APPENDIX

A Floodplains and Wetlands Assessment for the Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory

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Title

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Compiled by

Laura K. Marsh, Biology Team, RRES-ECO

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Assessment Decision

No adverse effect: Proposal effects on floodplains and wetlands would be short-term and temporary in nature.

Executive Summary

The Department of Energy proposes to build new access-control stations and new traffic improvements, including an east and west bypass road around Technical Area 3. This assessment documents potential impacts of the floodplains and wetlands associated with the areas. General best management practices are included to ensure that impacts do not occur to floodplains and wetlands that may exist in the area of the proposed projects. No potential loss of life or property has been identified with respect to the floodplains and wetlands for the proposed project. Concerns about siltation, erosion, and excessive storm water runoff will be addressed with specific mitigation implemented as part of careful project planning. Although there may be some effect to floodplains and wetlands, the potential impacts from these projects are expected to be minor.

1.0 Introduction

In the wake of the terrorist events of September 11, 2001, on properties within the US, the perceived nature and level of risk for terrorist attack to the Department of Energy (DOE), National Nuclear Security Administration (NNSA) facilities changed. Los Alamos National Laboratory (LANL; Figure 1) is one of three national security laboratories that support DOE's responsibilities for national security, energy resources, environmental quality, and science. The DOE, NNSA's national security mission includes maintaining and enhancing the safety, reliability, and performance of the US nuclear weapons stockpile; promoting international nuclear safety and nonproliferation; reducing global danger from weapons of mass destruction; and providing safe and reliable nuclear propulsion plants for the US Navy. The energy resources mission of DOE includes research and development for energy efficiency, renewable energy, fossil energy, and nuclear energy. The environmental quality mission of DOE includes treatment, storage, and disposal of DOE wastes; cleanup of nuclear weapons sites; pollution prevention; storage and disposal of civilian radioactive waste; and development of technologies to reduce risks and reduce cleanup costs for DOE activities. DOE's science mission includes fundamental research in physics, materials science, chemistry, nuclear medicine, basic energy sciences, computational sciences, environmental sciences, and biological sciences and often contributes to the other three DOE missions.

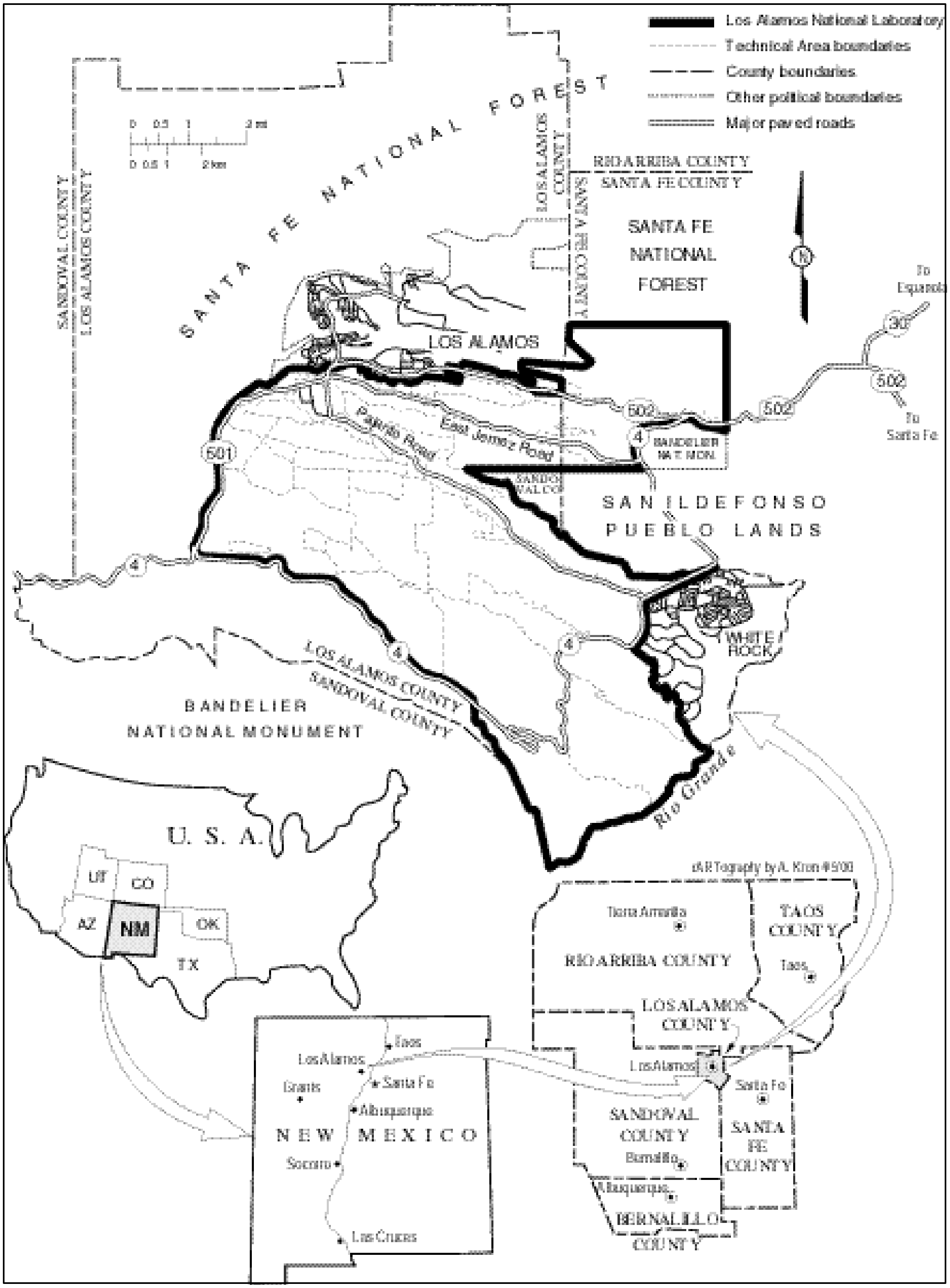

Figure 1. Location of Los Alamos National Laboratory.

LANL provides support to each of these departmental missions, with a special focus on national security. These mission support activities conducted at LANL make it a very important facility to the Nation and one for which physical security must be maintained. LANL is one of the few sites in the DOE complex where the general public has long enjoyed unrestricted vehicular access to core technical areas and where roads with public access pass close to Hazard Category 2 nuclear operations[1]. Temporary measures have been implemented since September 2001 to improve physical security within LANL. In January 2002, potential actions were identified to permanently address physical security concerns for LANL. NNSA determined that restricting public vehicular access to portions of LANL is an action that should receive high-priority consideration.

While the physical security environment of the Nation has changed, and, as a result, NNSA is considering making permanent changes to public vehicle access to various locations within LANL, it has long been recognized that the street and highway traffic patterns at some LANL locations have resulted in increased physical safety concerns. Over the past 15 years the population of LANL workers and visitors has grown. DOE, NNSA, and the University of California have been analyzing traffic flow problems and issues within LANL areas and have identified certain congested intersections and locations where safety issues exist. Various minor corrective actions have been implemented around LANL and other, more complex, actions have come under contemplation. Now, with the enhanced physical security environment at LANL and within the Nation, making traffic flow changes for combined physical security and safety purposes is ripe for decision.

2.0 Proposed Action

This proposed project would route unauthorized vehicular traffic around the core area of LANL. Authorized vehicle traffic would be allowed access to the LANL core area. Access-control stations would be constructed at appropriate access points to screen vehicles. This project would entail construction of an eastern and western bypass road around a major portion of Technical Area (TA) 3 of LANL. Figures 2, 3, and 4 show the conceptual alignments of these bypass roads and locations of access-control stations. Installation and operation of the various components of the Proposed Action would be performed in stages.

The western bypass road would have intersections at West Jemez Road, Mercury Road, and Pajarito Road while the eastern bypass road would include the redesign of the Jemez Road and Diamond Drive intersection and provide a new intersection with East Jemez Road. There would also be new intersections constructed at Eniwetok Road, on Sigma Mesa, and at Pajarito Road near TA-59. The proposed eastern bypass road would

[1] Hazard Category 2 facilities are those for which a hazard analysis identifies the potential for significant onsite consequences in the event of certain accidents. There are no Hazard Category 1 hazards or operations at LANL that would have the potential for significant offsite consequences (this categorization of hazards is usually applied to nuclear reactors).

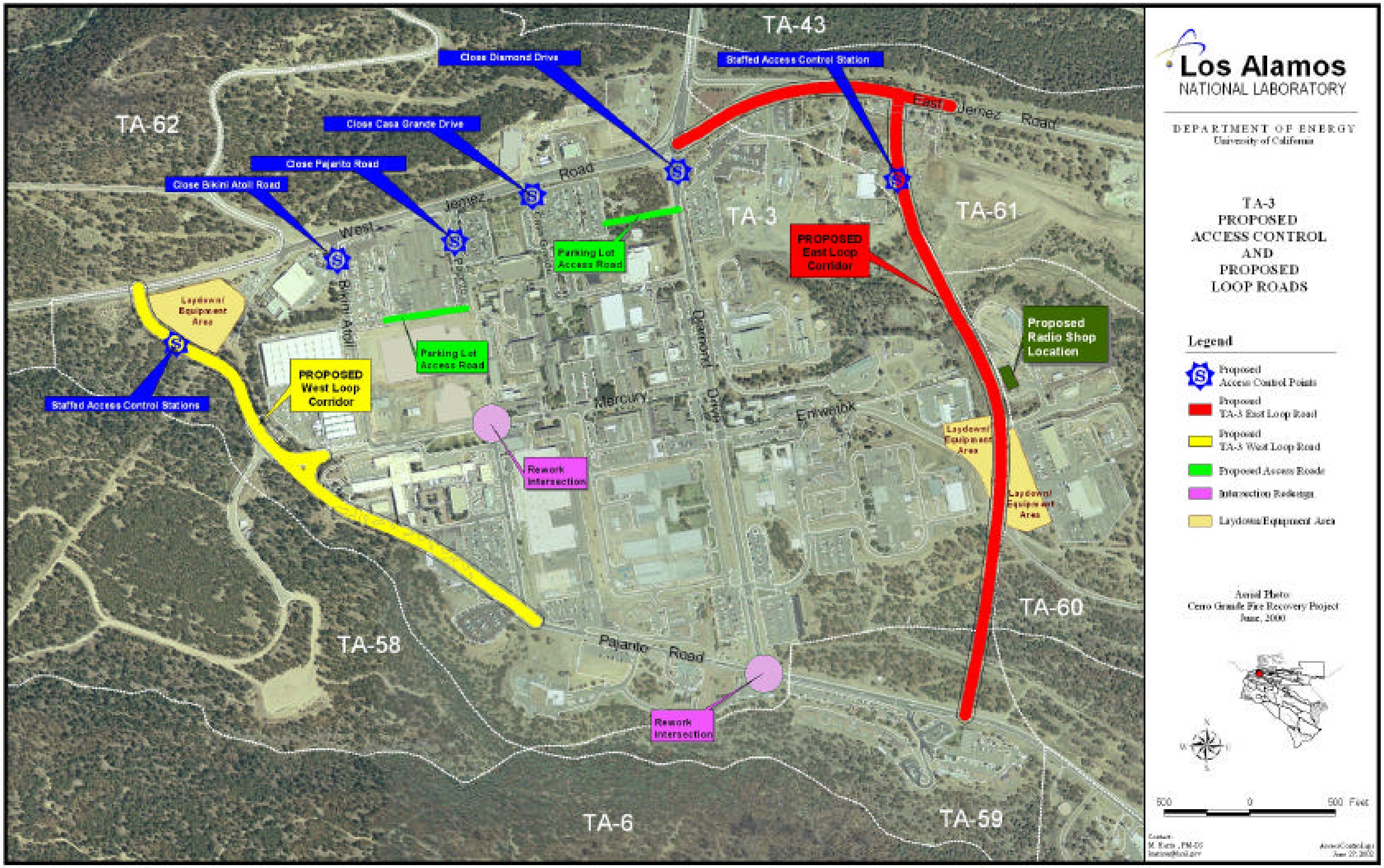

Figure 2. Proposed access controls and bypass roads around TA-3.

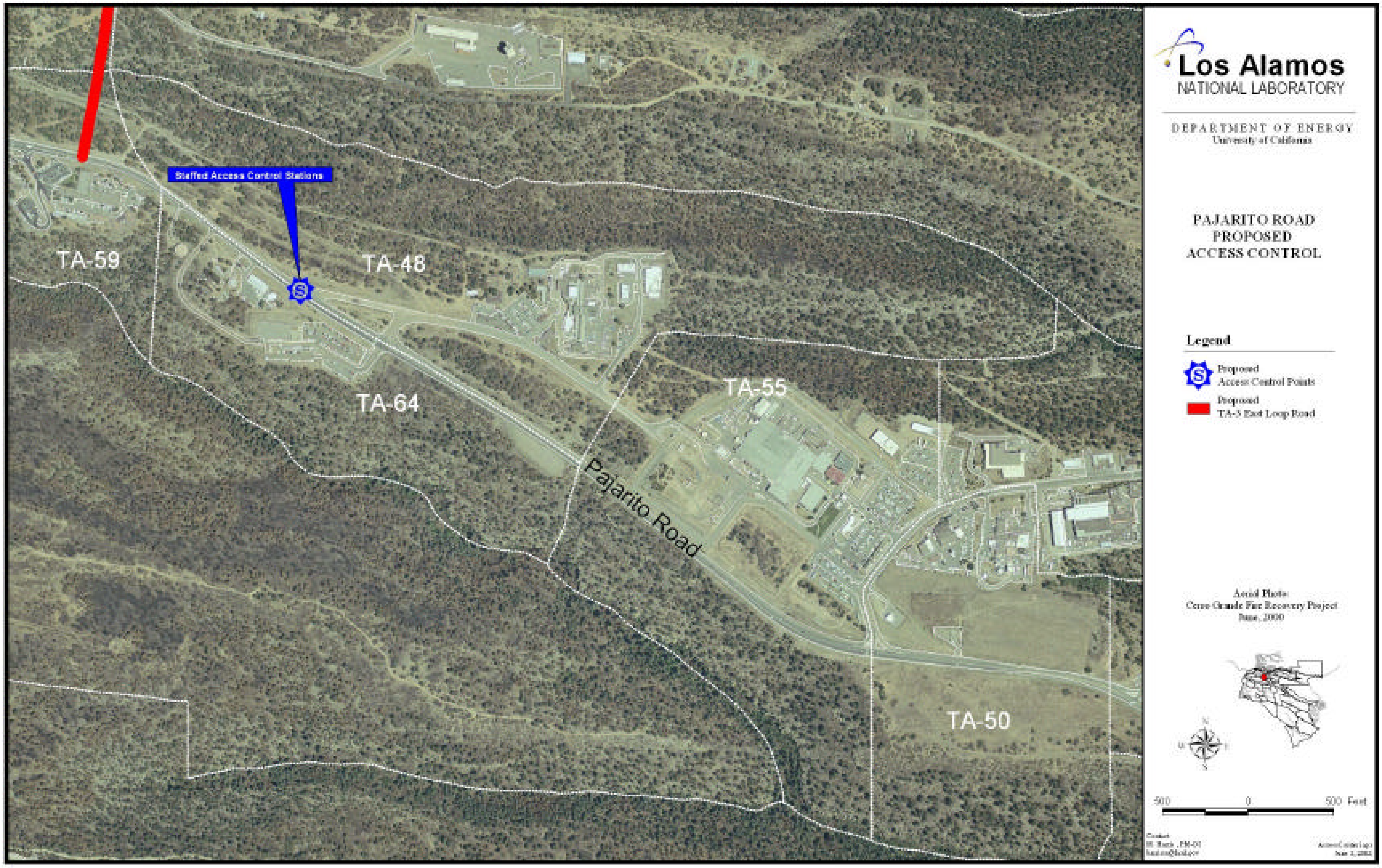

Figure 3. Proposed Pajarito Road access controls.

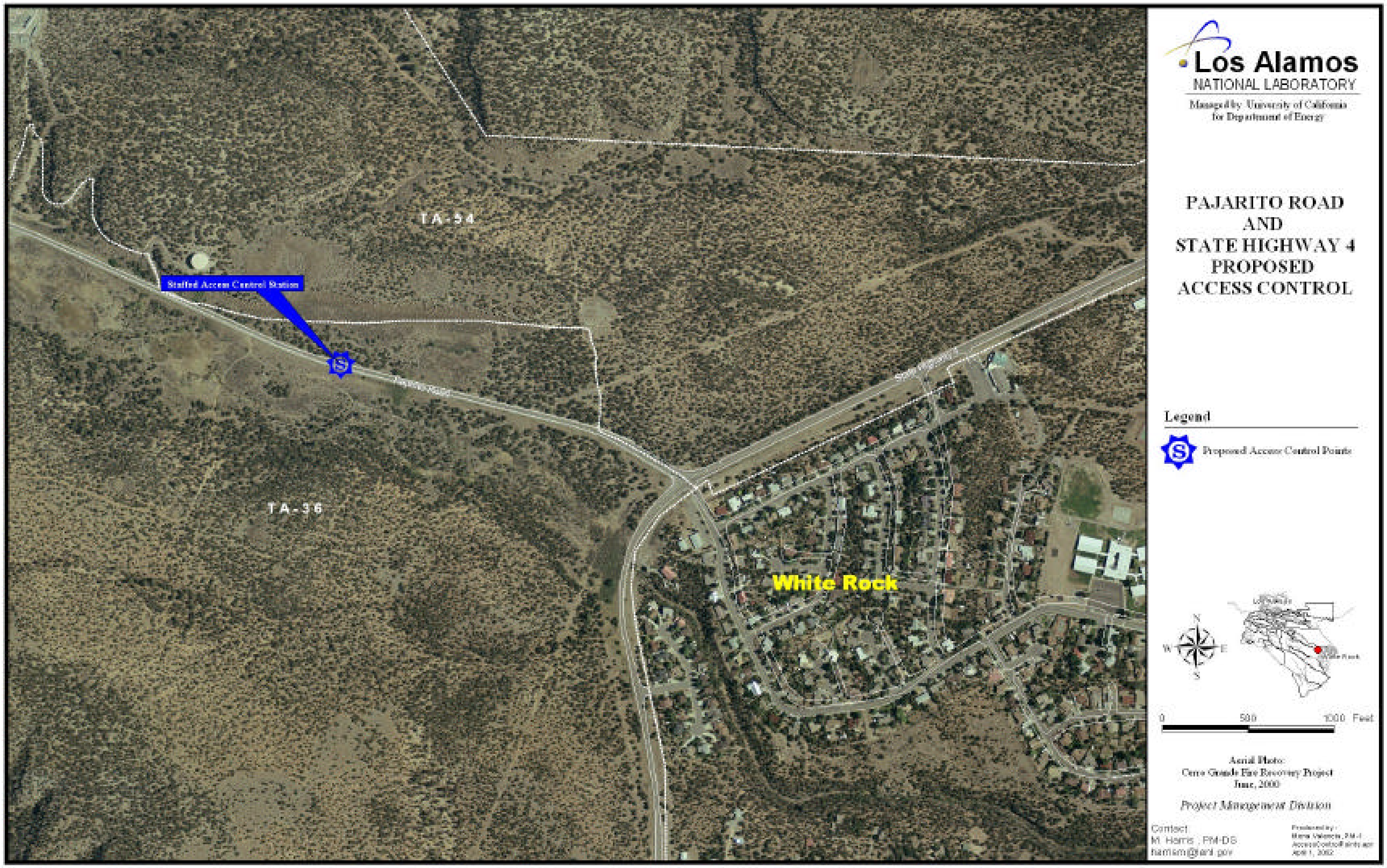

Figure 4. Proposed access controls at Pajarito Road near State Road 4.

cross Mortandad and Sandia Canyons. Several existing utilities would be relocated or rerouted at the intersections and at various points along the proposed corridors. Some existing structures, particularly the high bay part of Building 3-40 would likely have to be demolished, while some trailers and transportables would either be relocated within LANL, salvaged and removed from LANL, or demolished to accommodate the likely roadway.

Staffed and unstaffed access-control stations would be constructed at locations required to effectively isolate vehicle traffic from the LANL core area. The project would also provide emplacement of vehicle barriers, relocating existing utilities, providing new occupied structures with required utilities, installing vehicle queuing lanes, inspection areas, and vehicle turning areas. The northern ends of Casa Grande, Bikini Atoll Road, Diamond Drive, and Pajarito Road would be permanently closed off to assure that all vehicle access comes through controlled points.

Appropriate traffic control signals and signs that meet LANL and New Mexico State Highway Department standards would be provided along the proposed bypass road routes and at intersections. The roads would be constructed to accommodate heavy truck traffic and built to meet LANL and New Mexico State Highway standards. Paved pedestrian walkways and bicycle lanes would be provided along the bypass corridors. This project would replace parking areas removed as a result of road construction, provide new or expanded lots within or near the LANL core area, and build two parking lot access roads to link existing lots with local roads. Additional parking replacement options would need to be separately considered should private vehicles later be completely excluded from the LANL core area. Additional National Environmental Protection Agency review would be required should this action become necessary for security purposes.

Consistent with DOE Order 413.3, Program and Project Management for the Acquisition of Capital Assets, the bypass roads and related facilities would be constructed in accordance with sustainable design concepts. For example, construction might incorporate elements made of reclaimed and recycled materials, and energy-efficient lighting fixtures could be used. All activities at LANL are required to minimize waste generation. Every effort would be made to recycle and re-use construction (and demolition) materials. LANL has existing recycling contracts for concrete and asphalt. To the maximum extent possible, construction (and demolition) contractors would be required to segregate these materials for recycling. Waste Minimization Plans would be developed.

Site preparation and construction activities would produce a type of waste called "construction and demolition" waste, which is a nonhazardous subcategory of "solid" waste as defined in New Mexico State regulations. Solid waste refers to the regulatory definition of waste in Federal regulation (40 CFR 261.3) and not to its physical state; solid wastes may be solid, liquid, or gaseous. Soil and reclaimed asphalt material and crushed concrete rubble are also classified as construction and demolition waste. These wastes would be staged on Sigma Mesa at the TA-60 storage yards for building debris until they could be reused at LANL or at other onsite or offsite locations. Non-reclaimable and non-recyclable construction and demolition waste would be disposed of in the Los Alamos County Landfill or its replacement facility.

Clearing or excavation activities during site construction would have the potential to generate dust and to encounter previously buried materials. If buried material or cultural remains were encountered during construction, activities would cease until their significance was determined and appropriate subsequent actions taken. Standard dust suppression methods (such as water spraying) would be used onsite to minimize the generation of dust during construction activities. Work at the site would require the use of heavy construction equipment. The work would also require the use of a variety of hand tools and equipment. Noise at the site would be audible primarily to the involved workers and to workers housed in the adjacent LANL core area.

Construction work would be planned and managed to ensure that standard worker safety goals are met and that work would be performed in accordance with good management practices, regulations promulgated by the Occupational Safety and Health Administration, and various DOE Orders involving worker and site safety practices. Construction, maintenance, and environmental activities conducted within LANL water courses require permits certified by the New Mexico Environment Department under Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1251). Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) also apply to projects at LANL. Engineering best management practices (BMPs) would be implemented for each construction site as part of a site Storm Water Pollution Prevention Plan executed under a National Pollutant Discharge Elimination System (NPDES) construction permit. These BMPs may include the use of straw bales, plywood, or synthetic sedimentation fences with appropriate supports installed to contain excavated soil and surface water discharge during construction.

2.1 No Action Alternative and Other Alternatives

The No Action Alternative provides a description of current conditions to compare to the potential effects of the Proposed Action. This alternative must be considered even if NNSA is under a court order or legislative command to act [10 CFR 1021.32 (c)]. Under the No Action Alternative, NNSA would not construct either the western or eastern bypass roads, the access controls and the related improvements described in the Proposed Action - nor would NNSA demolish the buildings, including part of Building 3-40, that lie in the path of the proposed alignments. Diamond Drive would continue to serve as the principle north and south arterial within LANL's core area. Pajarito Road between White Rock and TA-3 would remain open to all vehicular traffic. There would be no construction or demolition debris that would require disposal. The Diamond Drive and Jemez Roads intersection would not be redesigned, and Diamond Drive would continue to be accessible to traffic at this location. Potential safety enhancements for pedestrians and vehicle traffic would not be made under the No Action Alternative. Security needs would continue to be met at LANL using temporary stations, roadblocks, and other means. Traffic flow would be rerouted or screened as necessary; and severe traffic congestion could result. Alternatives that were considered, but dismissed, were widening Diamond Drive and constructing access-control stations without bypass roads. For full detail of these alternatives, see this DOE/EA-1429.

3.0 Environmental Baseline

3.1 Regional Description

3.1.1 Location within the State

LANL and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, north-central New Mexico, approximately 100 km (60 mi) north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe (see Figure 1). The 11,596-ha (28,654-ac) LANL site is situated on the Pajarito Plateau. This plateau is a series of fingerlike mesas separated by deep east-to-west-oriented canyons cut by intermittent streams. Mesa tops range in elevation from approximately 2,400 m (7,800 ft) on the flanks of the Jemez Mountains to about 1,900 m (6,200 ft) at their eastern termination above the Rio Grande.

Most LANL and community developments are confined to mesa tops. The surrounding land is largely undeveloped. Large tracts of land north, west, and south of the LANL site are held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The Pueblo of San Ildefonso borders LANL to the east.

3.1.2 Geologic Setting

Most of the fingerlike mesas in the Los Alamos area are composed of Bandelier Tuff, which consists of ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 300 m (1,000 ft) thick in the western part of the plateau and thins to about 80 m (260 ft) eastward above the Rio Grande (Broxton et al., 1995). Tuff was deposited after major eruptions in the Jemez Mountains Volcanic Field about 1.2 to 1.6 million years ago (Self and Sykes 1996).

On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains (Self and Sykes 1996). The conglomerate of the Puye Formation underlies the tuff in the central plateau and near the Rio Grande. Chino Mesa basalts interfinger with the conglomerate along the river. These formations overlay the sediments of the Santa Fe Group, which extend across the Rio Grande Valley and are more than 1,000 m (3,300 ft) thick. LANL is bordered on the east by the Rio Grande, within the Rio Grande rift. Because of the faulting associated with the rift, the area experiences frequent minor seismic disturbances.

Surface water in the Los Alamos area occurs primarily as short-lived or intermittent reaches of streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into the upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the LANL site before they are depleted by evaporation, transpiration, and infiltration (DOE 1999). Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande several times a year in some drainages. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances.

Groundwater in the Los Alamos area occurs in three forms: (1) water in shallow alluvium in canyons, (2) perched water (a body of groundwater above a less permeable layer that is separated from the underlying main body of groundwater by an unsaturated zone), and (3) the main aquifer of the Los Alamos area. Ephemeral and intermittent streams have filled some parts of canyon bottoms with alluvium that ranges from less than 1 m (3 ft) to as much as 30 m (100 ft) in thickness. Runoff in canyon streams percolates through the alluvium until its downward movement is impeded by layers of weathered tuff and volcanic sediment that are less permeable than the alluvium. This process creates shallow bodies of perched groundwater that move downgradient within the alluvium. As water in the alluvium moves down the canyon, it is depleted by evapotranspiration and movement into underlying volcanics (Purtymun et al., 1977). The chemical quality of the perched alluvial groundwaters shows the effects of discharges from LANL.

In portions of Pueblo, Los Alamos, and Sandia Canyons, perched groundwater occurs beneath the alluvium at intermediate depths within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalts. Perched groundwater has been found at depths of about 37 m (120 ft) in the midreach of Pueblo Canyon to about 137 m (450 ft) in Sandia Canyon near the eastern boundary of LANL (Purtymun 1995a). This intermediate-depth perched water discharges at several springs in the area of Basalt Spring in Los Alamos Canyon. These intermediate-depth groundwaters are formed in part by recharge from the overlying perched alluvial groundwaters and show evidence of radioactive and inorganic contamination from LANL operations (Purtymun 1995a).

Perched water may also occur within the Bandelier Tuff in the western portion of LANL, just east of the Jemez Mountains. The source of this perched water might be infiltration from streams discharging from the mouths of canyons along the mountain front and underflow of recharge from the Jemez Mountains. Industrial discharges from LANL operations may also contribute to perched groundwater in the western portion of LANL. Perched groundwater in the Tschicoma Formation is the source of water supply for the ski area located just west of the LANL boundary in the Jemez Mountains.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply (Griggs 1964). The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group) into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth to the main aquifer is about 300 m (1,000 ft) beneath the mesa tops in the central part of the plateau. The main aquifer is separated from alluvial and perched waters by about 110 to 190 m (350 to 620 ft) of tuff and volcanic sediments with low (less than 10 percent) moisture content (Griggs 1964).

Water in the main aquifer is under artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johnson 1974). The source of recharge to the aquifer is presently uncertain. Early research studies concluded that major recharge to the main aquifer is probably from the Jemez Mountains to the west because the piezometric surface slopes downward to the east, suggesting easterly groundwater flow beneath the Pajarito Plateau (Purtymun 1995b). However, the small amount of recharge available from the Jemez Mountains relative to water supply pumping quantities, along with differences in isotopic and trace element composition, appear to rule this out. Further, isotopic and chemical composition of some waters from wells near the Rio Grande suggest that the source of water underlying the eastern part of the Pajarito Plateau may be the Sangre de Cristo Mountains (Blake et al., 1995).

Groundwater flow along the Rio Grande rift from the north is another possible recharge source. The main aquifer discharges into the Rio Grande through springs in

White Rock Canyon. The 18.5-km (11.5-mi) reach of the river in White Rock Canyon between Otowi Bridge and the mouth of Rito de los Frijoles receives an estimated 5.3 to 6.8×10^6 m^3 (4,300 to 5,500 acre-ft) annually from the aquifer (Griggs 1964).

3.1.3 Topographic Setting

LANL and its surrounding environments encompass a wide range of environmental conditions. This is due in part to the prominent elevational gradient in the east-west direction. This is also attributable to the complex, local topography that is found throughout much of the region.

The spectacular scenery that is a trademark of the Los Alamos area is largely a result of this regional gradient. The difference between its lowest elevation in the eastern extremities and its highest elevation on the western boundaries represents a change of approximately 1,568 m (5,146 vertical feet). At the lowest point along the Rio Grande, the elevation is approximately 1,631 m (5,350 ft) above mean sea level. At the opposite elevational extreme, the Sierra de los Valles, which is part of the more extensive Jemez Mountains, forms a continuous backdrop to the landscapes of the region being studied. The tallest mountain peaks in the Sierra include Pajarito Mountain at 3,182 m (10,441 ft), Cerro Rubio at 3,185 m (10,449 ft), and Caballo Mountain at 3,199 m (10,496 ft).

In addition to the prominent elevational gradient, the Los Alamos region is also topographically complex. Within Los Alamos County, there are three main physiographic systems (Nyhan et al., 1978). From east to west, these systems are the White Rock Canyon, the Pajarito Plateau, and the Sierra de los Valles. White Rock Canyon is 1,890 m (6,200 ft) above mean sea level. This rugged canyon is approximately 1.6 km (1 mi) wide and extends to a depth of nearly 275 m (900 ft). White Rock Canyon occupies about 5 percent of Los Alamos County. The Pajarito Plateau is the largest of the three physiographic systems, occupying nearly 65 percent of Los Alamos County. The Pajarito Plateau is a broad piedmont that slopes gently to the east and southeast. At a more localized scale, the Pajarito Plateau is also topographically complex. The surface of the plateau is dissected into narrow mesas by a series of east-west-trending canyons. Above 2,377 m (7,800 ft), the Sierra de los Valles rises to the western extremity of the study region. These mountains occupy approximately 30 percent of Los Alamos County. The Sierra is also dissected into regularly spaced erosional features, although these canyons in the mountains are not so prominent as the canyons on the Pajarito Plateau.

3.1.4 Weather and Climate

Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area because of the topography.

Los Alamos has four distinct seasons. Winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Spring is the windiest season of the year. Summer is the rainy season in Los Alamos, when afternoon thunderstorms and associated hail and lightning are common. Fall marks the end of the rainy season and a return to drier, cooler, and calmer weather. The climate statistics discussed below summarize analyses given in Bowen (1990 and 1992).

Several factors influence the temperature in Los Alamos. An elevation of 2,256 m (7,400 ft) helps to counter its southerly location, making for milder summers than nearby locations with lower elevations. The sloping nature of the Pajarito Plateau causes cold-air drainage, making the coolest air settle into the valley. The Sangre de Cristo Mountains to the east act as a barrier to arctic air masses affecting the central and eastern US. The temperature does occasionally drop well below freezing, however. Another factor affecting the temperature in Los Alamos is the lack of moisture in the atmosphere. With less moisture, there is less cloud cover, which allows a significant amount of solar heating during the daytime and radiative cooling during the nighttime. This heating and cooling often causes a wide range of daily temperature.

Winter temperatures range from 30°F to 50°F (-1°C to 10°C) during the daytime to 15°F to 25°F (-9°C to -4°C) during the nighttime. The record low temperature recorded in Los Alamos (as of 1992) is -18°F (-28°C). Winter is usually not particularly windy, so extreme wind chills are uncommon at Los Alamos. Summer temperatures range from 70°F to 88°F (21°C to 31°C) during the daytime to 50°F to 59°F (10°C to 15°C) during the nighttime. Temperatures occasionally will break 90°F (32°C). The highest temperature ever recorded (as of 1992) in Los Alamos is 95°F (35°C).

The average annual precipitation in Los Alamos is 47.57 cm (18.73 in.). The average snowfall for a year is 149.6 cm (58.9 in.). Freezing rain and sleet are rare at Los Alamos. Winter precipitation in Los Alamos is often caused by storms entering the US from the Pacific Ocean, or by cyclones forming or intensifying in the lee of the Rocky Mountains. When these storms cause upslope flow over Los Alamos, large snowfalls can occur. The snow is usually a dry, fluffy powder, with an average equivalent water-to-snowfall ratio of 1:20.

The summer rainy season accounts for 48 percent of the annual precipitation. During the July–September period, orographic thunderstorms form when moist air from the Gulf of Mexico and the Pacific Ocean moves up the sides of the Jemez Mountains. These thunderstorms can bring large downpours, but sometimes they only cause strong winds and lightning. Hail frequently occurs from these rainy-season thunderstorms.

Winds in Los Alamos are also affected by the complex topography, particularly in the absence of a large-scale disturbance. There is often a distinct daily cycle of the winds around Los Alamos. During the daytime, upslope flow can produce a southeasterly wind on the plateau. In the evening, as the mountain slopes and plateau cool, the flow moves downslope, causing light westerly and northwesterly flow. Cyclones moving through the area disturb and override the cycle. Flow within the canyons of the Pajarito Plateau can be quite varied and complex.

3.1.5 Plant Communities

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 1,500-m (5,000-ft) elevation gradient from the Rio Grande on the east to the Jemez Mountains 20 km (12 mi) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County: juniper-savanna, piñon-juniper, ponderosa pine, mixed conifer, and spruce-fir. All of the communities and their distribution are described in Balice (1998). The juniper-savanna community is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons at elevations between 1,700 to 1,900 m (5,600 to 6,200 ft). The piñon-juniper cover type, generally in the 1,900- to 2,100-m (6,200- to 6,900-ft) elevation range, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pines are found in the western portion of the plateau in the 2,100- to 2,300-m (6,900- to 7,500-

ft) elevation range. These three cover types predominate, each occupying roughly one-third of the LANL site. The mixed conifer cover type, at an elevation of 2,300 to 2,900 m (7,500 to 9,500 ft), overlaps the ponderosa pine community in the deeper canyons and on north-facing slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. Spruce-fir is at higher elevations of 2,900 to 3,200 m (9,500 to 10,500 ft). Twenty-seven wetlands and several riparian areas enrich the diversity of plants and animals found on LANL lands.

3.1.6 Post-Fire Plant Communities

In May 2000, the Cerro Grande fire burned over 17,200 ha (43,000 ac) of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. An assessment of fire-induced vegetation mortality was made by the Burned Area Emergency Rehabilitation Team (BAER 2000). As a result of the fire, approximately 3,110 ha (7,684 ac) or 28 percent of the vegetation at LANL was burned in some fashion. However, few areas on LANL were burned severely. About 20 percent (16 ac [7.2 ha]) of the total wetlands at LANL were burned in the Cerro Grande fire. Wetlands in Mortandad, Pajarito and Water Canyons received increased amounts of ash and hydromulch runoff as a result of the fire (Marsh 2001).

3.1.7 Pre- and Post-Fire Hydrology

McLin (1992) modeled all major 100-year floodplains for LANL using US Army Corp of Engineers Hydrologic Engineering Center HEC-1 and HEC-2 computer-based models. These data represent pre-fire flow rates for all of the floodplains on LANL. Post-fire analyses have been completed (McLin et al., 2001, 2002). These new models show increases in peak flow of one to two orders of magnitude per unit drainage basin area.

4.0 Description and Effects on Floodplains and Wetlands

Pursuant to Executive Order 11988, Floodplain Management, each Federal agency is required, when conducting activities in a floodplain, to take actions to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. DOE's 10 CFR Part 1022.4 defines a flood or flooding as ". . . a temporary condition of partial or complete inundation of normally dry land areas from . . . the unusual and rapid accumulation of runoff of surface waters . . . ." DOE's 10 CFR Part 1022.4 identifies floodplains that must be considered in a floodplain assessment as the base floodplain and the critical-action floodplain. The base floodplain is the area inundated by a flood having a 1.0 percent chance of occurrence in any given year (referred to as the 100-year floodplain). The critical-action floodplain is the area inundated by a flood having a 0.2 percent chance of occurrence in any given year (referred to as the 500-year floodplain). Critical action is defined as any activity for which even a slight chance of flooding would be too great. Such actions could include the storage of highly volatile, toxic, or water-reactive materials.

Pursuant to Executive Order 11990, Protection of Wetlands, each Federal agency is to avoid, to the extent practicable, the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands if a practicable alternative exists. DOE regulations define wetlands as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds" (10 CFR Section 1022.4[v]).

According to 10 CFR 1022.12(a)(2), a floodplain/wetland assessment is required to discuss the positive and negative, direct and indirect, and long- and short-term effects of the Proposed Action on the floodplain and/or wetlands. In addition, the effects on lives and property and on natural and beneficial values of floodplains must be evaluated. For actions taken in wetlands, the assessment should evaluate the effects of the Proposed Action on the survival, quality, and natural and beneficial values of the wetlands. If DOE finds no practicable alternative to locating activities in floodplains or wetlands, DOE will design or modify its actions to minimize potential harm to or in the floodplains and wetlands. The floodplains and wetlands that are assessed herein are those areas in canyons or drainages that are seasonally inundated with perennial or intermittent streams from runoff during 100-year floods.

4.1 General

Wetland functions are naturally occurring characteristics of wetlands such as food web production; general nesting, resting, or spawning habitat; sediment retention; erosion prevention; flood and runoff storage; retention and future release; groundwater discharge or recharge; and land-nutrient retention and removal. Wetland values are ascribed by society based on the perception of significance and include water-quality improvement, aesthetic or scenic value, experiential value, and educational or training value. These values often reflect concerns regarding economic values; strategic locations; and, in arid regions, the location relative to other landscape features. Thus, two wetlands with similar size and shape could serve the same function but have different values to society. For example, a wetland that retains or changes flood-flow timing of a flood high in the mountains might not be considered as valuable as one of similar size that retains or changes flood-flow timing of a flood near a developed community. Wetlands were addressed in the LANL Site-Wide Environmental Impact Statement as follows (DOE 1999):

"Wetlands in the general LANL region provide habitat for reptiles, amphibians, and invertebrates and potentially contribute to the overall habitat requirements of the peregrine falcon, Mexican spotted owl, southwestern willow flycatcher, and spotted bat. Wetlands also provide habitat, food, and water for many common species such as deer, elk, small mammals, and many migratory birds and bats. The majority of the wetlands in the LANL region are associated with canyon stream channels or are present on mountains or mesas as isolated meadows containing ponds or marshes, often in association with springs."

Wetlands within LANL have been broadly mapped by the US Fish and Wildlife Service. This information is available in the National Wetlands Inventory in a Geographic Information System-based format. This hierarchical system follows Cowardin et al. (1979) and is based entirely on aerial photography. Small wetlands, or those in steep canyons, may not be detected using this method. A 1996 field survey by LANL personnel identified an estimated 20 ha (50 ac) of wetlands within LANL boundaries, with more than 95 percent of these located in the Sandia, Mortandad, Pajarito, and Water Canyons watersheds.

4.2 Canyon Area Issues and Concerns

The canyon areas on LANL land are comprised primarily of mixed conifer and ponderosa pine. Areas outside of Habitat Management Plan (LANL 1998) areas for threatened and endangered species will be treated according to the mitigation detailed within this document and DOE/SEA-03 and the Storm Water Protection Plan for this project. In all cases, erosion, sediment transfer, and movement of contaminants are a concern, from work on mesa tops as well as within floodplains, particularly during rain events and the rainy season. Cumulative erosion of ash and soils from severely burned headlands above project sites is also a potential concern. The potential for downstream floodplain and wetland values to be impacted by the proposed project exists for the canyons.

4.3 Potential Effects of the Proposed Projects

The proposed western bypass does not have any floodplain or wetlands associated with the proposed area. Of the proposed guard stations, only the one nearest White Rock in Pajarito Canyon (Figure 4) may impact wetlands directly to the south of Pajarito Road. As long as the road widening and other modification take place to the north side of the road, there will not be impacts to sensitive habitats (c.f., Keller in preparation).

The proposed eastern bypass road corridor crosses Mortandad Canyon, Sandia Canyon, and relatively level areas between Pajarito Road and West Jemez Road. The proposed eastern bypass road also transects undisturbed areas, which are comprised of mainly ponderosa pine with mixed conifer in the canyons, consisting of Douglas Fir and white fir, with native grasses and understory brush. The proposed eastern bypass road would traverse floodplains in Sandia and Mortandad Canyons and a small wetland.

In all cases where the project takes place within a canyon, personnel are subject to maintaining the integrity of all natural and beneficial floodplain values. In those floodplains that also have wetlands, survival, quality, natural and beneficial wetland values also must be maintained. In carrying out activities described above for these projects, as per Executive Order 11988 and Executive Order 11990, all impacts to public health, safety, and welfare including water supply, quality, recharge and discharge, pollution, flood and storm hazards, sediment, and erosion will be evaluated. Additionally, the corresponding environmental assessment for this document includes discussion of suggested BMPs.

Possible direct effects of the proposed projects are a reduction in vegetation cover and exposure of mineral soils. If heavy equipment is used directly within the floodplain, soil compaction and increased surface impermeability may occur. General indirect effects of these efforts are the potential for the increase of erosion and storm water runoff. Even when the work is being performed above the floodplain on a mesa top or canyon rim, wetland and floodplain values can be affected if care is not taken to control materials entering canyons from above (e.g., debris, soils, and vegetation).

Primary indirect effects (within identified canyons) to floodplains and wetlands resulting from the removal effort may include movement or ponding of water or sediment within the project area. For instance, if work conducted in Sandia Canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands downstream. There will likely be a great deal of soil and sediment disturbance, particularly if they fill and put a new culvert in place.

Secondary indirect effects (outside of the project area) resulting from the removal effort would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio Grande). Downstream floodplain/wetland values potentially affected by the project may include a slight alteration of flood-flow retention times, a slight alteration of nesting, foraging, or resting habitat, a slight redistribution of sediments and sediment-retention time changes, and the slight potential loss of experimental or educational opportunities. These secondary indirect impacts are anticipated to come from both changes in timing of storm water runoff (speed) and increases in storm water runoff (volume) from increased impermeable surfaces within the tract from the use of heavy equipment compacting the soil.

5.0 Specific Assessments for the Proposed Project

5.1 Eastern Bypass

The eastern bypass road will cross over both Sandia and Mortandad Canyons. In Sandia, there will be work performed within the canyon bottom to fill and restructure the rubble pile for suitability as a road. There may be work done on the already existing culvert as well. For Mortandad, the road will cross the canyon on a bridge and construction is not planned to impact the integrity of the canyon walls or bottom. There is wetland vegetation along portions of the eastern bypass corridor, including narrowleaf cottonwoods, coyote willows, broad-leaf cattail, and rushes, particularly in the canyon bottoms.

5.1.1 Floodplains: Sandia

The floodplain covers the entire extent of the canyon from the headlands to the Rio Grande. The 100-year floodplain is shown in Figure 5.

5.1.2 Wetlands: Sandia

Wetlands that exist in Sandia Canyon are both part of an inactive reach (in the upper region nearest the rubble pile) and an active fen (further downstream, Figure 5). These wetlands are hydrologically maintained by storm water and outfalls. The Sandia Canyon wetland area is about 3.2 ha (8 ac) in size and to the east side of the rubble pile of concrete and asphalt material that was used to partially fill in this part of the canyon years ago. If the inactive reach were rewatered, it would likely regenerate into a functional wetland.

5.1.3 Potential Effects of the Proposed Action and Alternatives

Implementing the Proposed Action would result in the construction of the east bypass road section over the exiting rubble pile by filling the remaining distance to the south. If the sides of the existing fill are stabilized, it is possible that fill, soil, or rubble may fall into the floodplain thus restricting the flow of water through the culvert. All work involved with the culvert may likewise increase the amount of fill that might impede the water course. Additionally, fill or other rubble may fall into the inactive wetland reach. Since this wetland area was designated as a jurisdictional wetland by LANL professionals even though it has been dewatered (Bennett 2001), every effort to keep materials out of this area should be taken. The downstream wetland area east of the

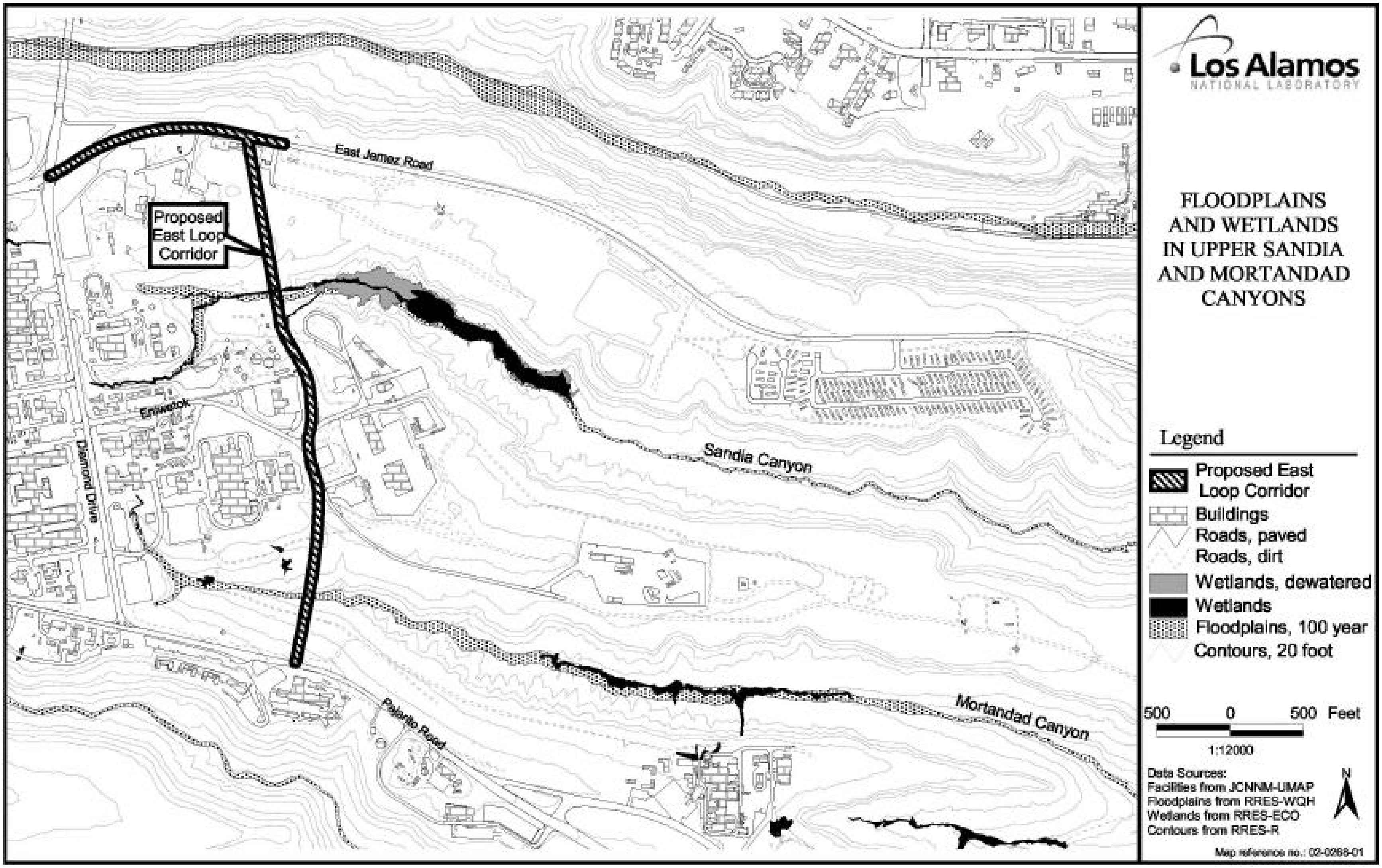

Figure 5. Floodplains and wetlands in upper Sandia and Mortandad Canyons.

rubble pile in the active reach would not likely be adversely affected because of the BMPs that would be employed at the site and the distance to the wetlands.

Under the No Action Alternative, the road would not be constructed and therefore no fill or damage to either the floodplain or wetland would occur. No adverse effect or change to the wetland and floodplain functions and values within Sandia Canyon would likely occur from the No Action Alternative.

5.1.4 Floodplains: Mortandad

Mortandad Canyon is approximately 30 m (100 ft) deep and 45 m (150 ft) wide in the area where the bridge would cross.

5.1.5 Wetlands: Mortandad

There are wetlands associated with this canyon, including two very small ones within the project area (the proposed road goes over the top of these wetlands canyon edge to canyon edge. For more details, see the environmental assessment DOE/EA-1429. The extent of wetlands in this canyon can be seen in Figure 5.

5.1.6 Potential Effects of the Proposed Action and Alternatives

Implementing the Proposed Action would result in the construction of the east bypass road section over the span of Mortandad Canyon indicated in Figure 2. If the construction materials do not fall into the canyon, nor does construction destabilize canyon walls such that debris, vegetation, or soils fall into the floodplain or associated wetlands, then there would not likely be any adverse effects since BMPs will be implemented.

6.0 Mitigation for the Proposed Projects

Mitigation measures are set forth to protect floodplain and wetland values as stated in the Executive Orders. In addition to those values stated above, maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity, stability, hydrologic utility, wildlife, timber, food and fiber sources, and recreational, scientific, and cultural issues can be mitigated with the following recommendations.

At a minimum, BMPs for runoff control, such as silt barriers and stormwater retention ponds, would be in place to mitigate runoff effects during work particularly in Sandia Canyon. These BMPs would incorporate considerations of the NPDES permit program and Environmental Protection Agency requirements for a Storm Water Protection Plan.

In all cases, BMPs would be followed according to DOE/SEA-03, the corresponding environmental assessment for this project, and any and all DOE and LANL BMPs for wetlands and floodplains. All sites should be monitored and improvements installed as needed. There may be some additional useful mitigation measures that are discussed below.

All work conducted for the proposed project that involves the disturbance of soils through road building, the continuous use of roads, off-road vehicle use, and dragging of debris potentially contributes to an increase in sediment movement during a 100-year storm event, even if the work is conducted above the floodplain. This, in turn, can possibly increase the amount of contaminants being removed to downstream areas, particularly if soils are disturbed in canyons. Careful planning of road placement and use can minimize overall damage to the floodplain and any stream channels (Colorado State Forest Service 1998). If fill areas are established within canyons, all effort to remain off the floodplain and out of water courses should be practiced. Additionally, care should be taken to maintain trees and shrubs growing at the base of fill slopes.

Mitigation actions associated with activities in floodplains will, in part, depend upon BMPs already in place for potential release sites, erosion control, and post-project mitigations found in the DOE/SEA-03 Mitigation Plan (DOE 2000). In general, no debris would be left in the floodplains as defined by McLin et al. (2001). This includes all downed trees, prunings, and chipped material, as well as any cement or structural debris. If a tree is felled, care would be taken to keep it from landing in a water course. Leaving debris of any kind in a drainage, stream channel, or water course, even if it only runs seasonally, may invoke a penalty under Sections 401 and/or 404 of the Clean Water Act. Enough vegetation should remain along channel edges to stabilize the banks. BMPs suggestions from the Colorado Forest Stewardship Guidelines (Colorado State Forest Service 1998) include maintaining streamside management zones that are 15.24-m (50-ft) buffers on all sides of a perennial streambed, spring, seep, wetland, or any riparianlike area, including seasonal water channels where no disturbance would occur. This enhances stability of any potential water course.

BMPs would be employed when working in canyon bottoms as a planned part of the projects since these areas are considered potentially contaminated until proven otherwise through extensive further contaminant testing. Minimizing soil disturbance and contaminant movement is desired. Following the already prescribed method of using established roads only in canyon bottoms will help with this issue.

In addition, work conducted during rainy season within a canyon bottom may be restricted for safety issues. This will be determined by Emergency Management Services for LANL. Reseeding and revegetating all disturbed surfaces should be completed once all proposed projects are completed. And finally, machine maintenance in the forest can result in water contamination. An effort should be made to prevent waste oil, gas, or antifreeze to drain onto the soil anywhere within the project area, but particularly within a floodplain (Colorado State Forest Service 1998) or within 30 m (100 ft) of a canyon edge.

7.0 Cumulative Impacts

The Cooling Tower Water Conservation Project has been proposed for work at approximately the same time as the proposed access controls and bypass roads. The cumulative effects to the wetlands in both Sandia and Mortandad Canyons are unknown. However, experts across the Laboratory through the Wetland Working Group suggest that drying up wetlands or not restoring previously dewatered wetlands, may have serious contamination issues in the future (i.e., it is unknown where contaminants move and how quickly they move downstream once a wetland is dewatered). Further mitigation measures may have to be discussed depending on the cumulative effect to wetlands within both project areas.

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