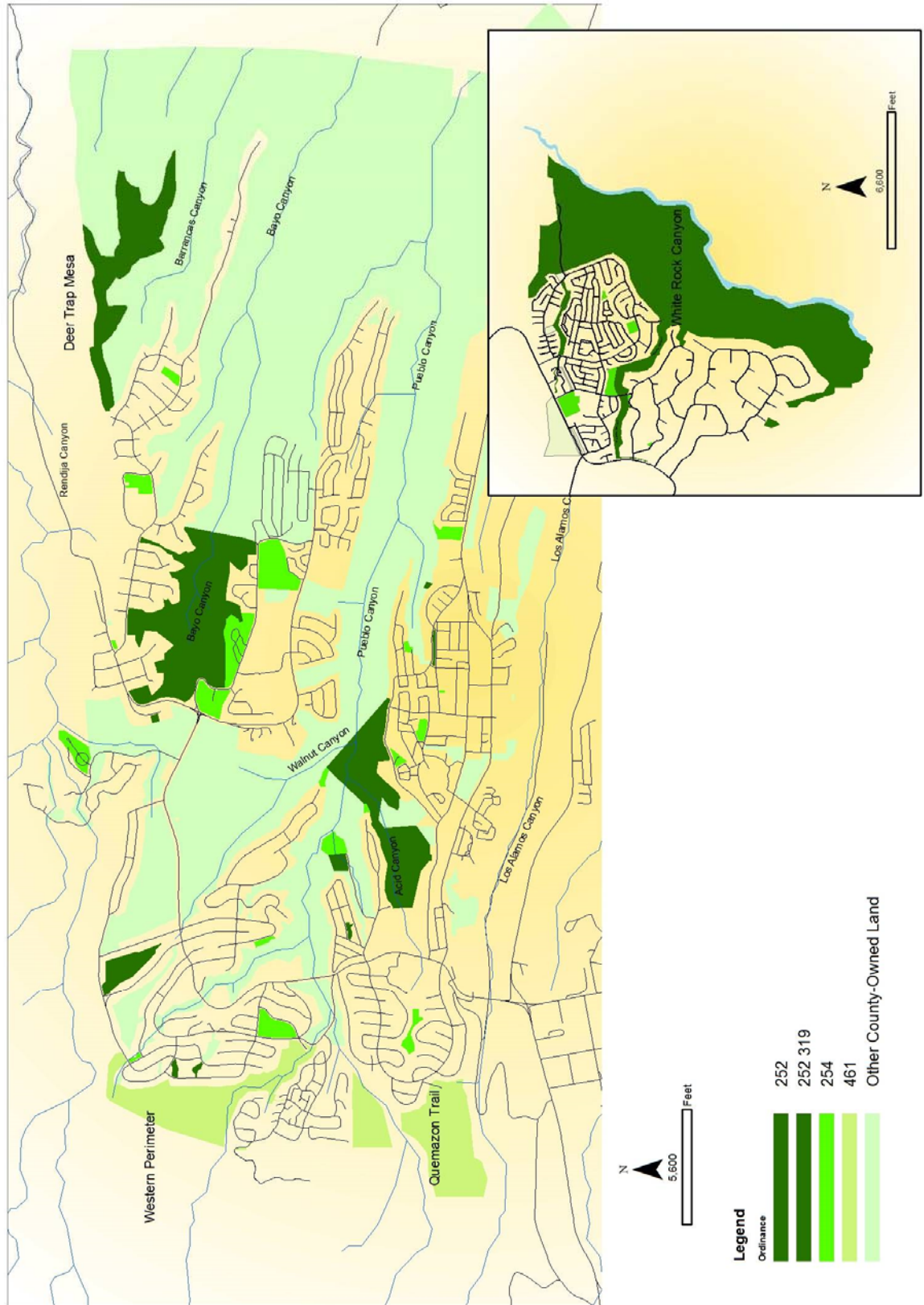
New Mexico First Town Hall Meeting: In 2004, Los Alamos County convened a “Town Hall” meeting facilitated by New Mexico First, a consulting firm that specialized in providing forums for solving issues related to development. The expected outcome of the two-day session was to develop recommendations for specific parcels on the land use map. The Town Hall participants recommended that Pueblo Canyon, the Rendija Tract transfer parcel, the parcel south of the airport, and all existing PL (W-1) and PL (W-2) lands be designated open space. No consensus was reached on the approximately 15 acres on the east and south sides of the golf course (see Map 15, page 86).

Despite considerable time and effort by citizens and staff, the land use map is still in draft form and an open space plan has never been adopted.

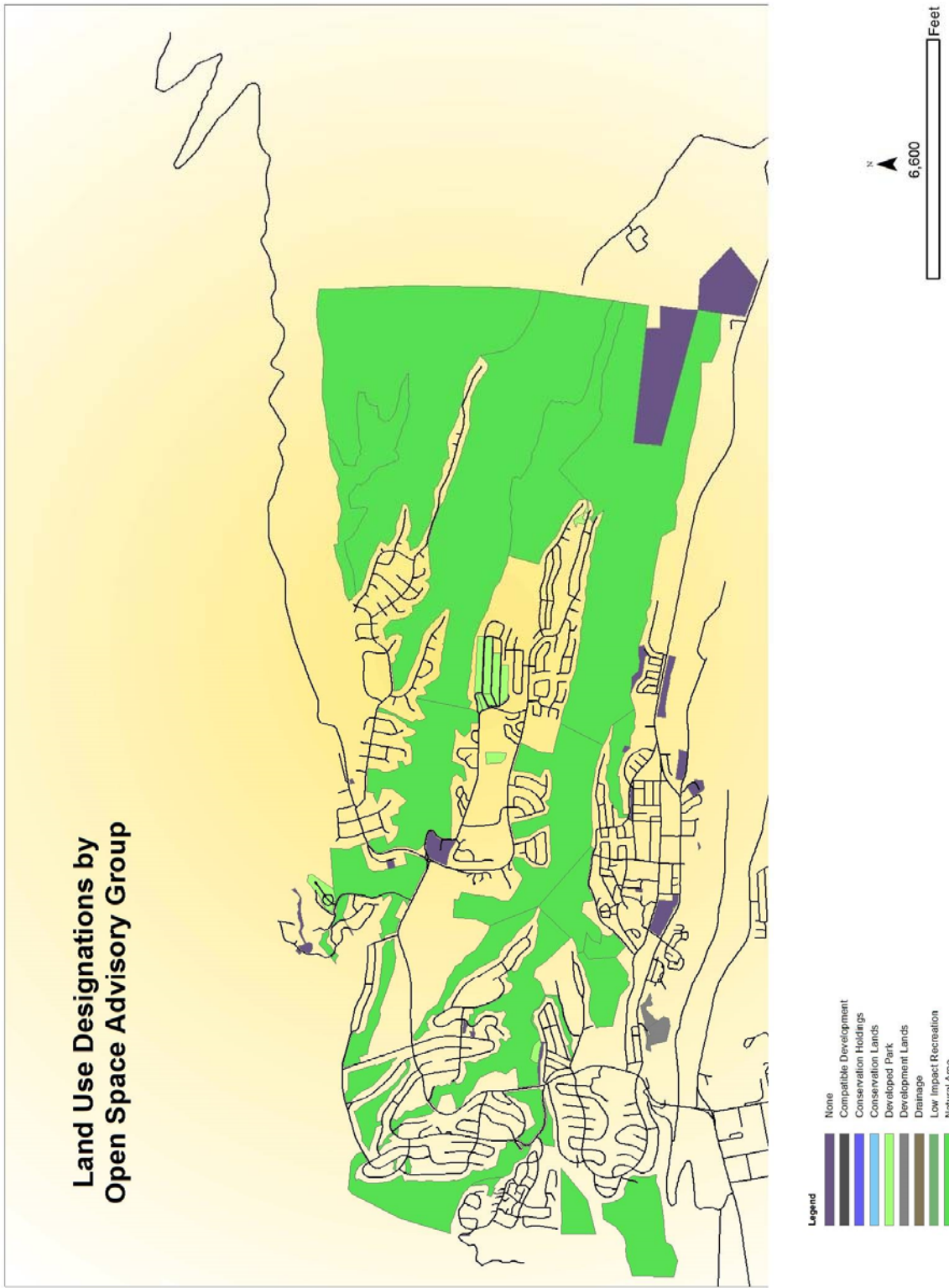
2014: Current Document: The current is based on the 2000 document from the Open Space Advisory Committee. It incorporates directives from the 2004 Los Alamos County Hazard Mitigation Plan, the 2009 Community Wildfire Protection Plan, and data collected over the past 10 years. It seeks to unify the past directives into a plan with general objectives and specific management goals that are ecosystem-based.

Map 13. Lands under Ordinances 252, 254, 461

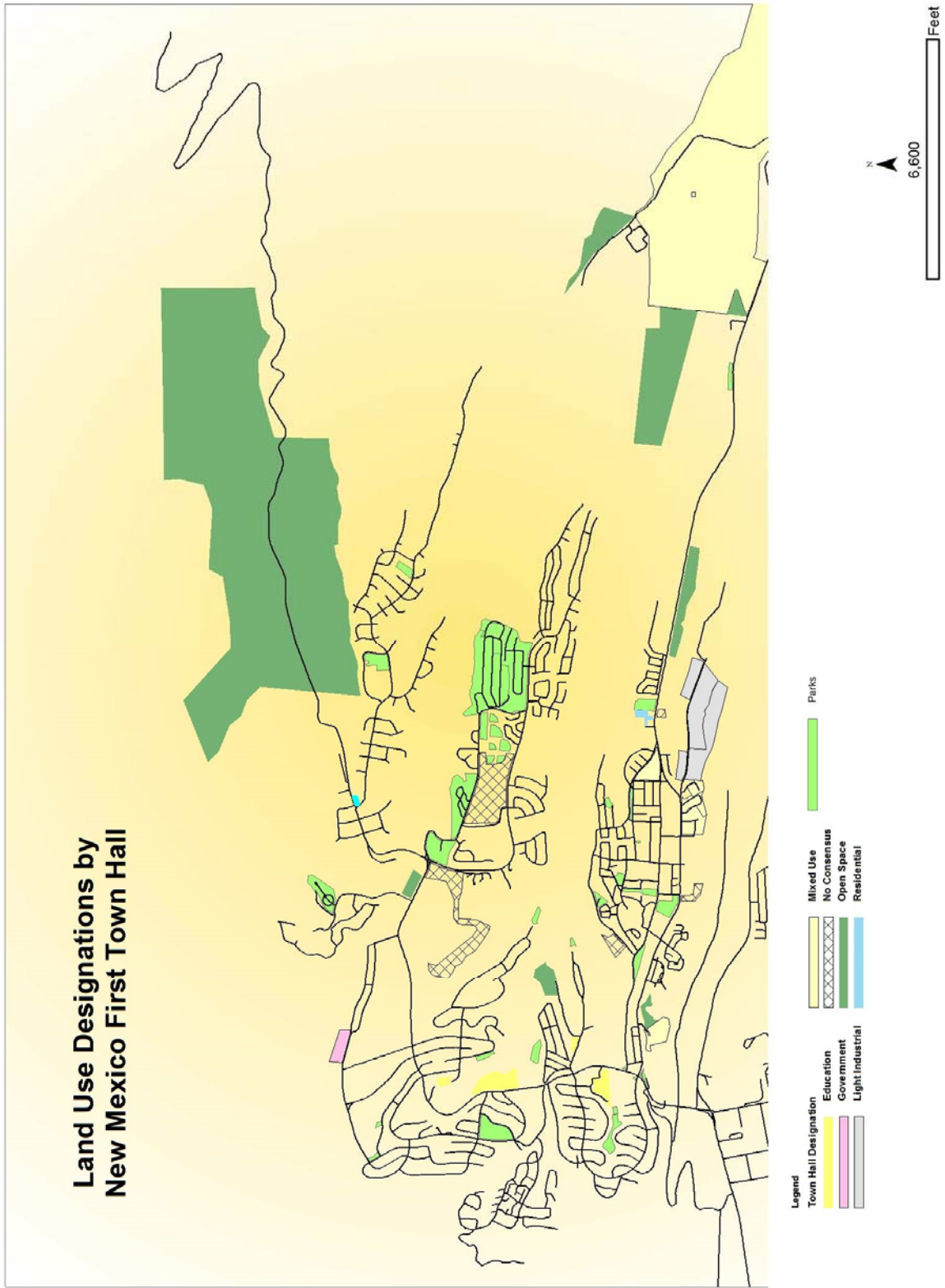
Lands Under Ordinances 252, 254, 461



Map 14. Land Use Designations by the Open Space Advisory Group



Map 15. Land Designations by New Mexico First Town Hall



APPENDIX 3. REFERENCES

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APPENDIX 4: TASK MATRICES

Task Matrix for Open Space Management Plan

CEDD = Community and Economic Development Department
 LAFD = Los Alamos Fire Department

OSS= Open Space Specialist
 LAPD = Los Alamos Police Department

Open Space Management Plan, General Tasks						
Task No.		Who	Prerequisites	Not Completed	Ongoing	Completed
	Defining Open Space					
1	Modify parcel zoning to create an open space system	CEDD and OSS		x		
2	Map open space areas and viewsheds	OSS	1	x		
3	Establish standards for adjacent development	CEDD and OSS	1, 2	x		
	Significant Viewsheds					
4	Develop criteria for identifying significant viewsheds and vistas	OSS				x
5	Identify and designate significant viewsheds	OSS				x
6	Amend development code to minimize impacts of development on viewsheds	CEDD and OSS	4, 5	x		
7	Protect canyon edges with a 40-foot buffer on County land and encourage buffer on private land				x	
	Natural Resources					

8	Inventory and monitor core habitat areas on the basis of their importance to wildlife and work to maintain connections among core patches	OSS			x	x
9	Maintain lists of plants and animal species found in Los Alamos County	OSS			x	x
10	List threatened and endangered species found within the County, map their locations, and monitor their populations yearly	OSS			x	x
11	Map and restore wetland areas	OSS			x	
12	Document changes to the landscape through repeat photography	OSS			x	
13	Use the Los Alamos County Invasive Species Plan to monitor and control threatening non-native species on open space	OSS			x	
14	Continue clean-up and restoration programs on County lands	OSS			x	
15	Engage young people, schools, residents, and businesses in providing stewardship of the open lands system as an educational and civic resource in which they can take pride through involvement	OSS			x	
16	Continue implementation of staging area documentation and evaluation	OSS			x	

17	Finalize development of stormwater standards for construction projects in the County	Public Works and OSS			x	
	Historical and Cultural Resources					
18	Coordinate with the State Historic Preservation Office (SHPO) to maintain a database of known cultural resources	OSS				x
19	Develop a monitoring protocol for cultural resources on open space	OSS				x
20	Develop a prioritization plan for cultural resources in need of protection	OSS				x
21	Define for all project managers the responsibilities of the County for communicating construction plans with the State Historic Preservation Office and the steps required for compliance with the Section 106 of the National Historic Preservation Act.	OSS			x	
22	Revisit sites at least every three years to document their current condition	OSS			x	
23	Coordinate with Pueblos to develop a list of culturally sensitive sites on County-owned land	OSS		x		
24	Develop a communication chain for reporting incidents involving disturbance of cultural resources	LAPD, Public Works, Utilities, OSS	23	x		
25	Clearly define historic trails on maps and on trail signage	OSS				x

26	Develop accepted techniques for trail maintenance on historic road and trails	OSS				x
	Trail Stewardship					
27	Provide opportunities for non-motorized recreation and transportation through a network of trails with historic, aesthetic, and recreational value	OSS			x	
28	Work with community members to maintain and protect the Trail Network	OSS			x	
29	Design new and redesign old trails that are safe, attractive, convenient, efficient, comfortable, and welcoming	OSS			x	
30	Educate the public on the beneficial use of the Trail Network through maps, brochures, web sites and other means	OSS			x	
	Neighborhood Open Space					
31	Identify the features of neighborhood open space that are valued by trail users and homeowners	OSS		x		
32	Use the characteristics to define and map neighborhood open space	OSS	32	x		
33	Develop land use or zoning overlay that identifies neighborhood open space	CEDD and OSS	32, 33	x		

Open Space Management Plan, Unit-Specific Tasks

CEDD = Community and Economic Development Department
 LAFD = Los Alamos Fire Department

OSS= Open Space Specialist
 LAPD = Los Alamos Police Department

Open Space Management Plan, Unit-Specific Tasks						
Task No.		Who	Not Completed	Ongoing	Completed	Additional Cost/Yr over 10 years
	Ponderosa Pine Management Unit					
1	Identify remaining unthinned stands through field surveys and GIS mapping	OSS		x		
2	Thin at least 5 acres per year prioritized by the Wildfire Hazard Zones from the CWPP and using historic patterns of "clumpiness:" trees are not evenly	OSS, LAFD		x		
3	Be sensitive to the needs of homeowners at the interface by addressing visual and sound screening in addition to fuel considerations	OSS, LAFD		x		
4	Use annual field surveys and GIS mapping to identify pine stands where ladder fuels are less than nine feet from ground level	OSS		x		
5	Remove ladder fuels on at least 5 acres per year prioritized by the CWPP	OSS, LAFD		x		
6	Use annual field surveys and GIS mapping to identify pine stands where significant large-diameter woody debris remains.	OSS		x		
7	In coordination with the Los Alamos Fire Department, reduce large-diameter fuel loads to 10 tons per acre on 25 acres per year through pile burn operations.	OSS, LAFD		x		

8	In coordination with the Los Alamos Fire Department, prepare for and implement broadcast burn operations on 20 acres	OSS, LAFD		x		
9	Monitor significant windthrow areas through field surveys and GIS mapping.	OSS		x		
10	Remove 80 percent of the windthrow when fuel loads exceed 10 tons per acre	OSS, LAFD		x		
11	Monitor and remove snags as necessary	OSS		x		
12	Update the Community Wildfire Protection Plan every five years	OSS, LAFD		x		
13	Reduce and monitor populations of bull thistle, Russian olive, and Siberian elm	OSS		x		
14	Create water controls along urban runoff channels	OSS		x		\$500
15	Establish stormwater wetlands where appropriate	OSS		x		
16	Review development and construction plans as related to stormwater effects on open space	OSS		x		
17	Maintain GIS records of windthrow and review annually in June	OSS		x		
18	Maintain wildlife habitat and corridors in fuel mitigation project areas	OSS		x		
19	Conduct annual survey of known former locations of populations of wood lily to establish any reappearance of the species.	OSS		x		
	Canyons Management Unit					
20	Continue a fire management plan that combines mechanical and hand thinning, piling and burning, and broadcast burning	OSS, LAFD		x		
21	Develop better access to the management unit by establishing new and connecting existing trails	OSS		x		\$1,000
22	Monitor seedling survival rates across the unit	OSS		x		

23	If survival rates fall below a density of 50 to 100 trees per acre, utilize volunteers to plant additional seedlings	OSS		x		
24	Protect threatened and endangered species within the canyon by limiting mechanized equipment during the nesting and fledging season	OSS		x		
25	Protect tent rocks by limiting vehicle traffic in the canyon	OSS		x		
26	Minimize sediment and contaminant transport by re-establishing riparian vegetation in the channel	OSS		x		\$500
27	Actively reduce populations of Dalmation toadflax, Russian olive, Siberian elm, and tamarisk in accordance with the Los Alamos County Invasive Species management plan	OSS	x			\$1,000
	Mesa Top Management Unit					
28	Establish study plots on both Deer Trap and Kwage mesas to evaluate long-term changes in stand density.	OSS			x	
29	Every five years, monitor piñon seedling density in study plots and use the data to determine management strategies	OSS		x		
30	Construct one-rock dams and use native materials to slow water in gullies	OSS		x		
31	Designate annually five acres to be treated with native grass seed	OSS	x			\$200
32	Close Kwage Mesa utility road down to a double track, add water bars, and other water control structures	Utilities	x			\$1,000
33	Monitor piñon seedling density in light of future stand density related to wildfire and ecosystem health and consider hand thinning to achieve appropriate numbers	OSS		x		
34	Establish baseline conditions for cultural sites and monitor the sites for potential erosion damage	OSS		x		

	Western Perimeter Management Unit					
35	Monitor ground cover establishment and use fire behavior modeling to determine thresholds for high risk of fire spread	OSS		x		
36	When high-risk thresholds are reached, implement a prescribed burning program	OSS, LAFD		x		
37	Using field surveys and GIS, map pockets of large-diameter fuels and include pile burns in plans	OSS		x		
38	Continue to monitor seedling survival ratings across the unit	OSS		x		
39	If survival rates fall below a density of 50 to 100 trees per acre, utilize volunteers to plant additional seedlings	OSS		x		
40	Annually evaluate ground cover and depth of masticated material on at least ten 100-meter transects in the unit	OSS		x		
41	If ground cover falls below 60%, re-seed five acres of the affected areas with native seed	OSS		x		\$500
42	Eliminate populations of Dalamatia toadflax, cheatgrass, non-native thistles, and yellow toadflax	OSS		x		
	White Rock Canyon Management Unit					
43	Protect petroglyphs from vandalism by maintaining a vigorous SiteWatch program for the most significant sites	OSS		x		
44	Maintain photo database of important petroglyph sites for continued monitoring	OSS		x		
43	Reduce proliferation of trails by developing and implementing a rim and canyon trail plan	OSS	x			\$500
	Use aerial photos to map extensive areas of soil loss along the rim as target areas for treatment and treat at least 5 acres per year	OSS	x			

46	Use field surveys and GIS to catalog locations of problematic runoff from the rim into the canyon. Develop and implement simple rock water controls in two drainages per year.	OSS	x			
47	Perform trail repairs on trail segments that become rutted or that conduct water from the rim into the canyon	OSS				
48	Protect viewpoints and vistas by seeking a Natural Area designation for the entire canyon	CED, OSS	x			
49	Protect and enhance habitat for helleborine orchids, gramagrass cactus, cardinal flower, and Springer blazing star	OSS	x			
50	Document damage to riparian zones, orchid habitat, springs and other locations from cattle	OSS	x			
51	Develop and implement a strategy for the removal of feral cattle from the canyon	OSS	x			\$500
52	Clean up and eliminate further accumulation of trash below the Overlook Point	OSS, Parks		x		
53	Maintain piñon density of 30 to 60 stems per acre; decrease juniper density to 50 stems per acre	OSS		x		
54	Maintain a break in fuel continuity along the county-private property lines	OSS		x		\$500
55	Conduct a field survey of the locations of invasive species and map the locations with GIS	OSS		x		
56	Work to eradicate at least one population of each species per year	OSS	x			
	Lower Rendija/Guaje Canyon Management Unit					
57	Control vehicle access to reduce erosion potential	LAPD, OSS	x			\$1,000

58	Respect the traditions of local Pueblos and protect cultural resources by maintain a vigorous SiteWatch program for the most significant sites	OSS	x			
59	Protect viewpoints and vistas by seeking Natural Area designation for the eastern portions of the mesa area	CED, OSS	x			
60	Reduce arroyo downcutting and re-establish riparian zones with a combination of channel stabilization techniques and riparian plantings to reduce peak flow and bank erosion	OSS	x			\$1,000
61	Implement fuel reduction along the foot of Barranca Mesa by reducing forest stands to 100 to 150 mature pines per acre through mechanic thinning, pile burning, and broadcast burns	LAFD, OSS	x			\$10,000