DOE/EA-1429

Environmental Assessment for Proposed Access Control and Traffic Improvements at Los Alamos National Laboratory, Los Alamos, New Mexico

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Department of Energy
National Nuclear Security Administration
Los Alamos Site Office

Contents

Figures

Tables

Photos

ACRONYMS AND TERMS

ac	acre
ADT	average daily trips
AEI	Areas of Environmental Interest
AOCs	areas of concern
BMPs	best management practices
CFR	Code of Federal Regulations
cm	centimeter
CRMP	Cultural Resources Management Plan
dBA	A-weighted decibel frequency scale
DOE	Department of Energy
DOI	Department of Interior
EA	environmental assessment
EIS	environmental impact statement
EPA	Environmental Protection Agency
ER	Environmental Restoration Program
ft	foot
HE	high explosives
HMP	Habitat Management Plan
JMVF	Jemez Mountains volcanic field
km^2	square kilometers
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LIR	Laboratory Implementing Requirements
mi	miles
mi^2	square miles
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NMAAQS	New Mexico Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
PCBs	polychlorinated biphenyls
PPE	personal protective equipment
PRSs	potential release sites
RCRA	Resource Conservation and Recovery Act of 1969
ROD	Record of Decision
SHPO	State Historic Preservation Office
SR	State Road
SWEIS	Site-Wide Environmental Impact Statement
SWMU	solid waste management unit
T&E	threatened and endangered (species)
TA	Technical Area (at LANL)
TCP	Traditional Cultural Property
TLV	threshold limit value
U.S.	United States
UC	University of California
VOCs	volatile organic compounds
WWTP	wastewater treatment plant

EXPONENTIAL NOTATION: Many values in the text and tables of this document are expressed in exponential notation. An exponent is the power to which the expression, or number, is raised. This form of notation is used to conserve space and to focus attention on comparisons of the order of magnitude of the numbers (see examples):

1×10^{4}	= 10,000
1×10^{2}	= 100
1×10^{0}	= 1
1×10^{-2}	= 0.01
1×10^{-4}	= 0.0001

Metric Conversions Used in this Document

Multiply	By	To Obtain
Length		
inch (in.)	2.50	centimeters (cm)
feet (ft)	0.30	meters (m)
yards (yd)	0.91	meters (m)
miles (mi)	1.61	kilometers (km)
Area		
acres (ac)	0.40	hectares (ha)
square feet (ft^2)	0.09	square meters (m^2)
square yards (yd^2)	0.84	square meters (m^2)
square miles (mi^2)	2.59	square kilometers (km^2)
Volume		
gallons (gal.)	3.79	liters (L)
cubic feet (ft^3)	0.03	cubic meters (m^3)
cubic yards (yd^3)	0.76	cubic meters (m^3)
Weight		
ounces (oz)	29.60	grams (g)
pounds (lb)	0.45	kilograms (kg)
short ton (ton)	0.91	metric ton (t)

EXECUTIVE SUMMARY

The National Nuclear Security Administration (NNSA)* has assigned a continuing role to Los Alamos National Laboratory (LANL) in carrying out NNSA's national security mission. It is imperative that LANL continue this enduring responsibility and that NNSA adequately safeguard LANL capabilities. NNSA has identified the need to restrict vehicular access to certain areas within LANL for the purpose of permanently enhancing the physical security environment at LANL. It has also identified the need to change certain traffic flow patterns for the purpose of enhancing physical safety at LANL.

The Proposed Action would include the construction of eastern and western bypass roads around the LANL Technical Area (TA) 3 area and the installation of vehicle access controls and related improvements to enhance security along Pajarito Road and in the LANL core area. This Proposed Action would modify the current roadway network and traffic patterns. It would also result in traversing Areas of Environmental Interest identified in the LANL Habitat Management Plan, demolition of part of an historic structure at Building 3-40, and traversing several potential release sites and part of the Los Alamos County landfill.

The No Action Alternative was also considered. Under this alternative NNSA would not construct the eastern or western bypass roads, any access-control stations, or related improvements. Diamond Drive would continue to serve as the primary conduit for most vehicle traffic within the LANL core area regardless of actual trip destinations. The No Action Alternative does not meet NNSA's purpose and need for action.

The proposed bypass road corridors traverse both developed and undeveloped areas. Several potential release sites are present. These would either be sampled and remediated in accordance with New Mexico Environment Department requirements before construction or avoided to allow for future remediation. In some cases, contaminant levels may fall below remediation thresholds and the Environmental Restoration Project would set requirements for workers. Structural bridges would be used to span canyons that are Areas of Environmental Interest because they include habitat for threatened and endangered species, or because they are 100-year floodplains or wetlands. Traffic congestion is not expected to increase once construction is completed. The Proposed Action would allow for a flexible approach to vehicle access controls in response to security conditions. Traffic safety within LANL would improve because access control would screen out drivers without a need to be in the LANL TA-3 area or along Pajarito Road. There would be adequate parking for University of California personnel and construction workers. Construction and demolition wastes would be transported to a licensed commercial landfill or recycled for other construction projects at LANL or offsite. Construction for the proposed bypass roads would be expected to produce only temporary and localized air and noise emissions. The Proposed Action would have no effects on visual resources, land use, socio-economics, or environmental justice. The roadways would be designed to accommodate geologic and soil conditions. The demolition of part of Building 3-40 could have an adverse effect on historic structures since it is eligible for the National Register of Historic Places and, therefore, a treatment plan would be negotiated between NNSA and the State Historic Preservation Office.

*The NNSA is a separately organized agency within the Department of Energy established by the 1999 National Nuclear Security Administration Act [Title 32 of the Defense Authorization Act for fiscal year 2000 (Public Law 106-65)].

Cumulative effects of the Proposed Action, along with past, present, and reasonably foreseeable actions, on LANL and surrounding lands are anticipated to be negligible. No increases in LANL operations are anticipated as a result of this action.

1.0 PURPOSE AND NEED

Section 1 presents the United States (U.S.) Department of Energy (DOE), National Nuclear Security Administration's (NNSA)[1] requirements under the National Environmental Policy Act of 1969 (NEPA), background information on the proposal, the purpose and need for agency action, and a summary of public involvement activities.

1.1 Introduction

NEPA requires Federal agency officials to consider the environmental consequences of their Proposed Actions before decisions are made. In complying with NEPA, the DOE, NNSA follows the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500–1508) and DOE's NEPA implementing procedures (10 CFR 1021). The purpose of an environmental assessment (EA) is to provide Federal decision makers with sufficient evidence and analysis to determine whether to prepare an environmental impact statement (EIS) or issue a Finding of No Significant Impact.

At this time, the NNSA must make a decision regarding the construction and operation of two segments of new roadways linking existing roadways and additional associated site access restriction actions for the purpose of improving physical security to certain portions of Los Alamos National Laboratory (LANL) and for the purpose of improving traffic safety within congested areas within the facility. LANL is a Federal facility located at Los Alamos, New Mexico (Figure 1), that comprises 43 square miles (mi^2) (111 square kilometers [km^2]) of buildings, structures and forested land. It is administered by DOE, NNSA for the Federal government and managed and operated under contract by the University of California (UC).

This EA has been prepared to assess the potential environmental consequences of the new road segments and site access restrictions compared to the No Action Alternative.

The objectives of this EA are to (1) describe the underlying purpose and need for DOE action; (2) describe the Proposed Action and identify and describe any reasonable alternatives that satisfy the purpose and need for agency action; (3) describe baseline environmental conditions at LANL; (4) analyze the potential indirect, direct, and cumulative effects to the existing environment from implementation of the Proposed Action, and (5) compare the effects of the Proposed Action with the No Action Alternative and other reasonable alternatives. For the purposes of compliance with NEPA, reasonable alternatives are identified as being those that meet DOE's purpose and need for action by virtue of timeliness, appropriate technology, and applicability to LANL. The EA process provides DOE with environmental information that can be used in developing mitigative actions, if necessary, to minimize or avoid adverse effects to the quality of the human environment and natural ecosystems should DOE decide to proceed with implementing the proposed construction and operation of these new road segments and other certain security features at LANL.

[1] The NNSA is a separately organized agency within the DOE established by the 1999 National Nuclear Security Administration Act [Title 32 of the Defense Authorization Act for Fiscal Year 2000 (Public Law 106-65)].

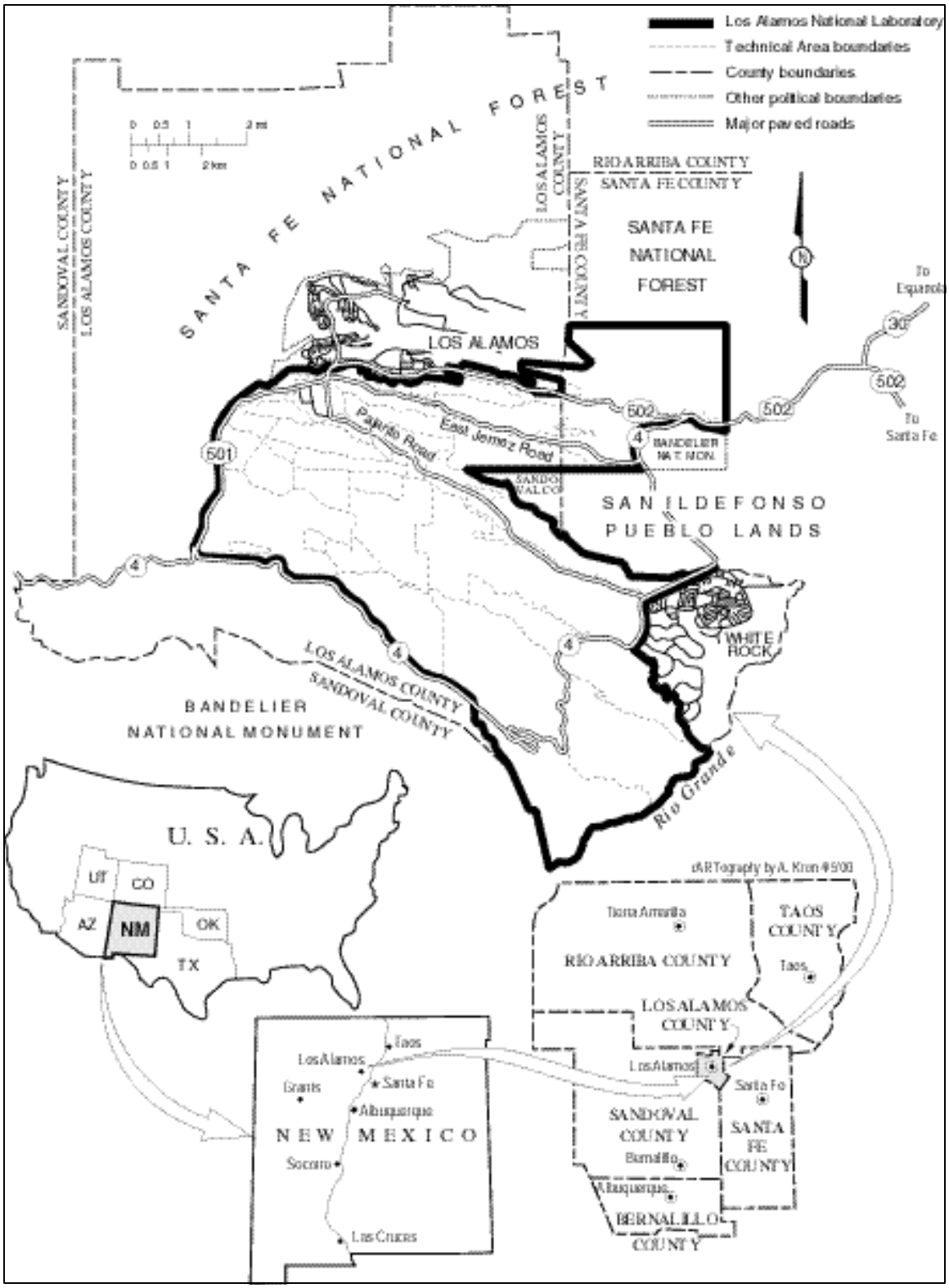

Figure 1. Location of Los Alamos National Laboratory.

Ultimately, the goal of NEPA, and this EA, is to aid DOE officials in making decisions based on an understanding of environmental consequences and taking actions that protect, restore, and enhance the environment.

1.2 Background

In the wake of the terrorist events of September 11, 2001, on properties within the U.S., the perceived nature and level of risk for terrorist attack to DOE, NNSA facilities changed. LANL 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 U.S. 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 U.S. 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. 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 within close proximity to Hazard Category 2 nuclear operations[2]. 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 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 UC 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] 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).

1.3 Statement of Purpose and Need for Agency Action

The DOE, NNSA has assigned a continuing role for LANL in carrying out its national security mission. To enable LANL to continue this enduring responsibility requires that NNSA maintain the capabilities and capacities required in support of its national mission assignments at LANL and adequately provide for their physical security. NNSA has identified the need to establish a permanent physical security framework to facilitate the implementation of security measures commensurate with daily DOE and NNSA imposed security conditions at LANL. It has also identified the need to change certain traffic flow patterns for the purpose of enhancing physical safety at LANL.

1.4 Scope of this EA

A sliding-scale approach (DOE 1993) is the basis for the analysis of potential environmental and socioeconomic effects in this EA. That is, certain aspects of the Proposed Action have a greater potential for creating environmental effects than others, therefore, they are discussed in greater detail in this EA than those aspects of the action that have little potential for effect. For example, implementation of the Proposed Action could affect transportation, ecological, waste management, and cultural resources in the LANL area. This EA, therefore, presents in-depth descriptive information on these resources to the fullest extent necessary for effects analysis. On the other hand, implementation of the Proposed Action would cause only a minor effect on socioeconomics at LANL. Thus, a minimal description of socioeconomic effects is presented.

When details about a Proposed Action are incomplete, as a few are for the Proposed Action evaluated in this EA (for example, the amounts of waste generated by demolition of certain buildings), a bounding analysis is often used to assess potential effects. When this approach is used, reasonable maximum assumptions are made regarding potential aspects of project activities (see Sections 2.0 and 4.0 of the EA). Such an analysis usually provides an overestimation of potential effects. In addition, any proposed future action(s) that exceeds the assumptions (the bounds of this effects analysis) would not be allowed until an additional NEPA review could be performed. A decision to proceed or not with the action(s) would then be made.

1.5 Public Involvement

DOE provided written notification of this NEPA review to the State of New Mexico, the four Accord Pueblos (San Ildefonso, Santa Clara, Jemez, and Cochiti), Acoma Pueblo, the Mescalero Apache Tribe, and to over 30 stakeholders in the area on March 22, 2002. DOE allowed for a 21-day comment period of the draft document. Where appropriate and to the extent practicable, concerns and comments were considered in the final EA. A public meeting at the Los Alamos Site Office was held on August 6, 2002, as part of this public involvement process.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This section discusses the Proposed Action and the No Action Alternative. Section 2.1 describes the Proposed Action for the EA that would allow NNSA to meet its purpose and need for agency action. The No Action Alternative is presented in Section 2.2 as a baseline for comparison with the consequences of implementing the Proposed Action. Alternatives that were considered but dismissed from further analysis in this EA are discussed in Section 2.3, and related actions are discussed in Section 2.4.

2.1 Proposed Action

This proposed project would route unauthorized vehicular traffic around the core area of LANL which includes the main administrative and technical area at TA-3. 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 on a 24 hour basis, seven days a week. This project would entail construction of an eastern and western bypass road around a major portion of Technical Area (TA) 3 of LANL. The Proposed Action would also include closing streets providing access into TA-3, safety improvements to intersections within TA-3, and construction of two new short access streets. Access along Pajarito Road between White Rock and TA-3 would be controlled and vehicles would be screened. The road would not be closed unless security conditions warranted such a response. Figures 2, 3, and 4 show the conceptual alignments of these bypass roads, locations of access-control stations, and other components of the Proposed Action. 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 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. Table 1 details the likely disposition of these structures.

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 emplace vehicle barriers, relocate existing utilities, provide new occupied structures with required utilities, and install 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

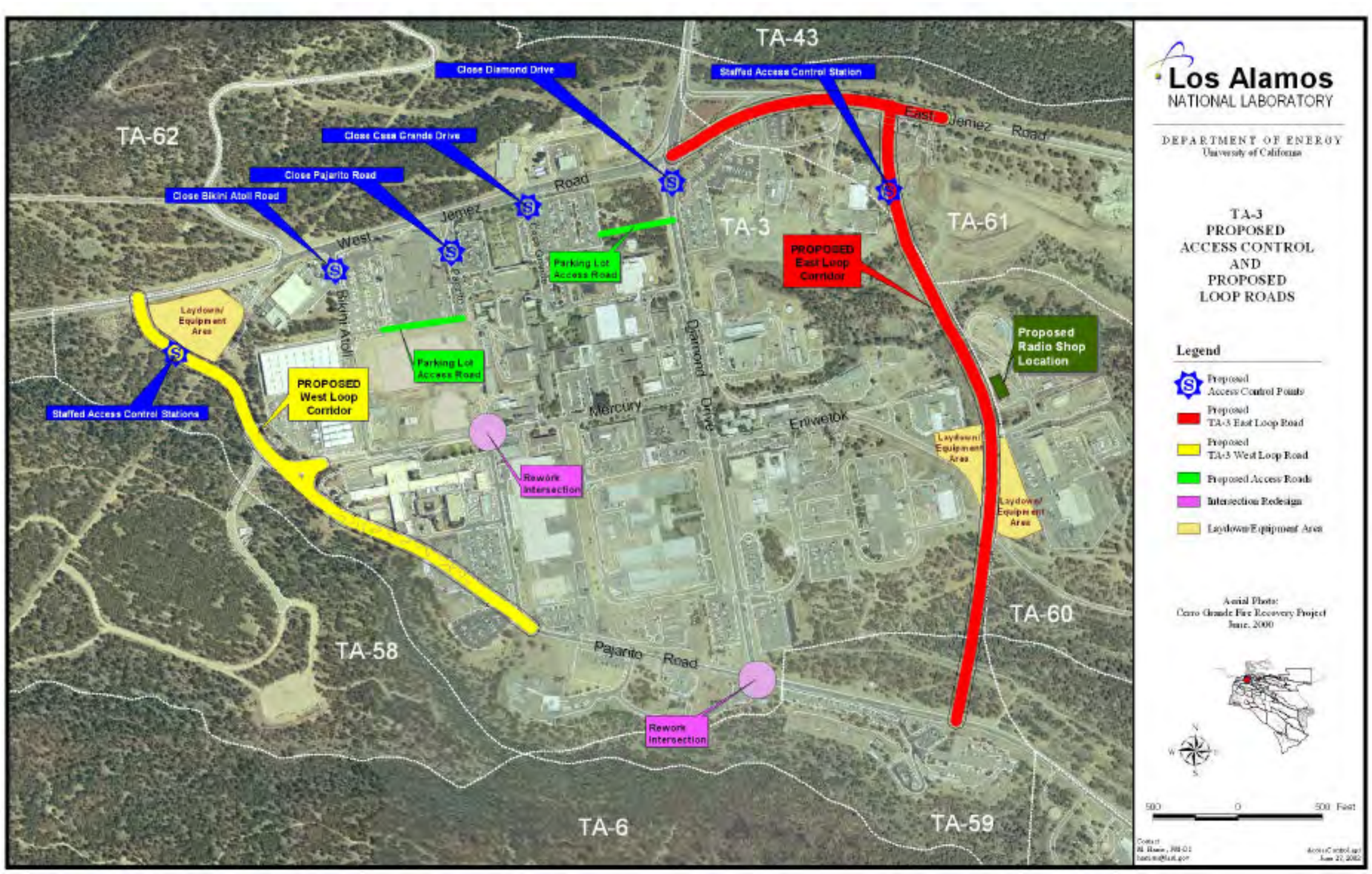

Figure 2. Proposed access controls and bypass roads around TA-3.

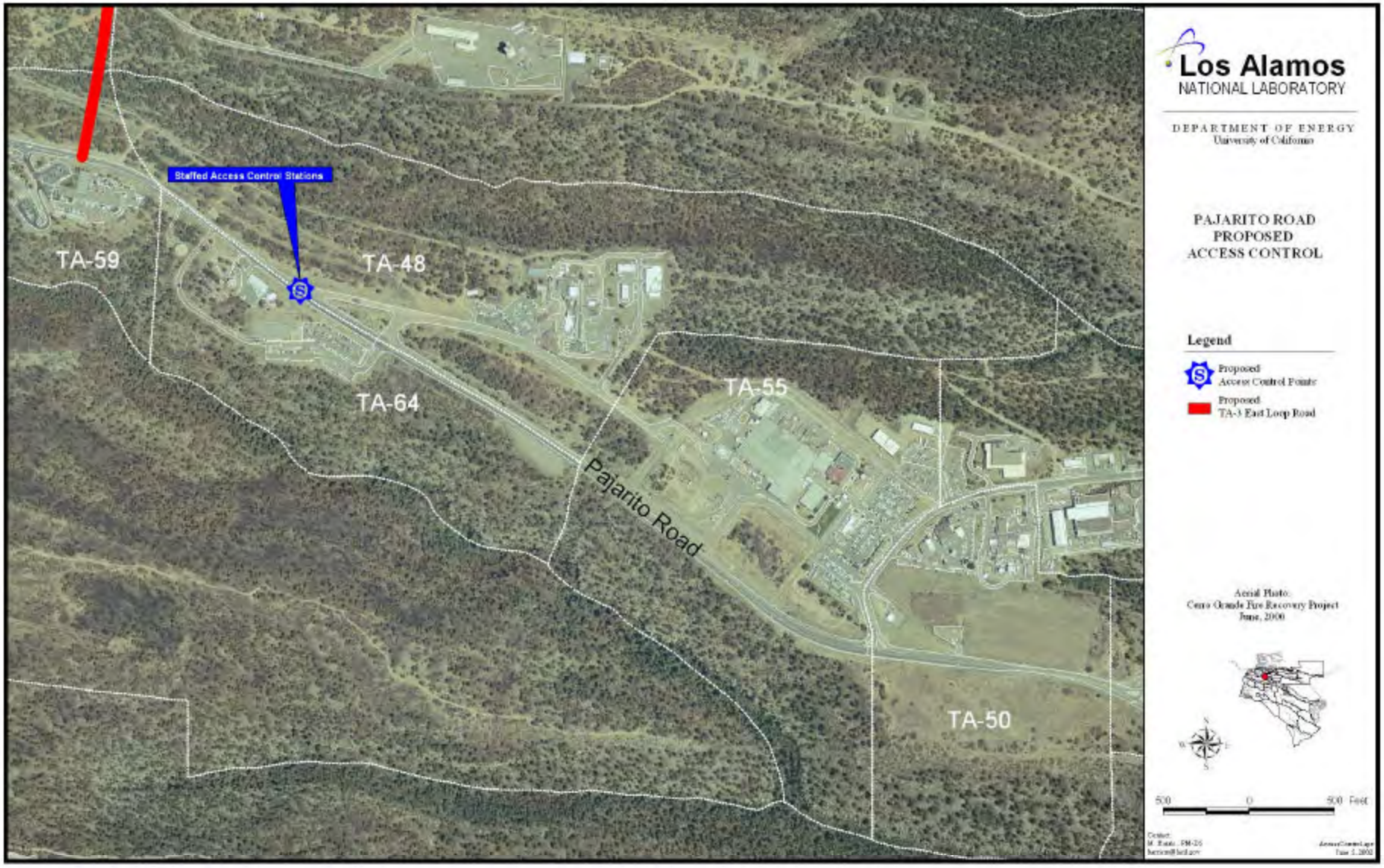

Figure 3. Proposed Pajarito Road access controls.

Figure 4. Proposed access controls at Pajarito Road near State Road (SR) 4.

Table 1. Bypass Roads Project: Structures Proposed for Removal, Relocation, or Salvaging

Structure	Potential Disposition
Western Bypass Road	
3-1887 Trailer, NASA Program	Salvage/Demo/Relocate
3-1888 Trailer, Nuclear Information System Group Office	Salvage/Demo/Relocate
3-545 Trailer	Salvage/Demo/Relocate
3-1702 Trailer, Earth, Environment, and Sciences Division, Hydrology, Geochemistry, and Geology group	Salvage/Demo/Relocate
3-1596 Trailer, Nuclear Information System Group	Salvage/Demo/Relocate
3-1530 Trailer, Leased Trailer	Return to owner/Remove from LANL
3-546 Trailer	Salvage/Demo/Relocate
3-1572 Trailer	Salvage/Demo/Relocate
3-473 Trailer	Salvage/Demo/Relocate
3-460 Trailer	Salvage/Demo/Relocate
3-473 Trailer, Geophysics group	Salvage/Demo/Relocate
3-472 Trailer, Geophysics group	Salvage/Demo/Relocate
3-461 Trailer, geo-engineering	Salvage/Demo/Relocate, could possibly stay in place
3-462 Trailer	Salvage/Demo/Relocate, could possibly stay in place
3-1789 Trailer	Salvage/Demo/Relocate
3-2018 Trailer	Salvage/Demo/Relocate
3-2234 Conex Box	Relocate
3-1934 Conex Box	Relocate
3-1936 Conex Box	Relocate
3-1932 Box on trailer	Relocate
3-1951 Conex Box	Relocate
3-1956 Conex Box	Relocate
3-1781 Truck Trailer	Relocate
3-1578 Trailer	Salvage/Demo/Relocate
3-1701 Trailer	Salvage/Demo/Relocate
3-40 High Bay at South End of Building	Demolish/Relocate Rock Shop to existing building
Antenna mounted on trailer	Relocate
Eastern Bypass Road	
61-23 Radio Shop	Demolish, construct new building next to Communications Operations Building
61-19 Storage Shed	Relocate
61-20 Storage Shed	Relocate
61-21 Storage Shed	Relocate
61-22 Storage Shed	Relocate
61-40 Storage Shed	Relocate
61-40 Storage Shed	Relocate
61-41 Storage Shed	Relocate
Los Alamos County Landfill, recycling area west of entrance road	County to relocate recycling function

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 NEPA 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 and implemented.

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. Involved site workers would be required to wear appropriate personal protective equipment (PPE), including hearing protection. During the construction phase, space within disturbed areas or paved parking lots in the immediate vicinity would be available for equipment storage and material staging (see Figure 2).

Construction and demolition work would be planned and managed to ensure that standard worker safety goals are met. 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. Activities would also be planned and performed according to applicable standard industry practices, DOE Orders, and LANL's Laboratory Implementing Requirements (LIRs).

Construction, maintenance, and environmental activities conducted within LANL water courses require permits certified by the New Mexico Environment Department (NMED) 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.

2.1.1 Construction

Construction would be planned to begin in early 2003 and be completed by the end of 2005. Some parts of the proposed project would be phased to address security priorities, traffic safety considerations, and access for emergency response vehicles during construction. Traffic control plans would be implemented to minimize delays and congestion during the construction. Table 2 details the approximate project sequencing.

Approximately 100 construction workers would be onsite during the peak construction period, adding approximately 45 vehicles to local roadways. These workers would park their personal vehicles either in existing parking lots or in other designated parking areas in existing disturbed areas. Equipment would include about ten large dump trucks, four dozers, six excavators, four backhoes, ten pickups, and related equipment such as compactors, a sideboom, trencher, and welders during the construction and demolition activities.

Table 2. Generalized Construction Sequence

Pajarito Road Access-Control Stations (east and west)
Eastern Bypass Road and Access Control
Jemez/Diamond and Eastern Bypass Intersections
Eastern Bypass Road/Pajarito Intersection
Western Bypass Road and Access Control
Western Bypass/West Jemez Intersection
Western Bypass/Pajarito Intersection
Parking Lot Access Roads
Pajarito/Mercury Intersection
Diamond/Pajarito Intersection
Close Diamond, Casa Grande, Pajarito, Bikini Atoll Roads

Note: These activities would occur partially in sequence and partially in parallel.

The vehicles would operate primarily during the daylight hours and both vehicles and some of the equipment would be locked and left onsite over night. Temporary construction lighting for any nighttime activity would be used; it would be directed toward the work area and away from canyon areas. Construction materials would be procured primarily from New Mexico suppliers. Construction workers would be drawn primarily from communities across New Mexico.

The bypass road routes would initially be surveyed and then cleared of trees and plants. Road corridors would vary from 50 to 200 ft (15 to 60 m) in width. Approximately 7.2 acres (ac) (2.9 hectares [ha]) of vegetation would be removed to build the Western and Eastern Bypass Roads. Utilities would be moved and all structures in the established corridor would be moved or demolished. Storm water pollution prevention measures would be set in place. Heavy equipment would be used to grade the road to "rough grade," filling in low spots and lowering high areas in the topography, with the exception of canyon crossings with Area of Environmental Interest (AEIs) that would be spanned with bridges. The construction contractor would balance the cuts (soil removal) with the fill (soil placement) so that there was an approximate mass balance of soils on the project site. Soils would be moved around as required on the project site to accomplish this. If a mass balance of the soils could not be achieved, soils would either be imported or exported from the site. Where additional soils were required, soils would be imported from local sources to fill in the road bed areas. Where additional soils are removed, these would be stockpiled in existing soil storage areas at LANL for future use. Any side slopes or retaining walls required would be constructed. Drainage ditches and all under-road culverts would also be set in place, and utilities would be installed. Bridges would begin to be constructed around the time that rough grading is accomplished, and then curbs and gutters would be installed. After rough grading, fine grading of the road would occur establishing the final elevations of the roadbed by placing and compacting approved fill material. The base course layer would be placed and compacted on the road. Asphalt or concrete would then be placed on top of the base course by heavy equipment. Guardrails, striping, signs, and traffic signals would be installed and intersections finished. These activities for road construction would not occur sequentially. Many activities would be concurrent. However, work would start at one end of the road and progress toward the other end. A typical roadway section is illustrated in Figure 5.

The Western Bypass Road would be constructed as a two-lane road. The proximity to existing structures and steep canyons (see Photo 1) makes construction of wider roads in this area difficult and very expensive. In particular, the area between Building 3-40 and the canyon just to the west is extremely narrow. Several existing trailers and other equipment near Building 3-40 would be demolished or relocated. A portion of Building 3-40 known as the High Bay, located on the south side of the building, would require demolition and associated repairs to the remaining portions of this structure. The Western Bypass Road would intersect two separate, two-lane roads in three locations. There are no wetlands or floodplains within the Western Bypass Road corridor, although portions of the corridor are partially within an AEI for the Mexican spotted owl.

The Eastern Bypass Road would be constructed as a four-lane road. The Radio Shop, Building 61-23, on East Jemez Road would be demolished so that East Jemez Road could be re-routed to intersect with the new Eastern Bypass Road. A new Radio Shop would be constructed near the Communication Operations Building (see Figure 2). The new Radio Shop would be constructed as a permanent building of about 10,000 ft^2 (900 m^2) in size. Utilities are present in the area and would be brought to the building site via short underground trenches.

The Eastern Bypass Road would intersect two two-lane roads in two locations. The Eastern Bypass Road would occupy a corner of the existing Los Alamos County Landfill boundary within an area that is used for storing recycled materials (such as rubber, metal, and organic

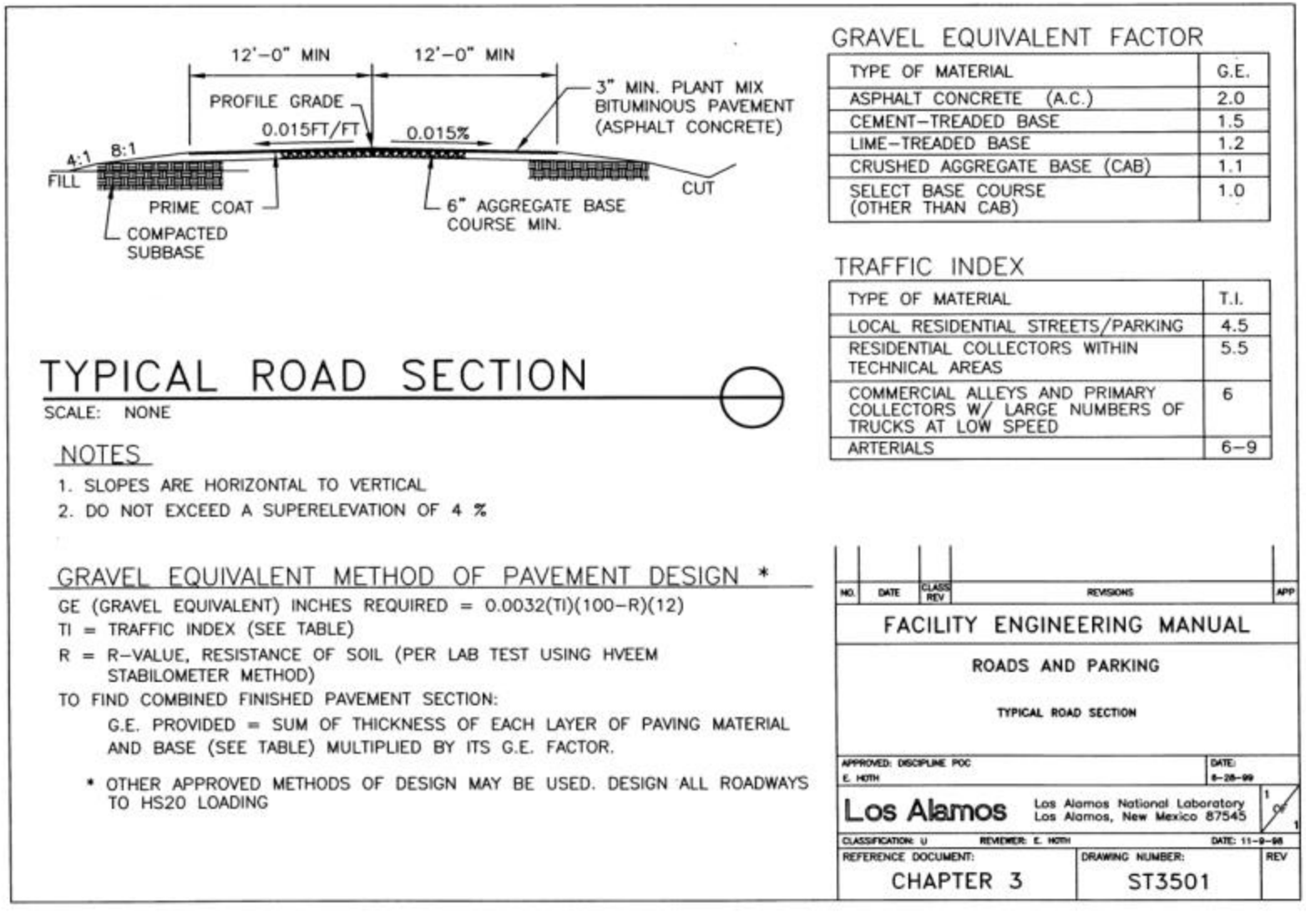

Figure 5. Typical road section.

Photo 1. Structures and canyons at southwestern portion of proposed Western Bypass Road.

material that could be used as mulch) and related activities. Permitting issues associated with this area would be coordinated among UC, NNSA, Los Alamos County, and New Mexico Environment Department (NMED). The proposed alignment of the Eastern Bypass Road would make use of the existing concrete and asphalt rubble fill area of the landfill site.

Approximately the top ten feet (ft) of the fill at the rubble fill area of the landfill site would be consolidated by grinding and pulverizing the material to provide a suitable roadbed. Reconstruction and strengthening of the rubble fill would likely result in the need to lengthen the drainage culvert running underneath, and changes to the slopes of the fill to a 2 to 1 or 3 to 1 slope would be required. Additional culvert sections would be added to the upgradient western side of the culvert using heavy machinery to augment the existing culvert sections. The Sandia Canyon wetlands area is located downgradient and east of this culvert.

The proposed Eastern Bypass Road alignment traverses a part of Sandia Canyon and upper Mortandad Canyon, and structural bridges are proposed to be constructed to span these two canyon locations. The use of structural bridges spanning the canyons would minimize the removal of canyon habitat. The portion of the Eastern Bypass Road crossing Mortandad Canyon

would require the removal of trees and vegetation on the upper slopes of the canyon within a corridor approximately 200 ft wide. Vegetation removal on the steep slopes of the canyon and the bottom of the canyon would be limited to removal of large trees that interfere with the structural bridge spanning the canyon. Photo 2 shows Mortandad Canyon while Photo 3 shows where the proposed alignment would traverse the rubble fill area of the landfill site close to its intersection with East Jemez Road.

Four staffed access-control stations with queuing approaches and necessary utilities would be constructed at the following locations:

- East end of Pajarito Road (west of intersection with New Mexico SR 4 in White Rock)
- Pajarito Road east of LANL core and west of TA-55
- North end of Eastern Bypass Road (south of East Jemez intersection)
- North end of Western Bypass Road (south of West Jemez intersection)

Photo 2. Eastern Bypass Road at Mortandad Canyon crossing area.

Staffed access-control stations would be built to LANL construction standards for such structures. These stations would each be about 200 ft^2 in floor space. Each would include an adjacent support building of up to about 2,000 ft^2 in floor space. Each station would be equipped with appropriate utilities including electricity and lighted parking. The staffed access-control station support buildings would be equipped with various video systems, electronic control devices, and fencing to preclude drive arounds as well as appropriate utilities including electricity, potable water, and sewage services.

Photo 3. Eastern Bypass Road rubble fill area of the landfill site.

Access into the TA-3 area would also be restricted through permanently closing Bikini Atoll Road and the northern end of Diamond Drive. Small unstaffed access-control stations would be placed at Casa Grande Drive and Pajarito Road to restrict traffic to a select set of LANL employees.

The intersections of Pajarito at Mercury and Pajarito at Diamond would be improved by widening the intersection and realignment of lanes with increased turning areas to facilitate use by larger vehicles including Emergency Management and Response vehicles. Signage and other traffic controls would also be installed to enhance safety.

Internal parking access roads to route traffic in and out of existing parking areas would be constructed off of Diamond Drive and Bikini Atoll Road. The Diamond Drive parking lot access road would be routed from Diamond Drive to the parking lot just north of the LANL Research Library (TA-3-207). This road would be a small 25-ft-wide, two-lane road with a maximum speed limit requirement of about 15 miles per hour. Mature trees would be removed to construct this access road into the parking lot. A small drainage area would be avoided and the side slopes would be protected to minimize erosion; such sensitive areas would be fenced or flagged before construction to assist avoidance by heavy machinery. The parking lot access road to be constructed off of Bikini Atoll Road would be routed just north of the Strategic Computing Complex (TA-3-2327) in a previously disturbed area containing sidewalks and riprap landscaping. No mature trees would require removal, and no areas would require avoidance.

New paved parking areas would be constructed to replace vehicle parking spaces eliminated as a result of constructing the proposed bypass roads. New parking lots would be placed in areas that are already previously disturbed. These parking areas would likely first be used as construction staging areas for the proposed project. Figure 2 identifies these areas; the specific number of parking spaces and the size of the lots would be determined as planning for the project progresses. From one to three parking lots would be constructed. Parking lot construction would be performed according to LANL standards for such facilities.

2.1.2 Operations

The proposed Western and Eastern Bypass Roads would serve as the primary arterials carrying traffic around the LANL TA-3 area. Diamond Drive, now used as the principle north and south arterial, would provide local access and become a service corridor with enhanced pedestrian activity. Under normal circumstances, access on Pajarito Road between White Rock and TA-3 would be restricted to screened vehicles. Screening would be based upon security assessments and could range from conditions that would allow nearly complete access to entirely precluding access to all vehicles. Generally access would be allowed for vehicles with riders possessing LANL or DOE badges, including visitor and temporary badges. It may be possible that vehicle identification technologies would be used to minimize inconvenience. East Jemez Road and Main Hill Road would serve as the primary roadways for the general public. Delivery trucks accessing areas outside of the LANL's core area would continue to be screened at an existing inspection station located on East Jemez Road just west of SR 4.

Road maintenance will include snow removal, road sweeping, painting of lines, repair and/or replacement of asphalt, signs, signals and guard rails. Every few years, the top layer of asphalt will be replaced or repaired depending on how it is weathered and worn. Bridge inspections, painting (depending on materials), and repairs will also occur. The access control posts will receive routine building maintenance for the electrical and mechanical systems, painting and the like.

2.2 No Action Alternative

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 Road 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 already used in TA-3 and elsewhere. Traffic flow would be rerouted or screened as necessary; and severe traffic congestion could result.

2.3 Alternatives Considered but Dismissed

2.3.1 Widening Diamond Drive

Widening Diamond Drive between East Jemez and Pajarito Road to allow for the placement of a staffed access-control station would not meet NNSA's purpose and need for action because security vulnerabilities for certain facilities would not be lessened. In fact, widening Diamond Drive could result in more traffic passing through LANL's central TA-3 area and this might increase exposures and vulnerabilities. Widening Diamond Drive would not readily facilitate the placement of access-control points, including staffed access-control stations, without removal of additional permanent structures. Cultural sites near construction locations could also likely be adversely affected and service disruptions would likely occur because of the major utilities located in this corridor. This alternative was not considered further in this EA.

2.3.2 Constructing Access-Control Stations without Bypass Roads

Constructing staffed access-control stations on Pajarito Road near White Rock and at specific locations around the LANL core area without constructing the two TA-3 bypass roads would not meet NNSA's purpose and need for action. This alternative would not provide sufficient distance for proper queuing lanes or for responding to security contingencies. Placing staffed access-control stations within the existing roadway network would result in unacceptable backups and congestion on East Jemez and West Jemez Roads and a corresponding decrease in the level of service afforded by these principal arterials. This in turn would adversely affect traffic flow within Los Alamos town site north of the Omega Bridge along Diamond Drive and Trinity Drive. This alternative was not considered further in this EA.

2.3.3 Realigning Pajarito Road

Realigning Pajarito Road so that traffic would travel further from certain technical areas along the current alignment would not meet NNSA's purpose and need for action because it would not diminish the security threat nor enhance traffic safety. Realigning the road would require construction and operation of a major transportation corridor within and along the north wall of Pajarito Canyon that would likely have an adverse affect on cultural and natural resources. A realigned road would still be subject to closures or traffic delays as a response to LANL security conditions. This alternative was not considered further in this EA.

2.3.4 Providing Truck Barriers

Placing a truck barrier such as a substantial metal or concrete bar above Pajarito Road, or barriers along the roadside would not meet NNSA's purpose and need for action because it would not address all security risks and could decrease traffic safety. An overhead barrier would constitute the use of deadly force as the only response to one security scenario. This is only authorized under certain conditions and cannot be used routinely. Large vehicles may sometimes be required to move material and items along Pajarito Road and such barriers would also constitute an unacceptable hindrance to necessary mission-support activities. This alternative was not considered further in this EA.

2.4 Related Actions

2.4.1 Final Site-Wide Environmental Impact Statement

The Final LANL Site-Wide Environmental Impact Statement (SWEIS) (DOE 1999a), dated January 1999, was issued in February of that year. A Record of Decision (ROD) was issued in September 1999, and a Mitigation Action Plan was issued in October 1999. The SWEIS considered transportation within a regional context and it focused on transportation accidents related to LANL operations, especially onsite and offsite shipments of radioactive and other hazardous materials. This EA tiers from the SWEIS and any points of difference from the effects attributable to the Bypass Roads Project are included in the analyses in Section 4, Environmental Consequences.

2.4.2 Arterial Improvements for Safety at LANL

There are a number of small safety-based roadway improvement projects that are proposed along Pajarito and East Jemez Roads including intersection improvements at TA-18, -51, and -54; widening the shoulders from TA-18 to TA-59 along Pajarito Road; replacing guard rails at various locations; and an acceleration lane on west-bound East Jemez Road from La Mesita Road at TA-53. NNSA has reviewed these projects to determine the appropriate level of compliance with NEPA; these independent small-scale actions were determined to be eligible for categorical exclusion from the need to prepare an EA or EIS.

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3.0 AFFECTED ENVIRONMENT

This section describes the natural and human environment that could be affected by the Proposed Action and the No Action Alternative. The potential environmental consequences of those actions are presented in Section 4. Based on the Proposed Action description, environmental resources that may potentially be affected as a result of implementing the Proposed Action have been considered. Environmental issues are identified and addressed based on the "Sliding Scale Approach" discussed earlier in this EA (Section 1.4). Table 3 identifies the subsections in Sections 3 and 4 where potential environmental issues are discussed and notes those issues that are not affected by the Proposed Action.

Table 3. Potential Environmental Issues

Environmental Category	Applicability	Sub-sections
Transportation, Traffic, and Infrastructure	Yes	3.1.1, 4.1.1
Ecological Resources (biological resources, wetlands, and floodplains)	Yes	3.1.2, 4.1.2
Water Quality	Yes	3.1.3, 4.1.3
Environmental Restoration	Yes	3.1.4, 4.1.4
Waste Management	Yes	3.1.5, 4.1.5
Air Quality	Yes	3.1.6, 4.1.6
Geologic Setting	Yes	3.1.7, 4.1.7
Cultural Resources	Yes	3.1.8, 4.1.8
Noise	Yes	3.1.9, 4.1.9
Human Health	Yes	3.1.10, 4.1.10
Socioeconomics	The Proposed Action would not have long-term effects on social or economic resources and issues in Los Alamos or the region. It is unlikely that access controls along Pajarito Road would measurably affect the economic outlook of businesses or accessibility to residences in White Rock. In 2000, DOE renegotiated a 30-year easement along SR 4 from Rover Drive to East Jemez Road to assure continued access to White Rock.	
Land Use	The Proposed Action would not alter current land use designations at LANL. Limiting access would assure land uses remain consistent with the SWEIS and the LANL Comprehensive Site Plan 2000.	N/A
Visual Resources	The Proposed Action would not create new vistas or otherwise alter the visual resources of the project area.	N/A
Environmental Justice	Populations that are subject to Environmental Justice considerations are present within 50 mile (mi) (80 kilometers [km]) of Los Alamos County; potential effects of this project would be localized within a 10-mi (16-km) radius. Populations nearest to the construction site and within this radius are not predominantly minority and low-income populations.	N/A

The Proposed Action would be implemented within the area of Los Alamos County that includes LANL. LANL comprises a large portion of Los Alamos County and extends into Santa Fe County. LANL is situated on the Pajarito Plateau along the eastern flank of the Jemez Mountains and consists of 49 technical areas spread out over 43 mi^2. The Pajarito Plateau slopes downward towards the Rio Grande along the eastern edge of LANL and contains several fingerlike mesa tops separated by relatively narrow and deep canyons.

Commercial and residential development in Los Alamos County is confined primarily to several mesa tops lying north of the core LANL development, in the case of the Los Alamos town site, or southeast, in the case of the communities of White Rock and Pajarito Acres. Approximately 12 percent of the land in Los Alamos County is privately held. The lands surrounding Los Alamos County are largely undeveloped wooded areas with large tracts located to the north, west, and south of LANL that are administered by the Department of Agriculture, Santa Fe National Forest, and the Department of the Interior (DOI), National Park Service, Bandelier National Monument. Lands to the east of LANL are administered by the DOI, Bureau of Land Management or are the property of San Ildefonso Pueblo.

Detailed descriptions of LANL's natural resources environment, cultural resources, socioeconomics, waste management, regulatory compliance record, and general operations are described in detail in the SWEIS (DOE 1999a). Additional information is available in the most recent annual Environmental Surveillance Report (LANL 2001a) and the *Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration, Actions taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2000). These documents are available at the Public Reading Room at 1619 Central Avenue, Los Alamos, New Mexico.

3.1 Affected Resources Issues

This section describes those affected resources and issues listed in Table 3. Section 4 analyzes the anticipated effects of implementing the Proposed Action and the No Action Alternative on the resources.

3.1.1 Transportation, Traffic, and Infrastructure

Motor vehicles are the primary method of transportation and highways are the primary access to LANL and the rest of Los Alamos County. Eighty-two percent of commuters in Los Alamos County drive alone while about 11 percent ride share. Use of mass transit has been low although a New Mexico State Highway and Transportation Department regional park and ride pilot project in 1998 was very popular, temporarily taking several hundred vehicles off the roads. LANL has a number of roads, including major thoroughfares, which can be used for unrestricted vehicular access to LANL technical areas and buildings. However, since NNSA controls the entire area within the LANL boundaries, it has the option to restrict traffic on LANL roadways (DOE 1997a) and frequently does so for operational purposes. These road closures are usually short-term events (minutes to hours in length). There are four main access points to LANL that convey about 43,000 average daily trips (ADTs). These roads and their ADTs are shown in Table 4. The LANL TA-3 area is accessed from Pajarito Road, East and West Jemez Roads, and Diamond Drive. Traffic on these roadways can be heavy, particularly during peak commuting hours. At present, the nearby Diamond Drive and Jemez Road intersection experiences

considerable congestion during peak traffic periods (DOE 1997b). Los Alamos County peak period traffic volumes and resulting congestion are greatly influenced by the over 12,000 LANL employees in the region, LANL being the main source for employment in Los Alamos County, existing roadway network constraints, and the unique topography of the Pajarito Plateau.

Table 4. LANL Main Access Points

Location	Average Daily Vehicle Trips
Diamond Drive across the Los Alamos Canyon Bridge	28,000
Pajarito Road	8,000
East Jemez Road	6,000
SR 4/West Jemez Road from the west	1,000
Total	43,000

Source: DOE 1997a

SR 501 (also known as West Jemez Road) lies within LANL boundaries and is under the administrative control of the NNSA. It provides public access between Los Alamos town site and SR 4 (which provides access to Bandelier National Monument and to the Valle Grande and points beyond). It also provides the primary access between LANL's TA-3 and TA-16 areas and to other interior technical areas. Although designated as a State Road, it is not the property of the State of New Mexico; NNSA retains administrative control of this highway. East Jemez Road (also called the Truck Route) also lies within LANL and is under NNSA control. It serves as the primary access road between LANL and White Rock and to locations beyond Los Alamos County. A truck inspection station is located on East Jemez Road just west of SR 4. The entrance to Los Alamos Neutron Science Center (TA-53) is along East Jemez Road; the Los Alamos County Landfill and Royal Crest Trailer Park are also served by East Jemez Road.

Pajarito Road is also within LANL boundaries and is administered by the NNSA. It has been open to vehicular access by the public for many years. It is used by the public for travel between White Rock and Los Alamos town site. There are many LANL facilities along or accessed from Pajarito Road, including TA-54, TA-18, TA-50, and TA-55.

There are no sidewalks or improved bicycle lanes along West Jemez, East Jemez, or Pajarito Roads. There are major utility lines at TA-3, including the areas proposed for the bypass road alignments. These include above and below ground electric power lines, natural gas pipelines, sanitary sewer pipelines, radioactive liquid waste pipelines, potable and non-potable water pipelines, electric and telecommunication duct banks, storm drains and pipelines, and steam and condensate pipelines.

3.1.2 Ecological Resources

A number of regionally protected and sensitive (rare or declining) species have been documented in the LANL region. These include three Federally listed endangered species: the whooping crane (*Grus americana*), the southwestern willow flycatcher (*Empidonax traillii extimus*), and the black-footed ferret (*Mustela nigripes*), and two Federally listed threatened species: the bald eagle (*Haliaeetus leucocephalus*) and the Mexican spotted owl (*Strix occidentalis*). Under the Endangered Species Act of 1973 (16 USC 1531) as amended, Federal government agencies are

required to consider the potential effects of all activities on Federally-listed threatened and endangered (T&E) species and their critical habitat.

The LANL Threatened and Endangered Species Habitat Management Plan (HMP) (LANL 1998a) establishes AEIs that are being managed and protected because of their significance to biological or other resources. Habitats of threatened or endangered species that occur or may occur at LANL are designated as AEIs. Activities are restricted in an AEI during breeding season until it is determined that the habitat is not occupied for that year. UC personnel perform annual surveys of the AEI early in the breeding season to determine the presence of breeding pairs. If the habitat is occupied, the AEI restrictions remain in place until the completion of the breeding season. Any activities that cannot be performed within the guidelines of the HMP require further consultation with the U.S. Fish and Wildlife Service.

Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands in the general LANL region provide habitat for mammals, birds, reptiles, amphibians, water-dependent mammals such as shrews, and invertebrates (such as insects). Wetlands also potentially contribute to the overall habitat requirements of the Mexican spotted owl, southwestern willow flycatcher, and spotted bat (*Euderma maculatum)*, all of which are Federal- or state-listed species, or both. 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 or seeps. A 1996 field survey by LANL personnel identified an estimated 50 ac (20 ha) of wetlands within LANL boundaries, with more than 95 percent of these located in the Sandia, Mortandad, Pajarito, and Water Canyons watersheds. 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 (LANL 2001b).

DOE regulations (10 CFR 1022) define 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. . . ." 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).

Pursuant to Executive Order 11988 (EO 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. The Special Environmental Analysis (DOE 2000) describes the actions taken in response to the fire, particularly for floodwater control. As a result of the fire, soil erosion, debris, water, ash, and silt have increased exponentially compared to pre-fire ratios. Mitigation for these problems include revegetation, channel work, and debris cleanup in floodplains.

The proposed Western Bypass Road would transect an undisturbed area, which is comprised of mainly ponderosa pine (*Pinus ponderosa* P. & C. Lawson) with native grasses and understory

brush (USDA 2001). Understory brush along the proposed corridor of the Western Bypass Road consists of Gamble's oak (*Quercus gambelii* Nutt), skunk bush sumac (*Rhus trilobata* Nutt), mountain mahogany (*Cercocarpus montanus* Raf.), gooseberry (*Ribes inerme* Rydb.), and New Mexico locust (*Robinia neomexicana* Gray). The understory of the area surrounding the site consists of little blue stem (*Schizachyrium scoparium* [Michx.] Nash) and blue grama (*Bouteloua gracilis* [Willd. ex Hunth] Las. ex Griffiths) grasses, with hairy aster (*Heterotheca villosa* [Pursh] Shinners), broom snakeweed (*Gutierrezia sarothrae* [Pursh] Britt. and Rusby), and New Mexico lupine (*Lupinus neomexicanus* Greene).

The proposed Eastern Bypass Road corridor crosses Mortandad Canyon, Sandia Canyon, and relatively level areas between Pajarito Road and West Jemez Road. Mortandad Canyon is approximately 100 ft (30 m) deep and 150 ft (45 m) wide in this area. 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 (*Pseudotsuga menziesii* [Mirbel] Franco) and White fir (*Abies concolor* [Gord. & Glend.] Lindl. Ex Hildebr.), with native grasses and understory brush.

The proposed Eastern Bypass Road would traverse floodplains in Sandia and Mortandad Canyons and a small wetland. The Sandia Canyon wetland area is about 8 ac (3.2 ha) in size and is located 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. The entire lengths of both of these canyons are considered 100-year floodplains, with the exception of the partially filled site in Sandia Canyon. There is wetland vegetation along portions of the Eastern Bypass corridor, including cottonwoods (*Populus augustifolia* [James]), coyote willows (*Salix exigua* Nutt), broad-leaf cattail (*Typha latifolia* L.), and rushes (*Juncus* sp.). No wetland or floodplains are located along or near the proposed Western Bypass corridor. Four newly staffed access-control stations would be constructed in developed areas at existing roadway intersections, along existing paved roads, corridors, or along the new bypass road corridors.

3.1.3 Water Quality

Surface water at LANL 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 LANL. Runoff from heavy thunderstorms or heavy snowmelt can reach the Rio Grande. Effluents from sanitary sewage, industrial water treatment plants, and cooling tower blow-down enter some canyons at rates sufficient to maintain surface flows for varying distances (DOE 1999a). Surface waters at LANL are monitored by UC and the NMED to survey the environmental effects of LANL operations. Planned releases from industrial and sanitary wastewater facilities within LANL boundaries are controlled by NPDES permits.

The nature and extent of groundwater within the LANL region have not been fully characterized. Alluvial groundwater bodies have been identified primarily by drilling wells in locations where impacts from LANL operations are most likely to occur (DOE 1999a). On LANL property, continually saturated alluvial groundwater bodies occur in Mortandad, Los Alamos, Pueblo, Sandia, and Pajarito Canyons. The depth to these alluvial groundwater bodies varies from approximately 90 ft (27 m) in the middle of Pueblo Canyon to 450 ft (135 m) in lower Sandia Canyon (LANL 1993). The main aquifer is separated from the alluvial groundwater bodies by

350 to 620 ft (105 to 186 m) of unsaturated volcanic tuff and sediments (Purtymun 1995). The aquifer is relatively insulated from the alluvial groundwater bodies by these geologic formations. Recharge of the aquifer is not fully understood nor characterized and it is not strongly interconnected across its extent. Groundwater within the LANL area is monitored to provide indications of the potential for human and environmental exposure from contaminants (DOE 1999a). Groundwater protection and monitoring requirements are included in DOE Order 5400.1, General Environmental Protection Program.

Data and analysis of LANL surface and groundwater quality samples taken from test wells indicate that LANL operations and activities have affected the surface water within LANL boundaries and some of the alluvial and intermediate perched zones in the LANL region. Details on the surface and groundwater quality can be found in the annual LANL Environmental Surveillance and Compliance Report (LANL 2001a).

Radiation (gross alpha, gross beta, and gross gamma) and radionuclide levels in surface waters are generally below and close to analytical detection limits and well within drinking water and public dose standards. Metals in surface water samples are typically within applicable standards when the samples are filtered before analysis. However, metal concentrations exceeding drinking water standards are relatively widespread when samples are not filtered. Plutonium concentrations exceed regional comparison values in several sediment samples. In general, while some sediment samples exceed regional comparison value concentrations for metals, most of these metals may occur naturally in the sediments. The exception to this is selenium in sediments from upper Los Alamos Canyon, which far exceeds regional comparison concentrations (DOE 1999b).

In the regional aquifer, which serves LANL and Los Alamos County, most radiochemical measurements were below the DOE drinking water standards or the Environmental Protection Agency (EPA) or New Mexico standards applicable to a drinking water system (LANL 2001a). In addition, most of the analytical results were near or below the detection limits of the analytical methods used. The exceptions include Am-241, Pu-238, -239, -240, and other isotopes. In many cases, duplicate analyses did not support the apparent detections indicating that these apparent detections are more likely false positives (LANL 2001a). Trace amounts of tritium, plutonium, americium, and strontium have been detected, but not in the water supply wells. Organic compounds have also been detected in samples from test wells at TA-49, and nitrate has been detected down-canyon from Los Alamos County's Bayo wastewater treatment plant (WWTP), which discharges into lower Pueblo Canyon. Contaminants also have been detected in alluvial and intermediate perched groundwater (DOE 1999b).

Canyons that drain the TA-3 area include Los Alamos, Sandia, Two-mile, and Mortandad Canyons. The streams within these canyons are ephemeral with the exception of Sandia Canyon. The stream in Sandia Canyon is sustained almost entirely by effluent discharges from outfalls at TA-3 and flows year-round in the TA-3 area. Continuous flow combined with storm water runoff usually does not extend beyond the middle canyon. All but Two-mile Canyon have perched aquifers within the alluvium along the canyon floor.

The upper reaches of these canyons, again with the exception of Sandia Canyon, in the TA-3 area generally have very low levels of contamination. Low levels of organic chemicals within the canyons are commonly found to be associated with runoff from light industrial settings at the

laboratory and urban settings in the Los Alamos town site. These levels of organic contaminants may represent only small releases or dispersed sources. Radionuclide and metals concentration levels are generally close to background and usually are not more than twice the background values. Radionuclide concentrations are higher in sediments downstream of TA-2 in Los Alamos Canyon. Radionuclide contamination in the uppermost portions of Mortandad Canyon have been remediated to background levels (LANL 1997, 1998b, 1999a, 1999b). Contamination in the uppermost portions of Sandia Canyon in the TA-3 area is directly related to outfalls and potential release sites (PRSs) within TA-3.

3.1.4 Environmental Restoration

NNSA and UC at LANL are jointly responsible for implementing the DOE ER Program at LANL which is a designated Resource Conservation and Recovery Act (RCRA) facility. NNSA, through the Los Alamos Site Office (LASO), conducts site characterization and waste cleanup (corrective action) activities at PRSs at LANL. Site characterization and cleanup is needed to reduce risk to human health and the environment posed by potential releases of contaminants at ER Project sites.

PRSs include solid waste management units[3] (SWMUs) and areas of concern[4] (AOCs), collectively. PRSs at LANL include septic tanks and lines, chemical storage areas, wastewater outfalls (the area below a pipe that drains wastewater), material disposal areas (landfills), incinerators, firing ranges and their impact areas, surface spills, and electric transformers. PRSs are found on mesa tops, in material disposal areas, in canyons, and in a few areas in the Los Alamos town site.

The primary means of contaminant release from these sites are surface water runoff carrying potentially contaminated sediments and soil erosion exposing buried contaminants. The main pathways by which released contaminants can migrate are infiltration into alluvial aquifers, airborne dispersion of particulate matter, and sediment migration from surface runoff. The contaminants involved include volatile organic compounds (VOCs), semivolatile organic compounds, polychlorinated biphenyls (PCBs), asbestos, pesticides, herbicides, heavy metals, beryllium, radionuclides, petroleum products, and high explosives (HE). The 1999 LANL SWEIS (DOE 1999a) contains additional information on contaminants.

3.1.5 Waste Management

LANL generates solid waste[5] from construction, demolition, and facility operations. These wastes are managed and disposed of at appropriate solid waste facilities. Both LANL and Los

[3] A SWMU is defined in the Hazardous and Solid Waste Amendments Module VIII of LANL's Hazardous Waste Facility Permit as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at or around a facility at which solid wastes have been routinely and systematically released."

[4] Sites that potentially contain hazardous substances but not hazardous wastes or hazardous constituents as defined by RCRA are called AOCs. The different geologic media of the canyons system—sediments, aquifers, and parent material—are categorized as AOCs.

[5] Solid waste, as defined in the Code of Federal Regulations (40 CFR 261.2) and in the New Mexico Administrative Code (20 NMAC 9.1), is any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

Alamos County use the same solid waste landfill located within LANL boundaries on DOE administered land. The Los Alamos County Landfill also accepts solid waste from other neighboring communities. The Los Alamos County Landfill receives about 52 tons per day (47 metric tons per day), with LANL contributing about 8 tons per day (7 metric tons per day), or about 15 percent of the total. When the current Los Alamos County Landfill closes it would be capped and monitored and a portion of the site could be used as a transfer station and recycling center. NNSA and UC are currently investigating future waste management options for LANL solid waste.

Building debris storage yards on Sigma Mesa (TA-60) or other approved material management areas are used at LANL to store concrete rubble, soil, and asphalt for future re-use at LANL. Low-level radioactive waste is disposed of at LANL, TA-54, Area G, or is shipped offsite to appropriate permitted facilities. Hazardous waste[6] regulated under RCRA is transported to TA-54 at LANL for proper management, which is carried out in accordance with applicable laws, regulations, and DOE Orders. Hazardous wastes and mixed wastes are both treated and disposed of offsite since LANL has no onsite disposal capability for these waste types. The offsite disposal locations are located across the U.S. and are audited for regulatory compliance before being used by UC.

3.1.6 Air Quality

Air quality is a measure of the amount and distribution of potentially harmful pollutants in ambient air[7]. Air surveillance at Los Alamos includes monitoring emissions to determine the air quality effects of LANL operations. UC staff calculates annual actual LANL emissions of regulated air pollutants and reports the results annually to the NMED. The ambient air quality in and around LANL meets all EPA and DOE standards for protecting the public and workers (LANL 2001a).

LANL is a major source of air emissions. A major source is one that has the potential to emit more than 100 tons per year of certain nonradioactive substances under the State of New Mexico Operating Permit program. Combustion units are the primary point sources of criteria pollutants (nitrogen oxides, sulfur oxides, particulate matter, carbon monoxide, and VOCs) emitted at LANL. Specifically, LANL is a major source of nitrogen oxides, emitted primarily from the TA-3 steam plant boilers although actual emissions reported to NMED in 2000 were 62 tons (LANL 2000a).

Mobile sources, such as automobiles and construction vehicles, are additional sources of air emissions; however, mobile sources are not regulated by NMED. Diesel emissions from

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[6] Hazardous waste, as defined in 40 CFR 261.3, which addresses RCRA regulations, and by reference in 20 NMAC 4.1, is waste that meets any of the following criteria: a) waste exhibits *any* of the four characteristics of a hazardous waste: ignitability, corrosivity, reactivity, or toxicity; b) waste is specifically *listed* as being hazardous in one of the four tables in Subpart D of the Code of Federal Regulations; c) waste is a mixture of a *listed* hazardous waste item and a nonhazardous waste; d) waste has been *declared* to be hazardous by the generator.

[7] Ambient air is defined in 40 CFR 50.1 as "that portion of the atmosphere external to buildings, to which the public has access." It is defined in the NMAC Title 20, chapter 2, part 72, as "the outdoor atmosphere, but does not include the area entirely within the boundaries of the industrial or manufacturing property within which the air contaminants are or may be emitted and public access is restricted within such boundaries."

conveyance vehicles are not regulated as stationary sources of emissions. Mechanical equipment including bulldozers, excavators, backhoes, side booms, tamper compactors, trenchers, and drill rigs are exempt from permitting under Title 20 of the NMAC Part 2.72, *Construction Permits.* This type of exemption does not require notification to NMED.

Both EPA and NMED regulate nonradioactive air emissions. NMED does not regulate dust from excavation or construction, but UC or their subcontractors take appropriate steps during construction activities to control fugitive dust and particulate emissions using, for example, Best Achievable Control Measures of water sprays or soil tackifiers.[8] Excavation and construction activities are not considered stationary sources of regulated air pollutants under the New Mexico air quality requirements; these activities are not subject to permitting under 20 NMAC, Parts 2.70 and 2.72. Annual dust emissions from daily windblown dust are generally higher than short-term construction-related dust emissions. LANL would ensure that the New Mexico Ambient Air Quality Standards (NMAAQS) and the National Ambient Air Quality Standards (NAAQS) for particulate emissions are met throughout any construction activities.

Provisions of 20 NMAC 2.72 require construction permits for new or modified sources of regulated air pollutants. Portable asphalt, rock crushing, or concrete plants require New Mexico Air Quality construction permits. If already permitted, a relocation notice must be filed with NMED. It may be necessary for the Proposed Action to include additional equipment, such as fuel-fired generators, in a construction permit. Permitting would take approximately six months. In addition, equipment issued a construction permit would require a change or update to the Title V Operating Permit Application. At the completion of the construction permitting process, the information required to update the Title V Operating Permit Application would be available. UC air quality staff would update the Title V Operating Permit Application.

3.1.7 Geologic Setting

The Jemez Mountains volcanic field (JMVF) is located in northern New Mexico at the intersection of the western margin of the Rio Grande Rift and the Jemez Lineament (Smith et al., 1970; Gardner et al., 1986; Heiken et al., 1996). The JMVF is the largest volcanic center along this lineament (ERP 1992). Volcanism in the JMVF spans a roughly 16-million-year period beginning with the eruptions of numerous basaltic lava flows and most recently in the eruption of the rhyolitic Bandelier Tuff at 1.79 and 1.23 million years ago (Self and Sykes 1996). All of LANL property is within the JMVF and is sited along the western edge of the Rio Grande Rift. Most of the bedrock on LANL property is composed of Bandelier Tuff.

The geologic structure of the LANL area is dominated by the north-trending Pajarito Fault Zone. The Pajarito Fault Zone consists of three major faults (Pajarito Fault, Rendija Canyon Fault, and the Guaje Mountain Fault) and numerous secondary faults with vertical displacements ranging from 80 to 400 feet. Estimates of the timing of the most recent surface rupturing paleoearthquakes along this fault range from 3000 to 24,000 years ago (Reneau and Gardner 1999, McCalpin 2000, Gardner et al., 1999, 2001).

[8] Tackifiers are chemical dust suppressants often added to water that acts to disperse the chemicals, then evaporates after application. The chemicals that are left behind bind the soil particles together into larger particles that are less easily blown in the air.

The entire TA-3 area is bounded by the Pajarito Fault on the west and the Rendija Canyon Fault on the east (Gardner et al., 1999). As such, the proposed bypass roads would be in an area of generally higher potential for seismic surface rupture relative to locations farther removed from the Pajarito Fault Zone (Gardner et al., 2001). Both the proposed Eastern and Western Bypass Roads are projected to cross secondary faults (see Figure 6). However, probabilistic analysis of 1 in 10,000 years seismic events suggests that significant seismic events are only expected to occur along, or on, the main trace of the Pajarito Fault west of SR 501 (Gardner et al., 2001).

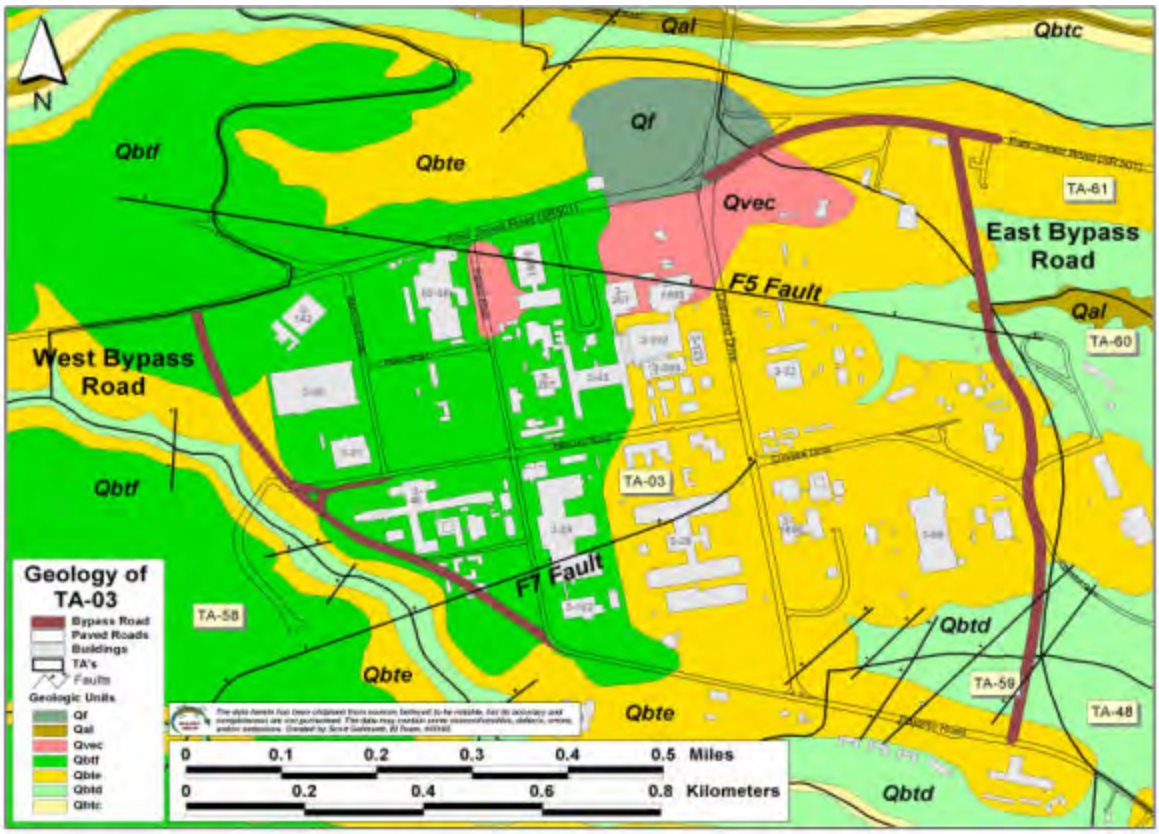

Figure 6. Locations of faults and the related geology relative to proposed bypass roads.

Parts of the TA-3 bypass roads would be constructed upon fill material and geologically deposited soil materials as opposed to bedrock. This fill was placed in Sandia Canyon over many years without structural reinforcements sufficient for the proposed bypass roads. A surface rupturing seismic event within or near the Pajarito Fault Zone could have considerable consequences for roads or bridges not constructed on bedrock. Depending upon porosity, permeability, and groundwater saturation, seismic vibrations could potentially cause soil "liquefaction"—essentially converting the soil or fill into acting like it was a fluid.

Many different types of soils have developed on the mesa tops and canyon walls and bottoms of the Pajarito Plateau. An extensive soil survey was carried out in the late 1970s for Los Alamos

County including the lands occupied by LANL. Most of the information reported here is derived from this report (Nyhan et al, 1978).

Soils information can be applied in managing land for many uses including conservation, wildlife habitat, urban planning, agricultural uses, and others. Detailed soils information can be used for site selection for buildings, roads, and other structures and for locating suitable sources of materials for road fill, sand, gravel, and topsoil. The properties of a soil, in various degrees and combinations, affect construction and maintenance of roads, building foundations, and buried utilities. The most important properties of soils for engineering projects are permeability, strength, compaction characteristics, drainage characteristics, shrink-swell potential, grain size, plasticity, reaction, depth to the water table, depth to bedrock, and slope.

Within TA-3 there are approximately nine distinct soil types (see Figure 7). However, only four of these exist in the area of the Proposed Action. These include the Carjo Series, the Tocal Series, and two rock outcrops.

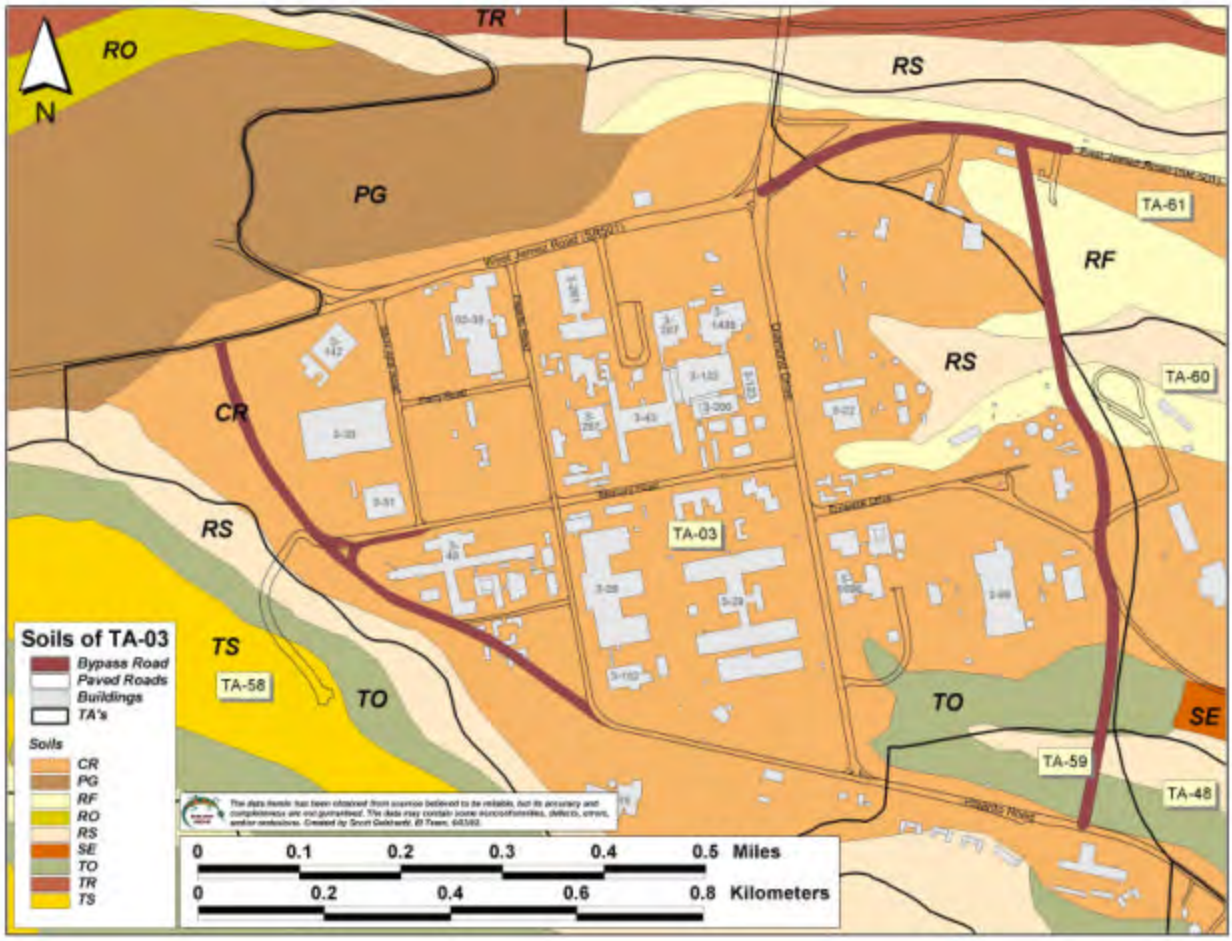

Figure 7. Distribution of various soil types in the TA-3 area.

The Carjo Series (CR) consists of moderately deep, well-drained soils that formed in material weathered from tuff. These soils are found on nearly level to moderately sloping mesa tops near the Jemez Mountains. The surface layer of the Carjo soils is a grayish brown loam, or very fine sandy loam about 10 cm thick. The subsoil is a brown and reddish brown clay loam and clay about 40 cm thick. The substratum is a light brown, very fine sandy loam about 10 cm thick. Depth to tuff and the effective rooting depth range from 51 to 102 cm and the available water holding capacity is medium. Runoff in this slowly permeable soil is medium, and the water erosion hazard is moderate (Nyhan et al., 1978).

The Tocal Series (TO) consists of very shallow to shallow, well-drained soils that formed in material weathered from tuff on gently to moderately sloping mesa tops. The surface layer of Tocal soils is a grayish brown very fine sandy loam about 10 cm thick. The subsoil is a reddish brown clay loam, or clay, about 15 cm thick. The substratum is a light brown silt loam about 5 cm thick. Depth to tuff and the effective rooting depth range from 20 to 50 cm. The permeability is moderately slow and the available water capacity is low. Runoff is medium and the water erosion hazard is moderate (Nyhan et al., 1978).

The rock outcrop (RF and RS) land types are based (partly) on slope. The RF land type is found on gently sloping to steep mesa tops and edges and consists of about 65 percent rock outcrop (Bandelier Tuff), 5 percent very shallow undeveloped soils, 5 percent Tocal soils, and 25 percent narrow escarpments. The RS land type has slopes greater than 30 percent on steep to very steep mesa breaks and canyon walls. It consists of about 90 percent rock outcrop (Bandelier Tuff) and 10 percent very shallow undeveloped soils (Nyhan et al., 1978).

Based on engineering properties discussed in Nyhan et al (1978), the two rock outcrop land types (RF and RS) are well suited for road construction as they consist predominantly of local bedrock. However, both the Carjo (CR) and Tocal (TO) Series soils are rated 'moderate' for road construction. These soil types both expand when wet and contract when dry, have low strength to support roads, and are characterized as having bedrock too near the surface. A rating of 'moderate' indicates that some soil properties are unfavorable but can be overcome or modified by special planning and design. The soils may need to be stabilized or replaced with material suitable for supporting roads with heavy traffic use.

3.1.8 Cultural Resources

Cultural resources include any prehistoric sites, buildings, structures, districts, or other places or objects considered to be important to a culture or community for scientific, traditional, religious, or any other reason. They combine to form the human legacy for a particular place (DOE 1999a). To date, over 1,950 archaeological sites and historic properties have been recorded at LANL. There is one recorded Traditional Cultural Property (TCP) within the project area near Jemez and Diamond intersection. There is also an Archaic Period lithic scatter and a portion of an historic wagon trail. In addition, a portion of Building 3-40 (an historic building) may require removal in consultation with the State Historic Preservation Office (SHPO).

The criteria used for evaluating cultural resources depends upon their significance as sites eligible for listing to the National Register of Historic Places (NRHP) as described in the National Historic Preservation Act (16 USC 470). These determinations of significance are met

by evaluating each cultural resource based on it meeting any one or more of the following four characteristics:

- Association with events that have made a significant contribution to the broad pattern of our history.
- Association with the lives of persons significant in our past.
- Illustration of a type, period, or method of construction; for its aesthetic values or for its representation of the work of a master; or if it represents a significant and distinguished entity whose components may lack individual distinction.
- It has yielded, or may be likely to yield, information important in prehistory or history.

The cultural resources at or near the proposed Bypass Road corridors and Proposed Action locations are not eligible for listing to the NRHP with the exception of the Physics Building. This building was constructed in the 1950s and is an important building in LANL history and is considered eligible for the NRHP.

3.1.9 Noise

Noise is defined as unwanted sound. Noise is categorized into two types: *continuous noise*, which is characterized as longer duration and lower intensity, such as a running motor, and *impulsive or impact noise*, which is characterized by short duration and high intensity, such as the detonation of HE. The intensity of sound is measured in decibel units and has been modified into an A-weighted frequency scale (dBA) for setting human auditory limits.

Noise measured at LANL is primarily from occupational exposures that generally take place inside buildings. Occupational exposures are compared against an established Threshold Limit Value (TLV). The TLV is administratively defined as the sound level to which a worker may be exposed for a specific work period without probable adverse effects on hearing acuity. The TLV for continuous noise is 85 dBA for an eight-hour work day. The TLV for impulsive noise during an eight-hour work day is not fixed because the number of impulses allowed per day varies depending on the dBA of each impulse, however, no individual impulse should exceed 140 dBA. An action level (level of exposure to workplace noise that is below the TLV but the use of PPE is recommended) has been established for noise in the workplace at LANL. The action level for both continuous and impulsive noise is 82 dBA for an eight-hour work day.

Environmental noise levels at LANL are measured outside of buildings and away from routine operations. These sound levels are highly variable and are dependent on the generator. The following are typical examples of sound levels (dBA) generated by barking dogs (58), sport events (74), nearby vehicle traffic (63), aircraft overhead (66), children playing (65), and birds chirping (54). Sources of environmental noise at LANL consist of background sound, vehicular traffic, routine operations, and periodic HE testing. Measurements of environmental noise in and around LANL facilities and operations average below 80 dBA.

The averages of measured values from limited ambient environmental sampling in Los Alamos County were found to be consistent with expected sound levels (55 dBA) for outdoors in residential areas. Background sound levels at the White Rock community ranged from 38 to 51 dBA (Burns 1995) and from 31 to 35 dBA at the entrance of Bandelier National Monument

(Vigil 1995). The minimum and maximum values for LANL and the County ranged between 38 dBA and 96 dBA, respectively.

3.1.10 Human Health

This section considers the health of LANL and non-LANL road construction and maintenance workers. These two categories are considered in this EA because each category of worker would either be involved in the construction or the maintenance of the new bypass roads, access-control stations, and supporting infrastructure work at LANL under the Proposed Action. LANL workers would be the primary users of the proposed new roads. Members of the general public unaffiliated with LANL are not considered because they would not be allowed routine access to the proposed road.

The health of LANL workers is routinely monitored depending upon the type of work they perform. Health monitoring programs for LANL workers consider a wide range of potential concerns including exposures to radioactive materials, hazardous chemicals, physical or environmental hazards, and routine workplace hazards. In addition, LANL workers involved in hazardous operations are protected by various engineering or process controls and required to wear appropriate PPE. Training is also required to identify and avoid or correct potential hazards typically found in the work environment and to respond to emergency situations. Because of the various health monitoring programs, and the requirements for PPE, and routine health and safety training, LANL workers are generally considered to be a healthy workforce with a below average incidence of work-related injuries and illnesses.

LANL staff monitors environmental media for contaminants that could affect non-LANL workers or members of the public. This information is reported to regulatory agencies, such as the NMED and to the public through various permits and reporting mechanisms and it is used to assess the effects of routine operations at LANL on the general public. For detailed information about environmental media monitoring and doses to the public, see LANL's Environmental Surveillance Report for 2000 (LANL 2001a). For those persons that work within the boundaries of LANL as subcontractors or demolition workers and could be exposed to radioactive or other hazardous materials, their exposures are monitored in the same manner as UC workers. In addition, site-specific training and PPE requirements also apply to these workers.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Anticipated Effects of Implementing the Proposed Action and the No Action Alternative

4.1.1 Transportation, Traffic, and Infrastructure

Proposed Action

The Proposed Action would have some long-term effects on the existing transportation network at LANL because new roads would be constructed around the TA-3 area while existing roads such as Diamond Drive would no longer serve as part of the major road network. Effects on traffic and infrastructure would be minor. Project design and sequencing would be used to minimize traffic and infrastructure impacts during construction of the proposed bypass roads and related access controls, including delayed response times for emergency vehicles.

Traffic control plans would be implemented to minimize delays and congestion during the construction. Nevertheless, those traveling to and from the LANL core would experience some inconvenience and delays during construction. In the long term, traffic patterns would change for some non-LANL commuter traffic between White Rock and Los Alamos town site because unauthorized vehicles would be routed to East Jemez Road and the Main Hill Road. Most of the residents of White Rock work at LANL and could continue to use Pajarito Road. While East Jemez Road is used for most school bus trips, there are also six school buses that use Pajarito Road.

Pajarito Road currently carries an average of 8,000 vehicle trips in both directions each workday while East Jemez carries 6,000. It is estimated that approximately 7,340 of these Pajarito Road trips are LANL-related, and that 660 or fewer "non-authorized" average daily vehicle trips would divert from using Pajarito Road and use East Jemez Road once access-controls were instituted. Vehicles rerouted to East Jemez Road would use State Road 4, thereby increasing average daily trips by about seven percent over the current level of 9,500. A segment of SR4 from Rover Boulevard in White Rock to East Jemez Road traverses the Pueblo of San Ildefonso. The DOE and San Ildefonso Pueblo renegotiated a 30-year easement on this stretch of highway in 2000.

Total available parking at LANL would remain the same, but location and access would change following construction, resulting in more circuitous trips and longer walks to work places. The TA-3 parking lot shuttle would operate within the proposed access-controlled area and service would not be disrupted because new parking lot access roads would be constructed.

Infrastructure effects would primarily occur during construction of the proposed access controls. Several existing utilities, including water and telecommunications, would be relocated or rerouted. While this would have no long-term effect it would involve trenching and placement of new lines and the capping and abandonment of existing lines or removal of the lines. Most of the trenching that would impact traffic would occur for approximately 3,000 ft (900 m) along Pajarito Road to serve the access-control station proposed at the east end.

No Action Alternative

Under the No Action Alternative, the new bypass roads, access-control stations, intersection improvements, internal traffic circulation improvements, connector roads, and parking lots would not be constructed. There would be no relocation of existing utilities. LANL and non-LANL traffic would continue to use Pajarito Road which could be closed or subject to access-controls in response to daily security conditions. Diamond Drive would remain open as the principal north and south transportation link through the LANL TA-3 area. Traffic congestion and safety conditions would not be improved at and around TA-3. Access by the public to the LANL core area would not change and security concerns would not be addressed.

4.1.2 Ecological Resources

Proposed Action

The Proposed Action would result in the removal of vegetation within a 50-ft (15-m)-wide corridor for most of the length of the proposed Western Bypass Road. The Eastern Bypass Road crossing Mortandad Canyon would result in removal of vegetation on the upper slopes within a corridor approximately 200 ft (60 m) wide. The maximum amount of vegetation removed would be approximately 7.2 ac (2.0 ha).

Larger wildlife species that currently move through the Western and Eastern Bypass Road corridors would be temporarily disturbed during the construction activities. Most of these species, however, would likely continue using the areas around the proposed road for foraging and migration after construction was complete. The Western Bypass and Eastern Bypass Road corridors also would be partially within an AEI for the Mexican spotted owl. The area of potential sensitive habitat disturbed would be approximately 5.3 ac (2.2 ha). This comprises less than one percent of habitat loss in this AEI. Timing restrictions would be imposed to mitigate effects on the AEI in accordance with the LANL HMP (LANL 1998a) so that there would not likely be any adverse affects from implementing the Proposed Action.

No long-term effects are anticipated for any floodplain or wetland. The Western Bypass Road corridor is not in a floodplain or wetland area; however, portions of the Eastern Bypass Road corridor span floodplain and are located at or near wetland areas in Mortandad Canyon. These would be avoided by bridging the canyon. During construction, only selected larger trees that interfere with bridge structures would be removed. BMPs would be employed during and after the construction phase to control runoff into the floodplains and drainage areas along both of the proposed bypass road corridors.

No Action Alternative

Under the No Action Alternative, the proposed Western and Eastern Bypass Roads, access-control stations, and related facilities would not be built. There would be no biological resources effects as a result of implementing the No Action Alternative. No changes to habitat or migration corridors would result and there would be no floodplains or wetlands affected.

4.1.3 Water Quality

Proposed Action

Vegetation reduction from canyon slopes would expose mineral soils due to excavation and heavy equipment. BMPs for runoff control, such as silt barriers and straw bales, would be used during this project. Siltation into the floodplains would be minor and temporary in nature. No long-term effects to surface water quality would be likely.

The proposed bypass road corridors would cross several PRSs that would either be remediated before construction begins or avoided so that future cleanup could be accomplished. In some cases, ER Project may permit work if it determines that the PRS does not pose a threat to people or the environment. A Storm Water Pollution Prevention Plan would be developed and implemented, including the placement of BMPs to prevent erosion of disturbed soil by storm water runoff or other water discharges. A Clean Water Act Section 404 Dredge and Fill Permit and a State of New Mexico section 401 Water Quality Certification would be obtained if required. All vehicles and equipment used for construction purposes would be inspected for leaks before arrival at the construction site to avoid inadvertent surface contamination from hydrocarbon fuel products.

The addition of new impermeable road surfaces in the TA-3 area would increase storm water run-off and would decrease surface water infiltration. While decreased infiltration is not expected to have an adverse effect on groundwater quality, the increased amount of run-off from road surfaces may have a slight effect on surface water quality and on residual contaminant transport within canyon sediments, streams, and area wetlands. BMPs should keep sediment and residual contaminant transport from occurring. The wetlands in Sandia and Mortandad Canyons could also be affected by runoff from the proposed Eastern Bypass Road, but the Sandia Canyon wetland presently receives contaminants from PRSs located within TA-3 and from general runoff from TA-3.

No Action Alternative

Under the No Action Alternative, the new bypass roads would not be constructed. No effects on water quality would result from implementing the No Action Alternative. The Mortandad and Sandia Canyons wetlands would not receive any runoff from the Eastern Bypass Road since it would not be constructed.

4.1.4 Environmental Restoration

Proposed Action

There are eight PRSs within the proposed bypass road corridors (see Table 5). Most of the PRSs in the proposed area of construction are located either in storm drain pipelines, liquid radioactive waste pipelines, or sanitary waste pipelines. Sampling, characterization, and remediation of some PRSs would occur before construction. Hazardous or radioactive wastes from PRSs impacted by construction activities would be removed and disposed of by the ER Project before construction activities begin. Some PRSs would be avoided by bridging or routing the road away from the area.

Table 5. PRSs in the Path of the Bypass Roads

PRS ID	Description
SWMU 03-014(a)-99	Consolidated unit representing the former WWTP
SWMU 03-009(i)	Debris area located east of the Liquid and Compressed Gas Facility
SWMU 03-015-00	Outfall located between Eniwetok Road and security fence northeast of Building 03-141
SWMU 03-045(h)-00	Consolidated unit consisting of cooling tower outfalls
SWMU 61-002	Storage area east of the Radio Repair Shop (Building 61-23) on East Jemez Road
SWMU 61-005	30-acre Los Alamos County Landfill
SWMU 61-006	Waste oil recycling area located in Los Alamos County landfill
SWMU 03-010(a)	Surface disposal site located on the rim of Two-mile Canyon west of Building 03-30

The PRSs that would be affected by the proposed construction of the Eastern Bypass Road include the following eight sites:

SWMU 03-014(a)-99: A consolidated unit representing the former WWTP. Several of the PRSs that make up this SWMU would be affected by the proposed road construction; some would require sampling and analysis to determine the nature and extent of contamination requiring cleanup while others could need Voluntary Corrective Actions. The Proposed Action would bridge this location and also possibly apply limited remediation as appropriate.

SWMU 03-009(i): A debris area located east of the Liquid and Compressed Gas Facility (TA-3-170). This SWMU requires further investigation. The Proposed Action would include remediation of this site as appropriate.

SWMU 03-015-00: NPDES-permitted Outfall 04A140 located between Eniwetok Road and the security fence northeast of Building 3-141 (Rolling Mill Building). This SWMU has been investigated but requires further study. The Proposed Action would include remediation of this site as appropriate.

SWMU 03-045(h)-00: A consolidated unit consisting of two NPDES-permitted outfalls associated with cooling towers. Sampling for former SWMU 03-049(a) suggests no contaminants of concern exist at this SWMU. Former SWMU 03-045(h) never had hazardous constituents or hazardous wastes in its effluent, and structure 03-187 had no history of chromate use. These former SWMUs were recommended for No Further Action. This PRS would be avoided by routing the road away from the SWMU.

SWMU 61-002: A storage area east of the Radio Shop (Building 61-23) on East Jemez Road that was used to store PCB-containing wastes. The SWMU was historically used to store capacitors and transformers, unmarked containers, and several oil-filled containers. Leaking containers with PCB-contaminated oil were also stored at SWMU. Elevated PCB concentrations were found in two samples in the drainage pathway, the furthest downgradient locations that were sampled. Further investigations were recommended to identify the extent of contamination. The Proposed Action would involve cleanup as appropriate.

SWMU 61-005: The 30-acre County Landfill. The landfill is located on the rim of Sandia Canyon near East Jemez Road. The landfill consists of pits excavated into tuff designed so that stormwater runoff does not enter the canyon. Waste is deposited into the active pit and covered

with soil daily. When full, the pit is capped and a new pit is put into service. The landfill was established in 1974 and is expected to close in 2004. Long-term monitoring of ground water and surface water quality will be conducted post-closure. The Proposed Action includes relocating affected surface activities in the vicinity of the landfill entrance, offices, and scales, and remediating as appropriate.

SWMU 61-006: An active oil recycling area located at the County Landfill (SWMU 61-005). This lined pit holds a 2,500-gal. holding tank. An 8-ft-long pipe leads to a filling bin at ground level. The Proposed Action would route the road to avoid this SWMU.

One PRS that would be affected by the proposed construction of the Western Bypass Road is the following site:

SWMU 03-010(a): A surface disposal site located on a steep slope along the rim of Two-mile Canyon west of Building 3-30. Discarded vacuum pump oil containing radionuclides and mercury was disposed of at this site in the 1950s. Remediation of this mixed waste site, which also contains VOCs, has been ongoing since 1992. Many of the soil contaminants have been removed. Stormwater runoff data does not indicate that this SWMU has had an effect on surface water quality. The Proposed Action would bridge this disposal site; however, remediation would occur if necessary.

No Action Alternative

Under the No Action Alternative, the proposed bypass road would not be constructed. PRSs in the proposed road corridor would not be affected by construction activities. Site cleanups would not be accelerated to provide cleanup of these particular PRSs.

4.1.5 Waste Management

Proposed Action

The Proposed Action would not require the construction of new waste landfills. The reuse of existing recyclable materials stockpiled at LANL would be a beneficial effect to the overall waste management program at LANL. The Proposed Action would generate a very small amount of solid waste from construction that would be disposed of at the Los Alamos County Landfill or other New Mexico solid waste landfills in accordance with practices required by LANL's LIR for General Waste Management (LANL 1998c). All excavated material is expected to be re-used in the construction of the proposed bypass road. Any soil excavated during the geotechnical investigation of the Sandia Canyon rubble pile would be replaced. Concrete and asphalt removed from the top of the Sandia Canyon rubble pile or from other locations such as from existing parking areas or streets would be recycled for use as road base material. Use of the existing construction debris staging area currently located at Sigma Mesa (TA-60) may be necessary for a short period of time during road construction to stockpile soil and other recyclable materials that would be used later for roadbase and fill along the proposed bypass road corridors.

Construction waste would be generated from the demolition of the high bay portion of Building 3-40 in TA-3. Approximately 200 cubic yards (yd^3) (155 cubic meters [m^3]) of construction debris are estimated to result from demolition of the high bay area. Recyclable material would

be packaged and shipped to an appropriate recycling facility. Material that is not recyclable would be disposed of at the Los Alamos County Landfill or other New Mexico solid waste landfills.

Hazardous waste generated by implementing the Proposed Action would be asbestos from the demolition of the Building 3-40 high bay and from cleanup of PRSs. Approximately one cubic yard of asbestos-contaminated material would be appropriately disposed of offsite at permitted landfills. Hazardous wastes from PRSs would be removed, as necessary, by the ER Project before roadwork was begun; approximately 800 yds^3 (608 m^3) of hazardous waste is estimated to be generated.

Approximately 200 trees would be removed to prepare the corridor for construction activities. Brush, trees, or vegetation would be chipped onsite and spread along the corridor. Chipped material would not be spread in or near any floodplain or drainage area.

No Action Alternative

There would be no additional waste generated under the No Action Alternative. There would be no demolition, grading, or construction activities. The construction debris waste shipments to landfills or recycling centers would not occur. No beneficial effects to the environment by PRS removals or from re-use of recyclable materials stockpiled at LANL would occur.

4.1.6 Air Quality

Proposed Action

Potential temporary effects on air quality would be associated with the Proposed Action. Construction of the proposed bypass roads would result in temporary, localized emissions associated with vehicle and equipment exhaust as well as particulate (dust) emissions from excavation and construction activities. The air emissions would not be expected to exceed either the NAAQS or the NMAAQs. Effects of the Proposed Action on air quality would be negligible compared to potential annual air pollutant emissions from LANL as a whole. No increases in non-point source emissions would be expected once access controls and traffic improvements were implemented, because there would be no appreciable net increase in vehicle trips or trip lengths within Los Alamos. Distances whether using Pajarito or East Jemez are nearly identical, and rerouted trips from White Rock to East Jemez Road would account for no more than a seven percent increase in average daily trips on a road that now carries fewer than 10,000 vehicles a day. Safety improvements resulting from the Proposed Action and LANL routine maintenance projects may also result in less congestion and therefore no net increase in emissions.

Hazardous wastes from some PRSs would be removed by the ER Project before the proposed construction activities begin. ER Project remediation activities could potentially affect air quality on a temporary basis. Excavation activities for the purpose of removing contaminated soil from ER Project sites for treatment or transport could result in a minor amount of airborne fugitive dust and the dispersion of volatile contaminants. The amounts of air emissions would be kept to a minimum by the control measures proposed as part of the Proposed Action, such as the use of water spray trucks and soil tackifiers. Radionuclide emissions from the PRSs would be monitored as part of LANL's ongoing air monitoring program. Potential emissions of

radionuclides would not be expected to exceed the EPA National Emission Standards for Hazardous Air Pollutants requirement, which is designed to protect the public from hazardous air pollutants.

Emissions from internal combustion and diesel engines would result from excavation and construction activities. All air emissions associated with the operation of excavation and construction equipment would be below ambient air quality standards. Total emissions of criteria pollutants and other air emissions associated with the operation of heavy equipment for excavation and construction activities would contribute greater emissions than other vehicles due to the types of engines and their respective emission factors. Heavy equipment would emit small quantities of criteria pollutants subject to the NAAQS and NMAAQS as adopted by the State of New Mexico in its State Implementation Plan[9].

No Action Alternative

There would be no change from ambient air quality effects associated with implementing the No Action Alternative. Excavation and construction activities would not occur.

4.1.7 Geologic Setting

Proposed Action

The local geologic setting is expected to have minimal effects on the Proposed Action; and no effect on the local geology is anticipated from implementing the Proposed Action. Seismic activity could affect the new bypass roads; however, the probability of a seismic event is very low. The proposed bypass roads would be designed with structural reinforcements to meet current building codes with respect to seismic hazards.

The local soils may have a slight affect on the Proposed Action. Local soils may need to be stabilized, or possibly replaced with a more suitable substrate to support the bypass roads.

No Action Alternative

Under the No Action Alternative, the new bypass and related facilities would not be constructed. Therefore, no geological or soils effects would result from implementing the Proposed Action.

4.1.8 Cultural Resources

Proposed Action

The planned construction of the TA-3 bypass roads would not affect recorded prehistoric archaeological sites or recorded TCP in the construction area. These sites would be marked as appropriate and avoided during construction. The demolition of a portion of Building 3-40 would be an adverse effect on an historic structure. Because the demolition of a portion of this building would be an adverse effect to the property as identified in Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800.5, "Assessment of Adverse

[9] The purpose of the State Implementation Plan is to ensure that federal emission standards are being implemented and NAAQs are being achieved.

Effects," a treatment plan to resolve these adverse effects would be negotiated between the SHPO and the NNSA through an interagency Memorandum of Agreement (MOA). The treatment plan would include a combination of the following elements: archival medium format photos, existing architectural blueprints, preparation of a current set of as-built drawings, preparation of a detailed report on the building's history, and interviews with past and present workers. Additions to the treatment plan could result from negotiations with the SHPO over the resolution of the adverse effects. The Advisory Council on Historic Preservation would be notified of the MOA and would have an opportunity to comment. No other adverse effects to historic structures would be expected to occur from implementing the Proposed Action.

No Action Alternative

Under the No Action Alternative, the new bypass roads would not be constructed. Therefore, there would be no adverse effects to cultural resources as a result of the No Action Alternative. The Building 3-40 high bay would not be demolished.

4.1.9 Noise

Proposed Action

The Proposed Action would result in limited short-term increases in noise levels associated with various demolition and construction activities. Following the completion of these activities, noise levels would return to existing levels. Noise generated by the Proposed Action is not expected to have an adverse effect on LANL workers, or members of the public, or on the environment.

The demolition of existing structures, earth-moving activities, and road and structure construction would require the use of heavy equipment for removal of debris, dirt, and vegetation and for paving of the new road. Heavy equipment, such as front-end loaders and backhoes, used during construction of the various structures and roadways would produce intermittent noise levels at around 73 to 94 dBA at 50 ft (15 m) from the work site under normal working conditions (Canter 1996, Magrab 1975). Truck traffic would occur frequently but would generally produce noise levels below that of the heavy equipment. PPE would protect workers hearing if site-specific work produced noise levels above the LANL action level of 82 dBA. Based upon a number of physical features, such as attenuation factors, noise levels should return to background levels within about 200 ft (66 m) of the noise source (Canter 1996). Since sound levels would be expected to dissipate to background levels before reaching most publicly accessible areas or undisturbed wildlife habitats, sounds from construction activities should not be noticeable to most members of the public and should not disturb most local wildlife. Traffic noise from commuting workers would not be expected to noticeably increase over the present traffic noise level on roads at LANL. The vehicles of workers would remain parked during the day and would not contribute to background noise levels. Therefore, noise levels are not expected to exceed the established TLV.

Long-term maintenance of the roads would not generally require the use of heavy equipment. Routine maintenance operations under the Proposed Action would result in noise of short-term duration that would be highly localized. The noise would also be consistent with noise levels in nearby developed areas and on existing roads at LANL.

No Action Alternative

Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of TA-3. Potential noise from demolition and construction activities associated with the Proposed Action would not occur.

4.1.10 Human Health

Proposed Action

Building demolition and road and access-control station construction and maintenance work planned under the Proposed Action would not be expected to have any adverse health effects on LANL workers. LANL workers would not be directly involved in demolition, site clearing, earthmoving, heavy equipment operations, or access-control station construction. Non-UC support and maintenance contractors would be actively involved in demolition, road construction, and maintenance activities under the Proposed Action. Approximately two NNSA workers and about 20 LANL workers would perform site inspections and monitor demolition activities during periods of peak activity. Applicable safety and health training and monitoring, PPE, and work-site hazard controls would be required for these workers.

The Proposed Action is not expected to result in adverse long-term effects on the health of construction or maintenance workers. Approximately 100 peak-period construction workers would be actively involved in potentially hazardous activities at the various construction and demolition locations around the LANL core and along Pajarito Road where access controls would be placed. Building demolition and road and access-control construction activities would take up to about two years to complete and involve heavy equipment operations. Removal of dirt and vegetation would be required from the road corridors. Large earth-moving machines would be used at various times at the subject locations. Potentially serious exposures to various hazards or injuries are possible during the construction phase of the Proposed Action. Adverse effects during construction activities could range from relatively minor events (such as cuts or sprains) to major injuries (such as broken bones or fatalities). To prevent serious injuries, all non-LANL site workers are required to adhere to a Contractor Safety Plan (Plan) for construction activities. Adherence to an approved Plan, use of PPE and engineered controls, and completion of appropriate hazards training are expected to help prevent adverse long-term health effects on demolition and construction workers.

Routine maintenance of the proposed new road and access-control stations would be performed in accordance with standard practices used at LANL for conducting work on buildings and infrastructure. Hazards associated with routine maintenance operations of buildings and roads could pose a minimal health risk to non-LANL maintenance workers. Adherence to required and applicable hazard control plans and completion of appropriate training would help to prevent adverse health effects on these workers.

No Action Alternative

Under the No Action Alternative, there would be no potential for injuries to LANL workers and non-LANL demolition and construction workers from activities planned under the Proposed Action. No exposures to demolition activities, earth moving, or road and access-control station construction would take place.

5.0 ACCIDENT ANALYSIS

Construction. No fatalities are likely to result from the proposed construction and demolition activities. The Proposed Action of constructing and operating eastern and western bypass roads and access roads around TA-3 and of constructing and operating various vehicle access-control stations would consist primarily of activities that are performed on a routine basis in the road construction industry. These activities can be mostly considered common practice in a standard industry. An exception would be unanticipated exposure to low levels of radiation or chemicals resulting from accidental disturbance of a previously unidentified SWMU. This activity would be considered a specialized accident type that is somewhat unique to DOE nuclear facilities, and environmental restoration would occur before construction of the bypass roads and related improvements.

The most serious potential accident considered for the Proposed Action would be a fatality during the following construction activities:

- site environmental restoration (cleanup SWMUs as required);
- demolition, relocation, and salvaging of affected structure;
- relocation, demolition, and tie-ins for existing utilities (east side, west side);
- clearing and grubbing roadways (east side, west side);
- preparation of roadbed, drainage, retaining walls, approaches, and dirt work (east and west sides);
- construction of bridges, roads, curbs, gutters, sidewalks, new utilities, etc (east and west sides);
- construction of access-control stations and new utilities (east and west sides);
- construction of intersections, installation of traffic signals, and other associated articles at interface locations with existing roads (east and west sides);
- testing and turnover of access-control stations for operations; and
- closing existing roads and re-routing traffic through new roads.

The activities are considered a form of construction, and so potential fatalities can be considered by comparing national statistics on construction with project worker information for the Proposed Action. The estimated number of workers was compared to recent risk rates of occupational fatalities for construction. Up to 100 full-time workers could be employed for as long as 24 months. The average fatality rate in the U.S. for industries that include causes of falls, exposure to harmful substances, fires and explosions, and being struck by objects, equipment, or projectiles is 1.9 per 100,000 workers per year (Saltzman 2001). Based on this statistic and the estimated worker information, no deaths (0.0029) from these causes are expected from implementing the Proposed Action.

Transportation. Two aspects of transportation safety were considered: potential accidents associated with construction lasting up to a two-year period and potential safety associated with the post-construction period upon use of the new road system. Approximately ten pickup trucks, ten large dump trucks, and other large earth-moving equipment would be used on the project. Transportation activities during construction of the new road are expected to include the transport of road construction materials to the site and waste and recyclable materials away from

the site. Of the different types of transportation occupations nationwide, drivers of all types of trucks experience the highest fatality rate (26 deaths per 100,000 full-time workers per year) (Saltzman 2001). Presumably, most of the fatalities as associated with "semi" style, tractor and trailer rigs; therefore, the statistics are not directly comparable to transportation associated with the project. However, the transportation activities for the Proposed Action are expected to constitute a minor fraction of the amount of travel on which transportation fatality rates for industry are based. Therefore, no fatalities (0.004) are expected from transportation directly relating to the Proposed Action.

Use of the new bypass roads, after construction, would be expected to be safer for passenger vehicles than the current roads because of the more modern road and intersection designs and lower traffic volumes. Traffic would be restricted to approved vehicles that would largely be driven by LANL workers who are generally more familiar with the area, as opposed to the No Action Alternative (the status quo) where members of the general public (including area tourists) are allowed unrestricted access to TA-3.

Exposure to Environmental Levels of Radiation. Road construction activities have the potential to result in exposure to low levels of radiation or hazardous chemicals when an unknown PRS is accidentally breached. The exposure would be limited to the involved workers that may not be wearing appropriate PPE for the site's contamination constituents. The probability of accidental breach of an unknown PRS is low. No fatalities would be expected from such an event.

Wildfire. Hot catalytic converters associated with internal combustion engines have the potential to cause ignition of a wildfire when they come into contact with tall vegetation. Since the proposed alignment of the bypass roads would cross small forested areas where heavy equipment would be used to clear the vegetation, the potential for this type of accident exists. Extreme wildfire prevention measures are enforced when necessary at LANL. These measures are based on current site conditions. Normal operational site wildfire hazard reduction measures are directed by the LANL Wildfire Hazard Reduction Program. The likelihood of this accident occurring would be, among other events, related to the failure to adhere to the restriction on driving or parking off of established roadways. If appropriate site requirements and restrictions are followed, then there is no likelihood of any fatalities from wildfire as a result of implementing the Proposed Action.

6.0 CUMULATIVE EFFECTS

Cumulative effects on any affected resources as a consequence of the Proposed Action are expected to be negligible. Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them. These effects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7). The cumulative effect analysis in the LANL SWEIS already documents the regional effect of the Expanded Operations Alternative and provides context for this EA. This section considers the Proposed Action and its possible effects on resources as relates to any ongoing or reasonably foreseeable future actions.

Four resources are dismissed from cumulative effects consideration because it has been determined they would not be affected by the Proposed Action and therefore could not contribute collectively to ongoing or reasonably foreseeable actions (see Table 3). These resources were socio-economics, land use, visual, and environmental justice. Five other resources analyzed in this EA would not contribute significantly to cumulative effects, because the Proposed Action would not have significant long-term or irreversible effects on water quality, air quality, geology (and soils), noise, and human health resources.

Transportation, ecological resources, cultural resources, environmental restoration, and waste management are discussed further in this section. This analysis concludes that there would be insignificant slight cumulative effects on these resources as a consequence of the aggregate of the Proposed Action and past, present, and reasonably foreseeable future actions. Moreover, some positive effects to resources, including transportation, infrastructure, and environmental restoration, would occur as a consequence of the Proposed Action controlling access to the LANL TA-3 core area.

Transportation. The Proposed Action would modify the existing LANL and Los Alamos County transportation network by placing access restrictions on vehicles using Pajarito Road and those entering into TA-3. These modifications would reallocate traffic primarily to two of the other three roads leading to Los Alamos town site but not cause significant impacts to the network. The proposed gas line project could affect the transportation network and traffic should the no action alternative to leave it in its current condition within the Main Hill Road right-of-way be selected. This is because future gas line repair or maintenance could require closing the road for some period. The placement of access-control points would be designed and phased to minimize vehicle waits, congestion, and effects on LANL roadways restricted to use by the public, while East Jemez Road (Truck Route) would remain open for unrestricted vehicle access. UC would coordinate with Los Alamos County to assure acceptable emergency response actions during and after the construction. Traffic within the LANL TA-3 area and to vehicle parking lots would be rerouted due to newly constructed road closures into TA-3 and internal access-control points. Access controls would actually enhance traffic safety by restricting vehicles to certain locations and reducing the number of vehicles within the Pajarito corridor and LANL TA-3 area.

Traffic and infrastructure impacts on U.S. Forest Service and Bandelier National Monument areas adjacent to LANL would not change as these lands would likely continue to be used for recreation, habitat management purposes, and timber production (only within the Santa Fe National Forest). Bandelier National Monument has long-term plans for rebuilding its main

access road and possibly relocating parking closer to SR 4, but this should not have an effect on inter-LANL transportation.

Parcels identified for land transfer are outside the proposed access-controlled areas and would not contribute to unforeseen traffic or infrastructure impacts. Similarly, there would be no long-term effects on other infrastructure. These access controls would be expected to enhance the safety and security of LANL utilities.

Ecological Resources. The Proposed Action would involve AEIs that include potential habitat, wetlands, and floodplains. The proposed bypass roads would create corridors of varying width from 50 to 200 ft where some vegetation would be removed or disturbed. Construction within these areas would be accomplished using BMPs to minimize impacts. Structural bridges would be used to span canyons over areas designated as AEIs.

UC is implementing an Integrated Resource Management Plan to coordinate responsible environmental stewardship at LANL that is consistent with its missions. This management plan will also help LANL management operate the facility without incurring adverse cumulative environmental effects pursuant to the SWEIS ROD. The Proposed Action would not contribute significantly to adverse cumulative effects on ecological resources.

Cultural Resources. The Proposed Action would result in demolition of the Building 3-40 high bay, which is eligible for the NRHP. There are a number of actions planned for LANL that would adversely affect LANL historic structures over the next several years, and many of the historic buildings at LANL would be demolished. Examples of buildings that are under consideration for demolition activities include the Administration Building in TA-3, Omega West facility (TA-2), the Manhattan Project detonator buildings at TA-6, several structures at TA-41, several structures at TA-21 related to early thermonuclear weapons, the Hollow at TA-15 where the Rex accelerator was located, several buildings at TA-33 associated with early gun development, and the Van de Graff accelerator (TA-3). Hundreds of buildings are on the LANL excess property list or may be proposed for demolition over the next several years, including most of the permanent buildings that date to the early Cold War era (1947–63). A small number of these buildings may have reuse potential; this potential must be considered as part of NNSA's management of historic properties. In response to these factors, NNSA and UC are preparing a Cultural Resources Management Plan (CRMP) in accordance with the mitigation action plan set forth in the SWEIS ROD. This management plan, which is due to be completed by the end of 2002, will address the rapid attrition of historic buildings and will establish a framework for identifying historic properties with exceptional importance in LANL history. The Proposed Action is not expected to result in a significant adverse cumulative effect on historic resources at LANL because the NNSA and the SHPO would negotiate a treatment plan for documenting the importance of Building 3-40 for future reference.

Environmental Restoration. There are eight SWMUs within or nearby the Proposed Action and most of these are located in drainage areas. Any of the PRSs impacted by construction would be sampled, characterized, and remediated as appropriate before construction of the bypass roads and associated facilities by the LANL Environmental Remediation Program. Wastes generated by these remediation efforts would be handled in accordance with applicable RCRA procedures and regulations and transferred to appropriate waste management facilities so

that the Proposed Action would not contribute to significant adverse cumulative effects. Some PRSs would be bridged or avoided to allow for future remediation.

Waste Management. The Los Alamos County Landfill is located adjacent to the Eastern Bypass Road component of the Proposed Action, and its possible closure is contemplated within the next five years. Part of the site could continue being used as a transfer station and recycling facility. NNSA and the County are studying new landfill sites or alternate means of sanitary waste disposal at this time, and NNSA will develop an appropriate NEPA compliance strategy. Waste generation is expected to be minimal for the Proposed Action; however, overall waste generation at LANL during the next ten years, both from decontamination and demolition of buildings and through environmental restoration efforts, could be large. Construction and demolition wastes would be recycled and reused to the extent practicable. Existing waste treatment and disposal facilities would be used according to specific waste types. Solid wastes would be disposed of at the Los Alamos County Landfill or other appropriate permitted solid waste landfills. Demolition wastes would similarly be disposed of at appropriate permitted facilities. No aspect of the Proposed Action or other planned actions would individually result in NNSA establishing a new disposal facility or expanding an existing one.

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7.0 AGENCIES CONSULTED

The Proposed Action involves demolition of the Physics Building high bay, which is a historic property. NNSA will seek concurrence from the SHPO regarding the mitigation plan for this historic property. This plan can include activities such as archival medium-format photos, compiling existing drawings, preparing a current set of as-builts, preparing a detailed report on the history of the building, and conducting interviews with persons who work or worked in the building. The photographic documentation would have to be completed before any demolition work on the building.

NNSA has determined that no consultation with the U.S. Fish and Wildlife Service regarding the potential effect of the Proposed Action on federally protected threatened or endangered species or their critical habitat is necessary as there would be no adverse effect to individuals of sensitive species or their critical habitat from the Proposed Action.

A floodplains and wetlands assessment of the Proposed Action has been prepared and included as an appendix to this EA. This is in accordance with DOE regulations regarding floodplain/wetlands environmental review requirements pursuant to 10 CFR 1022.

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APPENDIX

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

LA-UR-02-4592

Approved for public release; distribution is unlimited.

Title

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

Compiled by

Laura K. Marsh, Biology Team, RRES-ECO

August 23, 2002

CONTENTS

Figures

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

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.

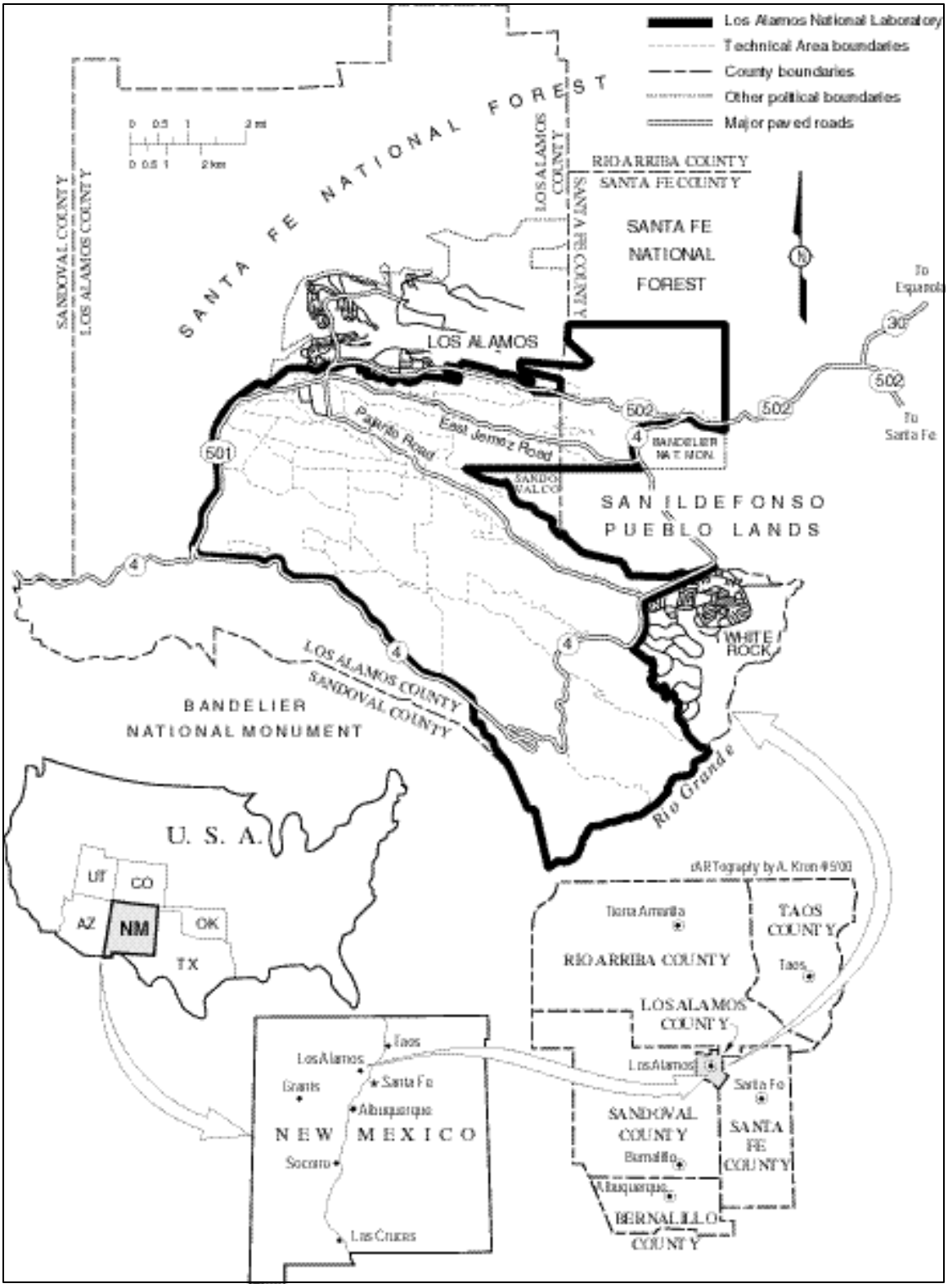

Figure 1. Location of Los Alamos National Laboratory.

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).

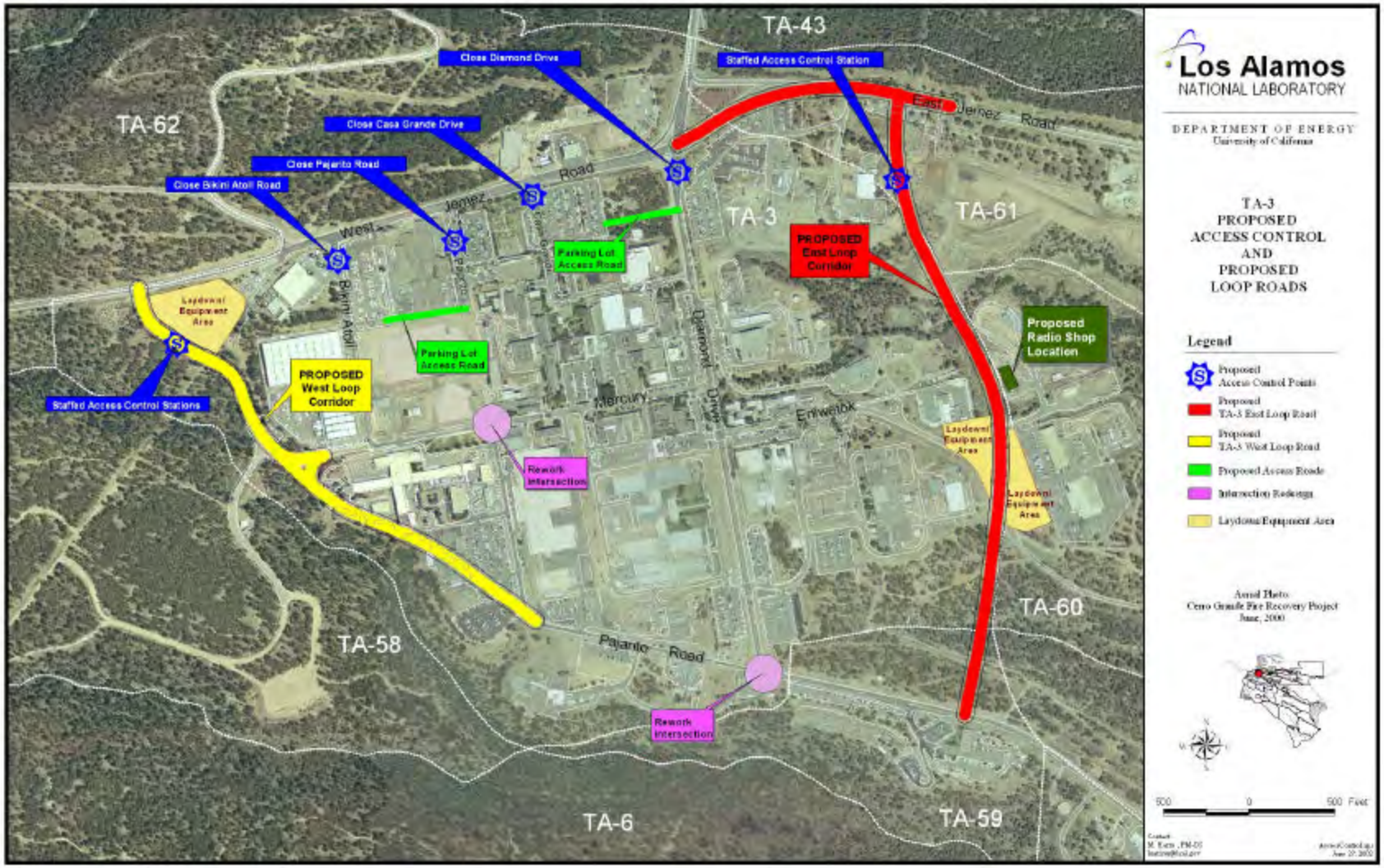

Figure 2. Proposed access controls and bypass roads around TA-3.

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

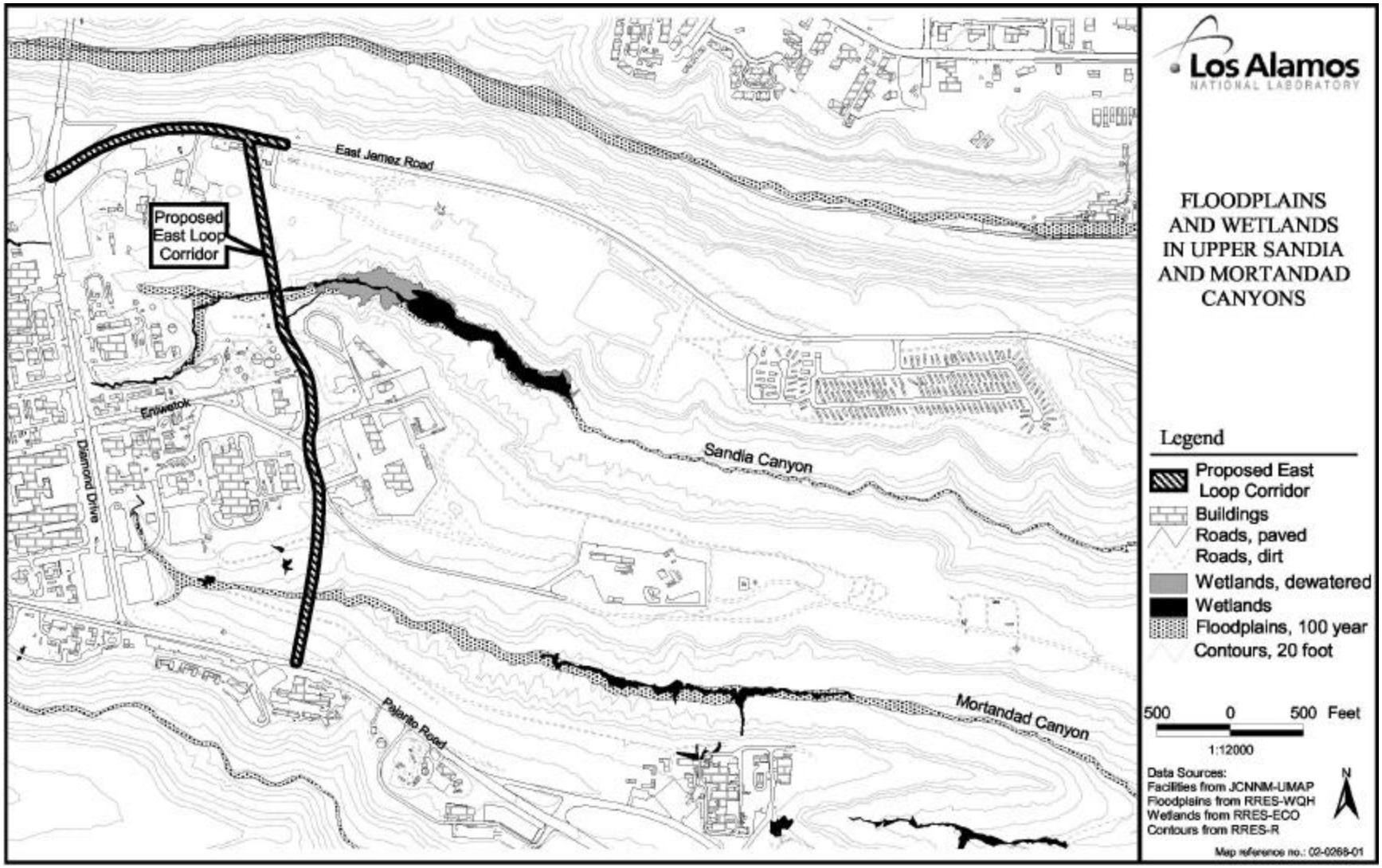

Figure 5. Floodplains and wetlands in upper Sandia and Mortandad Canyons.

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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