COVER SHEET

Responsible Agencies:

Lead Federal Agency: U.S. Department of Energy (DOE)

Cooperating Agencies: Incorporated County of Los Alamos, San Ildefonso Pueblo, U.S. Department of the Interior, and U.S. Department of Agriculture

Title:

Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico.

Contacts:

For further information on this Environmental Impact Statement (EIS):
Leave message at: 1-800-791-2280 or contact:
Ms. Elizabeth Withers
Conveyance and Transfer EIS Document Manager
Los Alamos Area Office,
Office of Environment,
U.S. Department of Energy
Los Alamos, New Mexico 87544
Call (505) 667-8690
Fax (505) 665-4872

For further information on the U.S. Department of Energy NEPA Process:
Leave message at 1-800-472-2756 or contact:
Ms. Carol Borgstrom
Director
Office of NEPA Policy and Assistance (EH-42)
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585
(202) 586-460

Abstract:

On November 26, 1997, Congress passed Public Law 105-119, the *Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1998* (the Act). This Act, in part, directs the Secretary of Energy to convey to the Incorporated County of Los Alamos, New Mexico (the County), or its designee, and transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso, parcels of land under the jurisdictional administrative control of the Secretary at Los Alamos National Laboratory (LANL). DOE's responsibilities under the Act include identifying suitable tracts of land according to criteria set forth in the law, conducting a title search on each tract of land, identifying and conducting, to the maximum extent practicable, any environmental restoration or remediation that would be needed for each tract of land, and conducting *National Environmental Policy Act* (NEPA) review of the proposed conveyance or transfer of the land tracts. In accordance with NEPA, this document assesses the potential environmental impacts of conveying and transferring certain land tracts located at LANL within the Incorporated County of Los Alamos and Santa Fe County. Specifically, this document examines the environmental consequences that could be expected if each of 10 eligible land tracts, in whole or in part, were conveyed or transferred with subsequent development and use of the tracts for the purposes identified by the Act and as further contemplated by the recipients. Two alternatives are analyzed in this document[1]: the No Action Alternative and the Conveyance and Transfer of Each Tract Alternative (the Proposed Action Alternative). Under the No Action Alternative, DOE would continue its administrative control of each individual tract tentatively identified as a candidate for conveyance and transfer. Under the Proposed Action Alternative, each of the 10 eligible tracts of land individually, in whole or in part, would be either conveyed or transferred to either the County or the Secretary of the Interior, in trust for San Ildefonso Pueblo. In addition, this document briefly discusses the known environmental restoration or remediation needed for each of the 10 eligible land tracts identified for conveyance or transfer and considers the planned use of the land and the ensuing potential environmental impacts subsequent to the conveyance or transfer of administrative control or ownership. The potential contemplated land uses identified in this document include cultural, historical, or environmental preservation and residential, commercial, or industrial development.

[1] Changes made to this CT EIS since publication of the Draft CT EIS are marked with a line in the margin.

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ACRONYMS AND ABBREVIATIONS

the Act	Public Law 105-119 (42 U.S.C. §§2391)
AECA	*Atomic Energy Community Act* of 1955
AEI	areas of environmental interest
BA	biological assessment
BLM	Bureau of Land Management
BNM	Bandelier National Monument
BTUs	British Thermal Units
°C	degrees Celsius
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CERFA	*Community Environmental Response Facilitation Act*
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CMR	Chemical and Metallurgy Research
COE	U.S. Army Corps of Engineers
the County	Incorporated County of Los Alamos, New Mexico
CRMT	Cultural Resource Management Team (LANL)
CT EIS	Conveyance and Transfer Environmental Impact Statement
DARHT	Dual Axis Radiographic Hydrodynamic Test (Facility)
D&D	decontamination and decommissioning
dB	decibels
dBA	A-weighted decibels
dBC	C-weighted decibels
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
EDE	effective dose equivalent
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ER	environmental restoration (LANL Project)
ERPG	Emergency Response Planning Guideline
ESA	*Endangered Species Act* of 1973
ESH	Environment, Safety, and Health (LANL Division)
ESRs	Environmental Surveillance Reports
°F	degrees Fahrenheit
FONSI	Finding of No Significant Impact
FR	*Federal Register*
GMAP	gaseous/mixed activation products
gpm	gallons per minute
GSA	General Services Administration
gwh	gigawatt-hours
HAPs	hazardous air pollutants
HFCs	hydrofluorocarbons
HRL	Human Resources Laboratory
HSWA	Hazardous and Solid Waste Amendments

ACRONYMS AND ABBREVIATIONS

ICRP	International Commission on Radiological Protection
IRIS	Integrated Risk Information System
ITE	Institute of Transportation Engineers
JCINNM	Johnson Controls Northern New Mexico
km	kilometer
LAAO	Los Alamos Area Office (DOE)
LAC	Los Alamos County
LANL	Los Alamos National Laboratory
LACEF	Los Alamos Critical Experiments Facility
LANSCE	Los Alamos Neutron Science Center
LCF	latent cancer fatality
LOS	level of service
LEDA	low-energy demonstration accelerator
LLW	low-level radioactive waste
MAP	Mitigation Action Plan
MAR	material-at-risk
MBTA	*Migratory Bird Treaty Act*
mcf	million cubic feet
MDAs	material disposal areas
MEI	maximally exposed individual
mgy	million gallons per year
mi	mile
mly	million liters per year
MOA	Memorandum of Agreement
mrem	millirem
MSW	municipal solid waste
mty	metric tons per year
mw	megawatts
NA	not applicable, also not available
NAAQS	National Ambient Air Quality Standards
NAGPRA	*Native American Graves Protection and Repatriation Act*
NCRP	National Council on Radiation Protection
NEPA	*National Environmental Policy Act* of 1969
NFA	no further action
NHPA	*National Historic Preservation Act* of 1966
NISC	Nonproliferation International Security Center
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSH&TD	New Mexico State Highway and Transportation Department
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PCB	polychlorinated biphenyl
PCI	potential contamination issue
pcph	passenger cars per hour
PF	Plutonium Facility

ACRONYMS AND ABBREVIATIONS

PFCs	perfluorocarbons
PL	Public Law
PM-10	particulate matter less than 10 microns in size
PRSs	potential release sites
R&D	research and development
RAMROD	Radioactive Materials Research, Operations, and Demonstration (Facility)
RANT	Radioactive Assay and Nondestructive Test (Facility)
RCMP	Rendija Canyon Area Master Plan
RCRA	*Resource Conservation and Recovery Act*
rem	Roentgen equivalent man
RIMS	Regional Input-Output Modeling System
RLW	radioactive liquid waste
ROD	Record of Decision
ROI	region of influence
RSRL	regional statistical reference level
SALs	screening action levels
SCC	Strategic Computing Complex
the Secretary	the Secretary of Energy
SHPO	State Historic Preservation Office(r)
SR	State Road
SWEIS	Site-Wide Environmental Impact Statement (LANL)
SWSC	Sanitary Wastewater Systems Consolidation
TA	technical area
TAPs	toxic air pollutants
TCPs	traditional cultural properties
TEDE	total effective dose equivalent
TeraOps	trillion floating point operations per second
tpy	tons per year
TRU	transuranic
TSFF	Tritium Science and Fabrication Facility
TSTA	Tritium Systems Test Assembly
TWISP	Transuranic Waste Inspectable Storage Project
U.S.C.	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VRI	Visual Resource Inventory
WCRR	Waste Characterization, Reduction, and Repackaging (Facility)

MEASUREMENTS AND CONVERSIONS

The following information is provided to assist the reader in understanding certain concepts in this *Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the U.S. Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico* (CT EIS). Definitions of technical terms can be found in Chapter 22, Glossary.

Scientific Notation

Scientific notation is used in this report to express very large or very small numbers. For example, the number 1 billion could be written as 1,000,000,000 or, using scientific notation, as 1×10^9. Translating from scientific notation to a more traditional number requires moving the decimal point either right (for a positive power of 10) or left (for a negative power of 10). If the value given is 2.0×10^3, move the decimal point three places (insert zeros if no numbers are given) to the right of its current location. The result would be 2,000. If the value given is 2.0×10^{-5}, move the decimal point five places to the left of its present location. The result would be 0.00002. An alternative way of expressing numbers, used primarily in the appendices of this CT EIS, is exponential notation, which is very similar in use to scientific notation. For example, using the scientific notation for 1×10^9, in exponential notation the 10^9 (10 to the power of 9) would be replaced by E+09. (For positive powers, sometimes the "+" sign is omitted, and so the example here could be expressed as E09.) If the value is given as 2.0×10^{-5} in scientific notation, then the equivalent exponential notation is 2.0E-05.

Units of Measurement

The primary units of measurement used in this report are English units with metric equivalents enclosed in parentheses.

Many metric measurements presented include prefixes that denote a multiplication factor that is applied to the base standard (e.g., 1 kilometer = 1,000 meters). The following list presents these metric prefixes:

giga	1,000,000,000 (10^9; E+09; one billion)
mega	1,000,000 (10^6; E+06; one million)
kilo	1,000 (10^3; E+03; one thousand)
hecto	100 (10^2; E+02; one hundred)
deka	10 (10^1; E+01; ten)
unit	1 (10^0; E+00; one)
deci	0.1 (10^{-1}; E-01; one tenth)
centi	0.01 (10^{-2}; E-02; one hundredth)
milli	0.001 (10^{-3}; E-03; one thousandth)
micro	0.000001 (10^{-6}; E-06; one millionth)
nano	0.000000001 (10^{-9}; E-09; one billionth)
pico	0.000000000001 (10^{-12}; E-12; one trillionth)

MEASUREMENTS AND CONVERSIONS

U.S. Department of Energy (DOE) Order 5900.2A, Use of the Metric System of Measurement, prescribes the use of this system in DOE documents. Table MC-1 lists the mathematical values or formulas needed for conversion between English and metric units. Table MC-2 summarizes and defines the terms for units of measure and corresponding symbols found throughout this report.

Radioactivity Unit

Part of this report deals with levels of radioactivity that might be found in various environmental media. Radioactivity is a property; the amount of a radioactive material is usually expressed as “activity” in curies (Ci) (Table MC-3). The curie is the basic unit used to describe the amount of substance present, and concentrations are generally expressed in terms of curies per unit of mass or volume. One curie is equivalent to 37 billion disintegrations per second or is a quantity of any radionuclide that decays at the rate of 37 billion disintegrations per second. Disintegrations generally include emissions of alpha or beta particles, gamma radiation, or combinations of these.

Radiation Dose Units

The amount of ionizing radiation energy received by a living organism is expressed in terms of radiation dose. Radiation dose in this report is usually expressed in terms of effective dose equivalent and reported numerically in units of rem. Rem is a term that relates ionizing radiation and biological effect or risk. A dose of 1 millirem (0.001 rem) has a biological effect similar to the dose received from about a 1-day exposure to natural background radiation. A list of the radionuclides discussed in this document and their half-lives is included in Table MC-4.

Chemical Elements

A list of selected chemical elements, chemical constituents, and their nomenclature is presented in Table MC-5.

MEASUREMENTS AND CONVERSIONS

Table MC-1. Conversion Table

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
ac	0.405	ha	ha	2.47	ac
°F	(°F - 32) x 5/9	°C	°C	(°C x 9/5) + 32	°F
ft	0.305	m	m	3.28	ft
ft^2	0.0929	m^2	m^2	10.76	ft^2
ft^3	0.0283	m^3	m^3	35.3	ft^3
ft^3	28.32	l	l	0.0353	ft^3
gal.	3.785	l	l	0.264	gal.
in.	2.54	cm	cm	0.394	in.
lb	0.454	kg	kg	2.205	lb
mCi/km^2	1.0	nCi/m^2	nCi/m^2	1.0	mCi/km^2
mi	1.61	km	km	0.621	mi
mi^2	2.59	km^2	km^2	0.386	mi^2
nCi	0.001	pCi	pCi	1,000	nCi
oz	28.35	g	g	0.0353	oz
pCi/l	10^{-9}	µCi/ml	µCi/ml	10^{9}	pCi/l
pCi/m^3	10^{-12}	Ci/m^3	Ci/m^3	10^{12}	pCi/m^3
pCi/m^3	10^{-15}	mCi/cm^3	mCi/cm^3	10^{15}	pCi/m^3
ppb	0.001	ppm	ppm	1,000	ppb
ton	0.907	metric ton	metric ton	1.102	ton
yd^3	0.7641	m^3	m^3	1.308	yd^3

MEASUREMENTS AND CONVERSIONS

Table MC-2. Names and Symbols for Units of Measure

LENGTH	
Symbol	**Name**
cm	centimeter (1×10^{-2} m)
ft	foot
in.	inch
km	kilometer (1×10^{3} m)
m	meter
mi	mile
mm	millimeter (1×10^{-3} m)
µm	micrometer (1×10^{-6} m)
VOLUME	
Symbol	**Name**
cm^3	cubic centimeter
ft^3	cubic foot
gal.	gallon
$in.^3$	cubic inch
l	liter
m^3	cubic meter
ml	milliliter (1×10^{-3} l)
ppb	parts per billion
ppm	parts per million
yd^3	cubic yard
RATE	
Symbol	**Name**
Ci/yr	curies per year
cm^3/s	cubic meters per second
ft^3/s	cubic feet per second
ft^3/min	cubic feet per minute
gpm	gallons per minute
kg/yr	kilograms per year
km/h	kilometers per hour

Table MC-2. Names and Symbols for Units of Measure (Continued)

RATE	
Symbol	**Name**
mg/l	milligrams per liter
mgy	million gallons per year
mly	million liters per year
m^3/yr	cubic meters per year
mi/h or mph	miles per hour
µCi/l	microcuries per liter
pCi/l	picocuries per liter
tpy	tons per year
mty	metric tons per year
NUMERICAL RELATIONSHIPS	
Symbol	**Meaning**
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to
2σ	two standard deviations
TIME	
Symbol	**Name**
d	day
h	hour
min	minute
nsec	nanosecond
s	second
yr	year
ELECTRICITY	
Symbol	**Name**
gwh	gigawatt-hour
mw	megawatt

MEASUREMENTS AND CONVERSIONS

Table MC-2. Names and Symbols for Units of Measure (Continued)

AREA	
Symbol	**Name**
ac	acre (640 per mi^2)
cm^2	square centimeter
ft^2	square foot
ha	hectare (1×10^4 m^2)
$in.^2$	square inch
km^2	square kilometer
mi^2	square mile
MASS	
Symbol	**Name**
g	gram
kg	kilogram (1×10^3 g)
mg	milligram (1×10^{-3} g)
µg	microgram (1×10^{-6} g)
ng	nanogram (1×10^{-9} g)
lb	pound
ton	metric ton (1×10^6 g)
oz	ounce
TEMPERATURE	
Symbol	**Name**
°C	degrees Celsius
°F	degrees Fahrenheit
°K	degrees Kelvin
SOUND/NOISE	
Symbol	**Name**
dB	decibel
dBA	A-weighted decibel

Table MC-3. Names and Symbols for Units of Radioactivity

RADIOACTIVITY	
Symbol	**Name**
Ci	curie
cpm	counts per minute
mCi	millicurie (1×10^{-3} Ci)
µCi	microcurie (1×10^{-6} Ci)
nCi	nanocurie (1×10^{-9} Ci)
pCi	picocurie (1×10^{-12} Ci)

MEASUREMENTS AND CONVERSIONS

Table MC-4. Radionuclide Nomenclature

SYMBOL	RADIONUCLIDE	HALF-LIFE	SYMBOL	RADIONUCLIDE	HALF-LIFE
Am-241	americium-241	432 yr	Pu-241	plutonium-241	14.4 yr
H-3	tritium	12.26 yr	Pu-242	plutonium-242	3.8×10^5 yr
Mo-99	molybdenum-99	66 hr	Pu-244	plutonium-244	8.2×10^7 yr
Pa-234	protactinium-234	6.7 hr	Th-231	thorium-231	25.5 hr
Pa-234m	protactinium-234m	1.17 min	Th-234	thorium-234	24.1 d
Pu-236	plutonium-236	2.9 yr	U-234	uranium-234	2.4×10^5 yr
Pu-238	plutonium-238	87.7 yr	U-235	uranium-234	7×10^8 yr
Pu-239	plutonium-239	2.4×10^4 yr	U-238	uranium-238	4.5×10^9 yr
Pu-240	plutonium-240	6.5×10^3 yr			

Table MC-5. Elemental and Chemical Constituent Nomenclature

SYMBOL	CONSTITUENT	SYMBOL	CONSTITUENT
Ag	silver	Pa	protactinium
Al	aluminum	Pb	lead
Ar	argon	Pu	plutonium
B	boron	SF_6	sulfur hexafluoride
Be	beryllium	Si	silicon
CO	carbon monoxide	SO_2	sulfur dioxide
CO_2	carbon dioxide	Ta	tantalum
Cu	copper	Th	thorium
F	fluorine	Ti	titanium
Fe	iron	U	uranium
Kr	krypton	V	vanadium
N	nitrogen	W	tungsten
Ni	nickel	Xe	xenon
NO_{2-}	nitrite ion	Zn	zinc
NO_{3-}	nitrate ion		

2.0 ALTERNATIVES CONSIDERED IN THE CT EIS

This chapter describes the No Action Alternative and the Proposed Action Alternative, together with other alternatives that were considered but not analyzed in detail because they were not reasonable within the context of the NEPA. This chapter also discusses the Preferred Alternative, a subset of the Proposed Action Alternative. As specified in Public Law (PL) 105-119, the disposition of a tract or portions of a tract will not occur if the land is needed for national security mission support or until any necessary environmental restoration or remediation is completed. The DOE recognizes that meeting the conveyance and transfer criteria within the mandated 10-year timeframe may not be possible for all portions of these tracts. This chapter describes the Preferred Alternative, which outlines the potential timing of disposition of the individual tracts based on these criteria. The chapter includes information provided by both of the potential recipients as to their contemplated uses of the subject tracts. The chapter concludes with a comparison of the environmental consequences of the two alternatives analyzed.

The No Action Alternative is analyzed to provide a baseline for comparison with the potential environmental impacts that could result from implementation of the conveyance and transfer of each tract. The DOE is considering a single action alternative to carry out its statutory responsibilities, the Conveyance and Transfer of Each Tract Alternative (the "Proposed Action Alternative"). This alternative involves the consideration of the immediate conveyance or transfer disposition decision of a partial parcel, while delaying the disposition decision for the remainder of the parcel. The proposed DOE action under this alternative is the conveyance or transfer of each tract of land identified as suitable, either in whole or in part, to either Los Alamos County or their designee, or the Secretary of the Interior in trust for San Ildefonso Pueblo. The analysis considers the future contemplated actions by the recipients of parcels of land and the resulting indirect impacts. The DOE has identified its Preferred Alternative, which is a subset of the Proposed Action Alternative. Other alternatives were considered but were dismissed from further detailed analysis as being unreasonable in the context of NEPA because they do not meet the purpose and need for agency action. These various possible alternatives are discussed in the following sections of this chapter. At the close of the chapter, a comparison of the two alternatives analyzed is presented in table form.

2.1 No Action Alternative

The No Action Alternative of not conveying and transferring the subject parcels of land is analyzed in this CT EIS. NEPA implementing regulations require the consideration of an alternative of taking no action on an issue. In this case, the No Action Alternative would be the retention of ownership (for each or all) of the tracts by the Federal Government under the administrative authority of the DOE, and conveyance or transfer actions for each or all of the tracts would not occur. There would be no change anticipated in the overall land use of each of the tracts within the foreseeable future (over the next 10 years), which is consistent with the Preferred Alternative analyzed in the LANL SWEIS. Individual tracts would continue to be used to either support LANL uses (as undeveloped programmatic activity buffer zones; historic, cultural, or environmental preservation areas; future growth areas; or in support of ongoing or similar mission support functions), or the DOE would continue to lease properties to the County for continuance of their current recreational, commercial, or public relations purposes. LANL Environmental Restoration (ER) Project activities would be conducted on the tracts as they become funded in accordance with either existing or similar plans developed with public and stakeholder input. Under this No Action Alternative, both the County and San Ildefonso Pueblo would need to seek other means of meeting their community self-sufficiency requirements and enhancing their economic diversification. A more detailed discussion of the No Action Alternative and how this alternative would result in a continuation of the status quo may be found in the individual tract discussions in Chapters 5 through 14 of this document.

2.2 Proposed Action Alternative

PL 105-119 (the Act) requires the DOE to convey or transfer the parcels of land preliminarily identified as suitable and for which the DOE has clear title within 3 years (36 months) of the enactment of the Act to the parties named, in the manner that they have agreed upon, and for the three future uses identified in the law. Provisions within the Act regarding this action allow the DOE to undertake conveyance or transfer either by the end of the third year after enactment of the Act or to delay a disposition decision for up to 10 years after enactment of the Act, ending November 26, 2007. The reasons provided under the Act to delay an immediate conveyance or transfer of the parcels are (1) that the property is required by the DOE for mission support purposes but may be released from such use within the 10-year period ending November 26, 2007 and/or (2) that the property is environmentally contaminated but may be remediated or restored by November 26, 2007. In the absence of either criterion being met by November 26, 2007, the DOE shall not convey or transfer the individual parcel(s). For the nine parcels that are currently either utilized for a mission-support function or that have some level of environmental contamination, the DOE will consider the potential disposition decision of immediately transferring the portions of a tract—as the “tract” was originally defined by the DOE in the April 1998 Land Transfer Report to Congress (DOE 1998b)—that do not require some level of environmental remediation or restoration or that are unneeded for mission support functions. For the retained portion of the tract there would be a later disposition decision based on whether environmental remediation or restoration or a release from need mission support use could be achieved within the 10-year period allowed under the Act, or a later no action decision would be made by the Secretary of Energy.

The DOE’s proposed action of conveying and transferring land tracts is one that, on the part of the DOE, would involve certain “paper transactions” and certain physical tenant relocation activities. This type of action does not in and of itself generally result in significant environmental effects. Environmental restoration or remediation of the subject tracts identified for potential conveyance or transfer would be the responsibility of the DOE and are expected to be accomplished as currently considered by the DOE in its plan entitled *Accelerating Cleanup: Paths to Closure* (DOE 1998c) and similar plans. It is not anticipated that the cleanup efforts would differ much between the Proposed Action Alternative and the No Action Alternative, with the exception of some decommissioning, decontamination, and demolition actions that are currently part of LANL’s ER Project; some timing of activities (cleanup of some tracts could be accomplished sooner than under the No Action Alternative); and some possible cleanup of floodplain areas. As such, most of the environmental restoration and remediation actions are not unique to the proposed action and do not generally involve significant adverse environmental impacts. However, in considering the full suite of potential impacts that could result from DOE action in implementing the conveyance or transfer of these parcels, the DOE must consider the planned use of the land and the ensuing potential environmental impacts subsequent to the conveyance or transfer of administrative control or ownership. Both the County and San Ildefonso Pueblo have expressed interest in pursuing uses of the parcels for the purposes established by the Act in ways that are potentially different from the manner in which the DOE has used the land over the past 55 years. Therefore, the CT EIS analysis focuses on subsequent indirect impacts of property development and use by the County and by San Ildefonso Pueblo (including their tenants or other third parties) that could only occur if the DOE decides to convey or transfer the subject land tracts.

In order to consider the potential impacts and benefits that could result from use(s) of the 10 tracts after disposition, the contemplated land uses identified by the two potential recipients were considered. These land uses were developed by both potential receiving parties in accordance with their own internal government policies and processes. The land uses identified are not reflective of any DOE plans for the future use of these tracts. The DOE believes that the contemplated land uses encompass a range of reasonable and likely land uses, given the individual tracts' location, physical attributes, and obvious development constraints. Before implementation of any future use of each tract, the sponsoring party would need to comply with all applicable local, State, and Federal laws and regulations. This may include the preparation of project-specific EISs, environmental assessments (EAs), or the equivalent that may be required under State law.

The potential contemplated uses identified for each tract and considered in this CT EIS analysis are as follows:

- **The Rendija Canyon Tract:** cultural preservation or residential development and environmental preservation (natural areas)
- **The DOE Los Alamos Area Office (LAAO) Tract:** residential or commercial development
- **The Miscellaneous Site 22 Tract:** commercial development
- **The Miscellaneous Manhattan Monument Tract:** historic preservation
- **The DP Road Tract (North, South and West):** commercial and industrial development or residential and commercial development
- **The Technical Area (TA) 21 Tract:** commercial and industrial development
- **The Airport Tract:** airport, commercial, and industrial development
- **The White Rock Y Tract:** environmental preservation or cultural preservation
- **The TA 74 Tract:** cultural preservation or environmental preservation
- **The White Rock Tract:** cultural preservation and commercial development or commercial and residential development

Each of the tracts may have existing or future infrastructure uses that include: utility lines, utility support structures, supply wells, storage tanks or structures, water or effluent treatment structures, and transportation routes. The "footprints" for utility treatment facilities and such structures may be expanded in the future, given the potential for increased use demands upon those systems.

New roads may be constructed to facilitate private or public vehicular traffic. Chapters 5 through 14 contain discussions of the land uses for each tract in more detail, including how an individual tract may be divided by two different collocated land uses.

2.3 Preferred Alternative

The DOE has identified the following subset of the Proposed Action Alternative, by tract, as its Preferred Alternative. Tracts are listed below in an approximate order of potential timing of disposition; the actual order of tract disposition may be slightly different. Consistent with PL 105-119, the actual disposition of each tract, or portion of a tract, would be subject to the DOE's continuing or future need for an individual tract, or a portion of the tract, to meet a LANL national security mission support function. This need could result from either direct or indirect activity involvement. Additionally, the disposition of each tract, or portion of a tract, would be subject to the ability of the DOE to complete any necessary environmental restoration or remediation.

The DOE has concluded that significant portions of two tracts (the TA 21 Tract and the Airport Tract) will not be available for conveyance or transfer within the 10-year period specified by PL 105-119. This is due to identified national security operational needs of two facilities within TA 21 and the need for surrounding areas to be retained as security, health, and safety buffer areas. The area of buffer retention is roughly equivalent to about a one-half mile radius from the facility sites and includes portions of the TA 21 Tract and the Airport Tract.

The DOE also recognizes with regard to six of the remaining tracts that meeting the conveyance and transfer criteria within the mandated 10-year timeframe may not be possible for all portions of these tracts. For example, the current national security mission support functions that are conducted on the DOE LAAO Tract and the DP Road Tract could possibly require portions of the tracts to be retained for use beyond the 10-year timeframe established by the Act, although this is considered to be unlikely. Similarly, there may be newly proposed activities at LANL facilities that could require the retention of portions of tracts for national security mission support reasons. One example of this is a proton radiography project that recently has been proposed for consideration through the DOE's fiscal year 2001 budget. The DOE will evaluate this project over the next several months to determine whether the project should proceed. The project evaluation will include a NEPA analysis that considers alternatives to the proposed actions, which will then be used to inform a project decision(s). Engaging in this proposed project could result in an expanded security, health, and safety buffer area(s) being required that may intrude upon one or more of the tracts under consideration for disposal. Because the White Rock Y Tract is the nearest subject tract to one of the alternative LANL locations that will likely be evaluated for the proton radiography project, the DOE ultimately could require that this tract be reduced to a partial tract status for disposition. In this case, only essential areas would be retained, and the remainder of the tract would likely be conveyed or transferred.

Further uncertainty regarding the DOE's ability to convey or transfer all of the tracts results because some portions of the six tracts have associated contamination issues. Those portions of the tracts may potentially require environmental restoration or remediation that could be technically difficult to achieve or that could require more than the 10-year period established under the Act for completion of these actions. The LANL ER Project process, which includes input from stakeholders and approval by the Administrative Authority(s), will proceed with the anticipation of completing the necessary environmental restoration and remediation actions by the end of the year 2007. However, the DOE recognizes that some tracts that have contamination issues are going to consume more time and resources and be more expensive to clean up because the cleanup technical strategy could change from those currently planned by the ER Project. For example, in the case of the TA 21 Tract, the regulatory authority(s) could require exhumation of material disposal sites on that tract, rather than the currently planned capping, long-term monitoring strategy, and possible exhumation strategy. Further, it is not certain that cleanup of all of this tract is technically feasible. Reaching agreement on the cleanup approach and conducting the necessary testing and remedial action could be a lengthy process. The extra funding required for such a change in the planned cleanup also may require the appropriation of additional funding from Congress. In other cases, some tracts include portions of canyon floodplains, which could be difficult to remediate. Given such considerations, it may not be possible to complete all of the necessary remediation or restoration actions to release all portions of the subject tracts within the allotted timeframe.

The DOE is confident that it can convey or transfer in whole two tracts in the near term; these two tracts are not currently used nor are they anticipated to be needed in the future for national security mission support needs. Although one of the tracts has a minor surface disposal site, it can easily be remediated within a short period of time. These two tracts are the Miscellaneous Manhattan Monument Tract and the Miscellaneous Site 22 Tract.

The Preferred Alternative for conveyance and transfer of the 10 land tracts identified as potentially suitable, per the criteria established in PL 105-119, is as follows (within each grouping no order of conveyance and transfer is intended):

Convey or Transfer Entire Tract in the Year 2000, or Soon Thereafter:

- Miscellaneous Manhattan Monument Tract
- Miscellaneous Site 22 Tract

Convey or Transfer Entire Tract or Partial Tract (Portions of Tract Without Potential Contamination Issues or Mission Support Concerns) in the Year 2000, or Soon Thereafter, But Before the End of the Year 2007:

- DOE LAAO Tract
- White Rock Tract
- Rendija Canyon Tract
- TA 74 Tract
- DP Road Tract
- White Rock Y Tract

Convey or Transfer Partial Tract (Portions of Tract Without Potential Contamination Issues or Mission Support Concerns) at a Later Time, But Before the End of the Year 2007:

- TA 21 Tract
- Airport Tract

For the tracts that are conveyed in part, the DOE would continue to resolve outstanding national security mission support issues and any contamination cleanup required on the remaining portions of the tracts so that conveyance or transfer of those portions could occur before the end of the 2007 deadline stated in the Act. The six tracts with possible partial tract conveyances or transfers are discussed individually in more detail in the following paragraphs.

The DOE LAAO Tract is partially occupied by the DOE Los Alamos Area Office Building and parking lot area that currently houses about 120 DOE staff and contractor staff personnel. The site also has three small potential release sites (PRSs) that have already been remediated, although the remediation has not yet received regulatory concurrence. There are two tract buildings that may require decontamination and decommissioning (D&D) as well. The duration of these efforts is estimated to involve up to about 18 months and cost from about $4,253,000 to about $9,680,000.

The White Rock Tract has no known PRSs within its boundaries that would require remediation or restoration. However, the tract is bisected by a floodplain area that has not yet been sampled for possible contaminants. Investigation of the floodplain must be conducted, and although it is not anticipated that levels of site contamination would warrant remediation, some remediation may nevertheless be required. The duration of these efforts is estimated to involve up to about 16 months and cost from about $954,000 to about $3,374,000.

The Rendija Canyon Tract has four PRSs within its boundaries; three of these sites have already been remediated and restored although the remediation has not yet received regulatory concurrence. The tract also is bisected by a floodplain area in which sampling efforts must be conducted, and some areas of site remediation may be warranted. The duration of remediation is estimated to involve up to about 30 months and cost from about $19,053,000 to about $20,462,000.

The TA 74 Tract has four PRSs within its boundaries; all four of these sites have already been remediated and restored although the remediation has not yet received regulatory concurrence. The tract also is bisected by floodplain areas in which sampling efforts must be completed, and site remediation may be warranted. The tract could continue to receive contamination from upstream areas, so additional offsite investigation and remediation also may be warranted. The duration of tract remediation is estimated to involve up to about 22 months and cost from about $3,683,000 to about $215,666,000.

The DP Road Tract is occupied by two large buildings: one that is used for the LANL archive storage and one that is used for a contractor support facility. Additionally, the tract has 10 PRSs within its boundaries and eight small structures. Two of the PRSs have already been remediated and restored, and the remediation has received regulatory concurrence; the others remain under investigation or have been remediated and are awaiting regulatory concurrence. The tract also shares a floodplain area with the Airport Tract along DP Canyon, where cleanup is warranted. The duration of remaining investigation and possible site remediation is estimated to involve up to about 84 months and cost from about $26,986,000 to about $29,070,000.

The White Rock Y Tract has no PRSs within its boundaries. However, the tract is bisected by a floodplain area in which sampling efforts must be conducted, and some areas of site remediation may be warranted. The tract could continue to receive contamination from upstream areas, so additional offsite investigation and remediation also may be warranted. The duration of remediation is estimated to involve up to about 24 months and cost from about $1,880,000 to about $10,424,000.

The environmental impacts of the Preferred Alternative, based on current information, would be expected to be between those presented for implementation of the Proposed Action and the No Action Alternatives for each tract. The impacts of these actions are discussed in following sections.

2.4 Alternatives Considered But Eliminated from Detailed Analysis

Alternative actions that were considered but not analyzed in detail are discussed in the following paragraphs. These alternative actions include

- Conveyance or transfer to parties other than those identified by the Act (see Section 2.4.1)
- Conveyance or transfer of the 10 tracts to other Federal agencies, such as the U.S. Department of the Interior, National Park Service (NPS), or the U.S. Department of Agriculture, U.S. Forest Service (USFS) (see Section 2.4.2)
- Conveyance or transfer of tracts with the retention of those tracts or portions of tracts with identified sensitive resources (such as wetlands, cultural or historic resources, or threatened or endangered species) (see Section 2.4.3)
- Conveyance or transfer of parcels with cultural and natural resources to other Federal agencies whose jurisdiction includes management of these resources at a level consistent with or greater than is currently performed by the DOE (see Section 2.4.4)
- Retention by the DOE of areas where the contemplated land use would be in conflict with surrounding land uses (see Section 2.4.5)
- Conveyance or transfer of two parcels of land not included in the April 1998 Land Transfer Report (DOE 1998b) (namely, the so-called University Site on State Road 4 and the Research Park Phase II site) (see Section 2.4.6)
- The deletion the 25-acre (10-hectare) “DP South” Tract from the DP Road Tract and the eastern three-fourths of the 260-acre (105-hectare) TA 21 Tract from the scope of the CT EIS (see Section 2.4.7)
- Maintaining assistance payments and not engaging in land conveyance or transfer (see Section 2.4.8)

2.4.1 Conveyance or Transfer to Parties Other than Those Identified by the Act

The conveyance or transfer of the 10 subject tracts to parties other than those identified by the Act was considered. The named recipients under the Act are the Incorporated County of Los Alamos (or their designee) and the Secretary of the Interior, in trust for San Ildefonso Pueblo. Therefore, the conveyance or transfer of the subject tracts to parties other than those two named in the Act would not allow the DOE to meet its need to comply with the requirements of the Act. Potential impacts that might be associated with the development and use of the 10 subject tracts by parties other the County and San Ildefonso Pueblo would likely be very similar in nature to those that are analyzed in the CT EIS for the conveyance or transfer to those two parties. The two parties named in the Act to receive the property propose uses that are representative of both private-sector individuals or corporations and of other area Federal agencies. For individual tracts, the potential for individual resource area impacts may be either less than or greater than those analyzed in the CT EIS, but would likely not result in vastly different cumulative impacts than those analyzed. This alternative is not analyzed further in this CT EIS.

2.4.2 Conveyance or Transfer to Other Federal Agencies

A suggested alternative of transferring the 10 tracts to other area Federal agencies, such as the NPS (U.S. Department of the Interior) or the USFS (U.S. Department of Agriculture), was considered. A portion of the 10 parcels are proposed for transfer to the Secretary of the Interior, under the direct management of the Bureau of Indian Affairs, to be held in trust for the San Ildefonso Pueblo. The remaining parcels of land would convey to a non-Federal Government entity, the County of Los Alamos. Transferring all 10 tracts to either the U.S. Department of the

Interior, either in trust for San Ildefonso Pueblo or for other potential agency use, or to another Federal Government agency would not comply with the requirements of the Act. Although such an action could possibly delay their ultimate conveyance, it may not preclude it because all government agencies are being asked to identify and convey or transfer lands that are not necessary for their mission use.

The USFS has management responsibility for lands within the Santa Fe National Forest. Their management is directed toward the wise use of land and resources under multiple use and sustained yield principles in order to provide optimum, long-term public benefits. The Santa Fe National Forest strives to meet the needs and desires of present and future generations. Existing uses of Santa Fe National Forest lands surrounding the Los Alamos townsite include tourism, mining, recreational activities (including hiking, hunting, fishing, camping, climbing, and skiing), and other traditional uses including firewood gathering and cutting of trees for vigas and latillas. The NPS, Bandelier National Monument (BNM) manages lands south and east of lands managed by the DOE and the town of Los Alamos. The lands managed by BNM are managed to protect and preserve all cultural and natural resources and provide opportunities for visitor understanding and enjoyment of those resources in a manner that preserves these resources for future generations. People visit BNM to hike, backpack in the wilderness, camp, picnic, visit the ruins, learn about the ancient and current Pueblo Indian culture, and enjoy the peace and special ambiance of the monument. While these properties could be used by the surrounding area Federal agencies to meet their mission support requirements, they are not known to be vital to these agencies' mission use needs.

In the usual course of events, unneeded government real properties are turned over to the General Services Administration (GSA) for disposal. Other Federal agencies are first notified of the availability of the land and, if another Federal usage need is identified, GSA would then arrange for the administrative control of the land to be turned over to that Federal agency for their use. Next in line for disposal of real estate would be State and local agencies and eligible nonprofit organizations for specified public uses. Purchase of the property at fair market value under competitive sale for unrestricted use is the last resort of the GSA for disposal of surplus land. Assuming that the land parcels were transferred to another Federal agency that identified the land as surplus and employed the GSA disposition process, then the potential impacts from use of the parcels would likely be very similar to those analyzed. This alternative is not analyzed further in this CT EIS.

2.4.3 Conveyance or Transfer Except for Tracts with Sensitive Resources

The conveyance or transfer of parcels while retaining those tracts or portions of tracts with identified sensitive resources (such as wetlands, cultural or historic resources, or threatened or endangered species) was considered. Under this alternative, the DOE would not meet its need to comply with the requirements of the Act, nor would it meet its requirement to comply with the *Endangered Species Act* (ESA) of 1973. Potential mitigations for dealing with sensitive resources present on the parcels will be included in the mitigations recommended by this CT EIS, although the DOE will not, in all cases, be responsible for seeing that these are carried out by the named recipients. Retaining these parcels or portions of parcels with sensitive resources would likely result in similar impacts to those potentially encountered by the conveyance and transfer of the land, although perhaps not on the same scale as identified by the contemplated land uses. If the DOE retained a portion of a tract and conveyed or transferred the remainder of the tract, enforcement of protection of the retained portion would be very burdensome to the agency and perhaps effectively impossible. Such action would likely require fencing of the sites, which would effectively notify the public as to the location of these resources. Fencing of these sites could result in additional taking of threatened or endangered species or site disturbance and potential illegal pot-hunting actions by the public if archeological resources are present. This alternative is not analyzed further in this CT EIS.

2.4.4 Conveyance or Transfer of Tracts with Cultural and Natural Resources to Other Federal Agencies

The transfer of all of the parcels with cultural and natural resources to other Federal agencies having administrative and legal capabilities to manage these resources to a level consistent with or greater than is currently performed by the DOE was considered as an alternative. This alternative would not allow the DOE to meet its requirements under the Act. As already mentioned, it is likely that other Federal agencies would ultimately dispose of the land, and similar potential impacts analyzed in this CT EIS would still occur in the future. This is because a less stringent level of protection to threatened and endangered species is required of non-Federal Government agencies under the ESA; very little protection to archeological, cultural, or historic sites is afforded under the various applicable laws by non-Federal Government entities. This alternative is not analyzed further in this CT EIS.

2.4.5 DOE Retention of Areas with Conflicting Land Uses

Retention by the DOE of areas where the proposed land use is in conflict with surrounding land uses was considered. Such an alternative would not allow the DOE to meet the requirements set forth in the Act. Due to the manner in which the Los Alamos County area was developed, there are many areas of incongruent land use. In this case, the identified contemplated land uses are consistent with neighboring land uses, so the issue is moot. This alternative is not analyzed further in this CT EIS.

2.4.6 Convey or Transfer Two Parcels Not in Land Transfer Report

The conveyance or transfer of two parcels of land not included in the April 1998 Land Transfer Report (DOE 1998b) (namely, the so-called University Site on State Road 4 and the Research Park Phase II site) was considered.

The DOE and LANL have reviewed contemplated future mission requirements. The conclusion of months of analysis has indicated that the 10 parcels of land named in the April 1998 Land Transfer Report to Congress identified the parcels of land that could potentially qualify for conveyance and transfer. The two parcels suggested for inclusion in the CT EIS analysis were determined to be required for mission support uses beyond the 10-year period designated in the Act. This alternative is not analyzed further in this CT EIS.

2.4.7 Deletion of Two Tracts from CT EIS Scope

The suggested deletion of two portions of tracts from the scope of the CT EIS (namely, the 25-acre [10-hectare] "DP South" Tract and the eastern three-fourths of the 260-acre [105-hectare] TA 21 Tract) was reviewed. DOE and LANL management resources have carefully reviewed the mission requirements and the land and facility use needs of each organization at the LANL site.

The two tracts recommended for exclusion were identified as potentially being suitable for transfer at some time prior to November 26, 2007. Making what would be essentially a no action determination on these parcels at this time is inappropriate. This alternative is not analyzed further in this CT EIS.

2.4.8 Reinitiate Assistance Payments Without Conveyance or Transfer

Reinitiating assistance payments to the County and not effecting the conveyance or transfer of the preliminarily identified parcels was an alternative considered that would not meet the letter or intent of the Act. The environmental impacts of such an alternative are inherently considered in the analysis of the No Action Alternative. Such action on the part of the DOE would require additional congressional legislation before it could be undertaken. This alternative was not analyzed further in this CT EIS.

2.5 Comparison of Environmental Consequences of the No Action Alternative and the Proposed Action Alternative

2.5.1 Environmental Impacts

The environmental impacts of the proposed conveyance and transfer of the 10 land tracts are described below. The assumptions associated with the analysis of impacts are provided. The impacts are broken out into direct and indirect impacts. The impacts of the No Action Alternative are compared to the impacts projected to result from implementation of the Proposed Action Alternative in Table 2.5.1-1 (at the end of this chapter). As an aide to the reader, a second table (Table 2.5.1-2) is provided that presents a summary of the impacts of the Proposed Action Alternative on a tract-by-tract basis. The environmental impacts of the Preferred Alternative, based on current information, would be expected to be between those presented for implementation of the Proposed Action and the No Action Alternatives for each tract.

2.5.1.1 Analysis of Impacts

The land tracts are part of LANL with the exceptions of the Rendija Canyon and Miscellaneous Manhattan Monument Tracts. Because the tracts are part of or near LANL, the information contained in the LANL SWEIS (DOE 1999c) analysis is used with regard to environmental resources or existing conditions in the CT EIS. The four alternatives analyzed in the SWEIS relate to varying levels of operations at LANL. The TA 21 Tract has the only facilities analyzed in the SWEIS that are located on the subject tracts, while the other tracts are either excluded from the SWEIS analysis or remain unchanged in land use across the SWEIS alternatives. The SWEIS Preferred Alternative is used as the basis for the CT EIS No Action Alternative because it provides a reasonable upper “bounding analysis” of impacts regarding those resources of concern. This approach assures that the CT EIS has not underestimated the potential impacts that may result from the conveyance and transfer of the subject tracts.

Implementing the SWEIS Preferred Alternative would maximize use of electric power due to expanded LANL operations; more people being hired, mostly for long-term employment; and more LANL workers being exposed to radioactive materials and processes. In particular, the level of use of utilities (such as electricity and natural gas), waste management and disposal facilities, and groundwater resources are greater in the SWEIS Preferred Alternative.

Timeframe of Analyses

The schedule for conveyance or transfer of each tract, either in whole or in part, and the potential recipient’s eventual development of the tracts cannot be accurately determined at this time. Therefore, the relation of those schedules to the schedule for full implementation of the activities described in the SWEIS Preferred Alternative also cannot be evaluated. In order to provide bounding analyses, it is assumed in this CT EIS that the SWEIS Preferred Alternative has already been fully implemented, and all of the tracts are conveyed or transferred and developed within the next 10 years. This assumption, while ensuring the analyses of impacts bound those likely to occur, may be overly conservative in some cases. Those cases where the analyses may be overly conservative (for example, in estimating when utility demand may exceed capacities) will be identified.

Direct and Indirect Impacts

Once the land tracts are conveyed or transferred, they will pass beyond the administrative control of the DOE. All subsequent use of the land will be independent of the DOE. Therefore, for the purpose of this CT EIS, all impacts associated with actions that would be undertaken by the DOE due to the proposed conveyance and transfer of the land tracts are described as direct impacts. All subsequent impacts resulting from actions undertaken by the recipients after the proposed conveyance and transfer of the tracts are described as indirect impacts.

2.5.1.2 Comparison of Direct Impacts

A comparison of the impacts of the No Action Alternative and the impacts projected to result from implementation of the Proposed Action Alternative are presented in Table 2.5.1-1. The direct and indirect impacts of the Proposed Action Alternative are also discussed below. The impacts of the No Action Alternative are detailed where they differ from those presented in the SWEIS.

The direct impacts of the proposed conveyance and transfer of the subject tracts consist of those associated with the relocation of DOE LANL operations and personnel who currently reside on the various tracts. Employees requiring relocation could be moved to existing buildings on other parts of LANL property, or new buildings could be constructed. These plans are not ripe for decision. Any decision regarding construction of new facilities would be preceded by appropriate NEPA review.

There would be no difference in direct impacts between the conveyance and transfer of the tracts and the No Action Alternative in infrastructure, noise, visual resources, socioeconomics, geology and soils, water resources, or human health.

The differences between the direct impacts of the conveyance and transfer of the tracts and the No Action Alternative in land use, transportation, ecological resources, cultural resources, and air resources are discussed by affected resource in the following paragraphs.

Land Use

Under the No Action Alternative, no specific changes in land use or direct impacts are anticipated. Completion of environmental restoration activities, including decontamination, decommissioning, and possible demolition of DOE facilities may allow possible changes in future land use. Environmental restoration activities would proceed in accordance with existing and developing plans. Worker impacts associated with environmental restoration activities cannot be projected at this time. Environmental restoration activities would be subject to their own DOE NEPA review.

Under the Proposed Action Alternative (the conveyance and transfer of the tracts, in whole or in part), no specific changes in land use or direct impacts are anticipated. In general, environmental restoration activities are independent of the conveyance and transfer process; but, the conveyance and transfer scenarios may influence decisions on the timing, cleanup levels, and the inclusion of certain buildings in environmental restoration activities. The waste estimates would be roughly the same as for the No Action Alternative.

Transportation

Under the No Action Alternative, no specific changes in direct impacts in transportation are anticipated.

Direct consequences of the conveyance and transfer of the tracts under the Proposed Action Alternative include small alteration of the overall daily commute. DOE and contractor personnel relocated from the DOE LAAO, TA 21, and DP Road Tracts would have to change their commuting routes. Some DOE and contractor personnel may have a shorter drive to work, those living in White Rock for example; but, most would have farther to travel.

Ecological Resources

Under the No Action Alternative, no specific changes in direct impacts to ecological resources are anticipated.

Direct impacts of the Proposed Action Alternative (the conveyance and transfer of the tracts) are limited to the changes in responsibility for resource protection. Environmental review and protection processes and procedures for future activities would be different from those that are currently governing the subject tracts and may not be as rigorous. The LANL Threatened and Endangered Species Habitat Management Plan would no longer be in effect for those tracts occupied by or containing suitable habitat for endangered species.

Cultural Resources

Under the No Action Alternative, no specific changes in direct impacts to cultural resources are anticipated.

Direct impacts of the Proposed Action Alternative (the conveyance and transfer of the tracts) are limited to the potential transfer of known and unidentified cultural resources and historic properties out of the responsibility and protection of the DOE. Under the Criteria of Adverse Effects (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of resources eligible for listing on the National Register of Historic Places (NRHP) is an adverse effect. NRHP eligible resources are present on nine of the tracts being assessed in this CT EIS and would be directly impacted by the Federal action. The disposition of each of the subject tracts also may affect the protection and accessibility to Native American sacred sites or sites needed for the practice of traditional religion by removing them from consideration under the *American Indian Religious Freedom Act*, the *Religious Freedom Restoration Act*, and Executive Order 13007, "Indian Sacred Sites." In addition, the disposition of the tracts would potentially affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tracts under the *Native American Graves Protection and Repatriation Act*.

Air Resources

Under the No Action Alternative, no specific changes in direct impacts in air resources or global warming are anticipated.

Direct consequences of the Proposed Action Alternative (the conveyance and transfer of the tracts) include small alteration of the overall daily commute. DOE and contractor personnel relocated from the DOE LAAO, TA 21, and DP Road Tracts would have to change their commuting routes. Some DOE and contractor personnel (for example, those living in White Rock) may have a shorter drive to work; but, most would have farther to travel. This would result in slightly greater emissions.

2.5.1.3 Comparison of Indirect Impacts

Indirect impacts are anticipated from the subsequent uses contemplated by the receiving parties for several of the 10 tracts (see Table 2.5.1-2). The receiving parties have identified a combination of contemplated uses for the tracts after conveyance or transfer. These uses include development of part or all of some of these tracts. Estimates of the development acreage reflect the best available information on the footprint of the contemplated developments. This acreage may include the redevelopment of disturbed land as well as the new use of relatively undisturbed areas. The impact analysis assumes that these footprints represent an approximation of areas that would be developed but that may not include all areas that would otherwise be disturbed. Likewise, there are no specific acreage estimates for land that may be disturbed or developed for land uses that include undefined improvements to utilities or recreational areas. These areas are qualitatively addressed in the impact analysis.

Land Use

Under the No Action Alternative, no specific changes in land use or indirect impacts are anticipated.

Under the Proposed Action Alternative, the indirect impacts of the conveyance and transfer of the tracts include regional changes in land use, such as the development of forest, grazing, and open-space land for residential and commercial uses. Future land use patterns could change on several tracts. Approximately 826 acres (335 hectares) of the total acreage proposed for transfer and conveyance could be developed or redeveloped for other uses.

There is the potential for the introduction of land uses that would be incompatible with adjacent landowners' resource protection efforts. There may be loss of recreational opportunities currently enjoyed on some tracts.

While cumulative impacts to land use affect only a small percentage of the total region, many of the anticipated impacts are concentrated in the vicinity of Los Alamos, LANL, and White Rock and therefore could appear substantial.

Transportation

Under the No Action Alternative, no specific changes or indirect impacts in transportation are anticipated.

Under the Proposed Action Alternative (the conveyance and transfer of the tracts), commercial, industrial, and residential developments would greatly increase the number of trips generated. Peak-hour traffic entering or exiting 6 of the 10 tracts could increase by a range of approximately 751 to 3,775 trips. There could be a positive regional traffic impact in that more LANL employees could live in Los Alamos and reduce the overall commuter traffic from other areas.

Cumulative impacts to regional transportation include substantial increases in overall regional and local traffic that would require improvements to traffic controls, new roads, road widening, and bridges. The anticipated impacts to transportation would be expected to be concentrated near the Los Alamos townsite and the LANL area.

Infrastructure

Under the No Action Alternative, the electrical system is already at the limits of its capacity. With the addition of the Strategic Computing Complex (SCC) and other regional developments, the electric power demand will exceed system capacity.

Under the Proposed Action Alternative, the total estimated increases in utility usage associated with the development of the tracts would be as follows:

- Electricity use: 32 gigawatt-hours (gwh)
- Peak power: 6 megawatts (mw)

- Natural Gas: 459 million cubic feet (mcf) (13,000 million liters per year [mly])
- Water: 382 million gallons per year (mgy) (1,446 mly)
- Solid Waste: 2,385 tons per year (tpy) (2,163 metric tons per year [mty])

Increases in discharges to wastewater treatment plants could be 132 mgy (500 mly) for the Bayo Wastewater Treatment Plant and 41 mgy (155 mly) for the White Rock plant.

The increase in peak electricity demand is in addition to the already anticipated exceedance of the capacity of the electrical power system. Water usage demand is projected to exceed water rights. The natural gas delivery systems may have to be upgraded to handle the increased demand. The existing wastewater treatment capacity is expected to be exceeded. Solid waste production is expected to reduce the expected life of the regional landfill. However, given the conservative assumptions used in the calculations and the phased development of the tracts, the actual utility usage may not reach capacity limits within the next 10 years.

Noise

Under the No Action Alternative, no specific changes in indirect impacts in noise are anticipated.

Under the Proposed Action Alternative, ambient noise levels would be expected to increase above current levels for most of the contemplated land uses. Ambient noise levels associated with cultural preservation may decrease, and noise levels associated with natural areas would be expected to remain the same or increase slightly. Noise associated with transportation and utility corridors would remain the same or could increase with additional infrastructure construction and use. Demolition and construction activities would be expected to temporarily elevate noise levels on the tracts from the No Action Alternative levels to a range of 74 to 95 decibels (dB) on the A-weighted scale (dBA). Residential uses typically would result in ambient noise levels between 50 and 70 dBA depending on traffic, density, and location. Commercial and industrial land uses typically would result in 60 to 70 dBA. Noise would be present during a greater part of the day than currently on the tracts that are developed for residential, commercial, and industrial land uses. Overall noise from vehicular traffic would increase.

Visual Resources

Under the No Action Alternative, no specific changes in indirect impacts in visual resources are anticipated.

Under the Proposed Action Alternative, most of the tracts would maintain their current level of visual aesthetic value after conveyance and transfer and any subsequent development. However, the development of currently undeveloped areas, such as the Rendija Canyon and White Rock Tracts, would typically degrade the visual landscape. The reduction in visual quality would not be substantial on a regional scale, but local diminished viewsheds could impact resources important to maintaining a positive visitor experience on adjacent NPS lands.

Socioeconomics

Under the No Action Alternative, no specific changes in indirect impacts in socioeconomics are anticipated.

Under the Proposed Action Alternative, short-term economic gains would be expected from employment due to construction activities for new development. Long-term gains would depend on the intensity and success of the development. Depending on the scenarios implemented, 320 businesses could be developed on the tracts, employing up to 6,080 workers and generating a total of 8,957 jobs within the region of influence (ROI). As many as 2,360 residences could be placed on the tracts, increasing White Rock and Los Alamos population by 6,620 residents.

Overall impacts to employment, income, population, and housing would be minor within the ROI, but would be concentrated in the Los Alamos area. Improvements would be expected in the Los Alamos County tax base but would probably not offset the loss of assistance payments, according to information provided by the County (see Chapter 18, Section 18.1).

Ecological Resources

Under the No Action Alternative, no specific changes in indirect impacts in ecological resources are anticipated.

Under the Proposed Action Alternative, development footprints for the 10 tracts include approximately 770 acres (312 hectares) of relatively undisturbed habitat, primarily ponderosa pine forest and pinyon-juniper woodland. Contemplated uses also would be expected to degrade large amounts adjacent habitat, including preferred habitat for the American peregrine falcon and the Mexican spotted owl.

Highly mobile wildlife would be forced to relocate to adjacent undeveloped areas. However, successful relocation may not occur due to increased competition for limited resources. For less-mobile species, direct mortality could occur during the actual construction or from habitat alteration. Habitat modification could affect several Federal-listed threatened and endangered species. Development in some tracts could result in direct loss of wetland structure and function with potential increased downstream and offsite sedimentation. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- or long-term natural resource management strategies. Additionally, transfer of the land tracts may result in a much less rigorous environmental review and protection review process for future activities because neither the County of Los Alamos nor the Pueblo of San Ildefonso have regulations that would match the Federal review and protection process. Cumulatively, the development could result in fragmentation of habitat and disruption of wildlife migration corridors.

Cultural Resources

Under the No Action Alternative, no specific changes in indirect impacts in cultural resources are anticipated.

The development of approximately 826 acres (335 hectares) and use of tracts for recreation under the Proposed Action Alternative could result in physical destruction, damage, or alteration of cultural resources on the subject tracts and in adjacent areas and disturbance of traditional religious practices.

Geology and Soils

Under the No Action Alternative, no specific changes in indirect impacts in geology and soils are anticipated.

Under the Proposed Action Alternative, soil would be disturbed by development, new road building, and utilities. Removal of vegetation and increased runoff from new impermeable surfaces could increase erosion. The cumulative impacts to geology and soils would be insubstantial.

Water Resources

Under the No Action Alternative, no specific changes in indirect impacts in water resources are anticipated.

Under the Proposed Action Alternative, supplies of groundwater would be reduced, potentially accelerating drawdown of the main aquifer. Placement of new water supply wells could impact groundwater quality. New development could potentially degrade the surface water quality by increasing the pollutant loads and surface runoff volumes from construction activity, and by creating additional impermeable surfaces such as roads and parking lots.

Air Resources

Under the No Action Alternative, no specific changes in indirect impacts in air resources are anticipated.

Under the Proposed Action Alternative, there would be increases in criteria pollutants from mobile sources and homes using natural gas or propane. Slight increases in emissions of hazardous air pollutants would be expected from the development of new industrial facilities. The current contributions to global climate change from the land tracts would increase more than 25-fold over the No Action Alternative due to motor vehicle traffic and residential use of fossil fuels. Additional use of artificial lighting could impact the visibility of the night sky.

Human Health

Under the No Action Alternative, no specific changes in indirect impacts in human health are anticipated.

Under the Proposed Action Alternative, as many as 900 new residents could be brought into closer proximity to LANL facilities at the DOE LAAO and DP Road Tracts, and another 2,200 residents and lodgers at the White Rock Tract. Commercial development could bring as many as 6,000 private-sector employees into existing one-half mile radiation site evaluation circles at the DP Road, TA 21, and Airport Tracts (discussion of these “circles” is provided in Chapter 4, Section 4.2.12.2). While the maximally exposed individual doses would not increase, these developments would mean increased total population exposures to radiological and chemical emissions from normal LANL operations and hypothetical accidents. A substantial increase in the public collective radiation dose and latent cancer fatalities would result. Risk of developing excess latent cancer fatalities on the subject tracts from accident events could maximally increase from about 57 excess cancer deaths to about 98 excess cancer deaths.

Development of the tracts by the recipients would involve construction with its attendant risks to workers. Should the development include industrial activities, these activities would involve commensurately greater worker risks.

Environmental Justice

There would be no impact to environmental justice under the No Action Alternative. Under the Proposed Action Alternative, there would be no direct adverse effects on minority or low-income populations. Any indirect effects would be specific to each land tract, not to populations, and could include possible disruption of traditional wood gathering activities. Indirect impacts to traditional cultural properties (TCPs) potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process. The Homesteaders Association of the Pajarito Plateau (as regards all of the subject tracts) and legal counsel for the Pueblo of San Ildefonso (as regards four specific tracts) have expressed their opinions that the conveyance and transfer of these tracts and their subsequent contemplated uses would have additional environmental justice impacts on their populations.

2.1.2 Mitigation Measures

Mitigations are actions or activities that can be taken to avoid, minimize, rectify, or compensate for anticipated impacts.

2.1.2.1 Mitigations Prior to Conveyance or Transfer

Prior to conveyance or transfer of any of the land tracts, the DOE will initiate cultural resource consultations with the affected Pueblos and tribal nations and the State Historic Preservation Office(r), and complete consultation regarding threatened or endangered species or their habitat with the U.S. Fish and Wildlife Service (USFWS). In the case of conveyance of land tracts to the County, the DOE may include deed restrictions precluding any development within the 100-year floodplains or wetlands, consistent with the provisions of PL 105-119.

2.1.2.2 Recommended Mitigations

The DOE will coordinate consultations with the New Mexico State Historic Preservation Office(r), Advisory Council on Historic Preservation, receiving parties, and other interested agencies and parties to engage consideration of impacts on cultural resources resulting from the conveyance and transfer of the subject tracts from the responsibility and protection of the DOE. The goal of these consultations would be a formal Memorandum of Agreement (MOA) addressing the impacts of the potential loss of certain cultural resource protections and DOE responsibilities on the subject tracts, and defining specific procedures and responsibilities for managing cultural resource concerns upon transfer to the receiving parties. For example, the parties could consider the implementation of covenants that would ensure identification of all resources before development, minimization of the impacts to cultural resources, and protection of the rights of Native Americans regarding traditional religious practices. Other agreements among the parties could include development of agreements concerning threatened or endangered species habitat, integrated resource management plans, integrated emergency response plans, and future land use options.

2.1.2.3 Potential Resource-Specific Mitigations

Chapter 16 provides a large list of potential mitigation measures that were developed for each resource area. The mitigation measures suggest how specific aspects of individual impacts could be avoided or minimized. These potential measures range from seeking additional resources to offset predicted shortfalls in power and water supplies; providing new access and rights of way for neighboring land owners and utilities; and establishing habitat buffer zones through conservation programs, maintenance of natural vegetation, and erosion control; to implementing measures to control dust during construction.

Table 2.5.1-1. Comparison of Impacts of the Alternatives

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Land Use	Current mission support, research and development and LANL activity buffer land uses would continue on the 10 subject tracts.	Implementation of the Proposed Action Alternative would cause regional changes in land use, including the development of forest and open-space land for residential, commercial, and industrial uses and dedication of tracts for cultural preservation or as natural areas. Approximately 826 acres (335 hectares) of the total acreage could be developed or redeveloped for other uses. There is the potential for the introduction of land uses that would be incompatible with adjacent landowners' resource protection efforts. There may be a loss of recreational opportunities associated with changes in land use. While cumulative impacts to land use affect only a small percentage of the total region, many of the anticipated impacts are concentrated in the vicinity of Los Alamos, LANL, and White Rock and, therefore, could appear substantial.
Environmental Restoration	Environmental restoration activities would proceed in accordance with existing and developing plans and would be subject to their own NEPA review. Worker impacts associated with environmental restoration activities cannot be projected at this time. Completion of environmental restoration activities, including decontamination, decommissioning, and possible demolition of DOE facilities on these tracts would result in preliminary projected waste volumes of up to 207,860 cubic yards (158,820 cubic meters). These include 42,300 cubic yards (32,320 cubic meters) for the cleanup of potential release sites (PRSs); 61,970 cubic yards (47,350 cubic meters) for the decontamination and decommissioning (D&D) of structures and 103,590 cubic yards (79,150 cubic meters) for remediation of canyon systems.	Environmental restoration activities are generally independent of the conveyance and transfer process; but, the conveyance and transfer scenarios may influence decisions on the timing, cleanup levels, and the inclusion of certain buildings in environmental restoration activities. The waste estimates would be roughly the same as for the No Action Alternative.

Table 2.5.1-1. Comparison of Impacts of the Alternatives (Continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Transportation	Under the No Action Alternative, traffic generated from tract activities would not change from current levels. Gradual increases in regional traffic levels, especially during peak hours, would be expected to continue due to population growth, other area developments and increases in LANL employment.	As a direct consequence of the Proposed Action Alternative, there would be a small alteration of the overall daily commute for DOE and contractor personnel relocated from the DOE LAAO, TA 21, and DP Road Tracts. Development of the tracts would greatly increase the number of trips generated. Traffic entering or exiting 6 of the 10 tracts during the peak hours would increase by a range of 750 to 3,775 trips per day. Cumulative impacts to regional transportation include substantial increases in overall regional and local traffic that would require improvements to traffic controls, new roads, road widening, and bridges. The anticipated impacts to transportation would be expected to be concentrated near the Los Alamos townsite and the LANL area.
Infrastructure	Under the No Action Alternative, utility demand and infrastructure needs generated by current tract activities would not change from current levels. There would continue to be increases regionally in utility demand and in the need for additional sources, distribution systems and waste disposal infrastructure due to LANL activities and other regional developments. The electrical system is already at the limits of its capacity. The electrical power demand will exceed capacity with the addition of the Strategic Computing Complex. The projected No Action Alternative utility usage is: • Electrical Use: 799 gwh • Peak Power: 116 mw • Natural Gas: 3,273 mcf (92,730 mly) • Water: 1,851 mgy (7016 mly) • Solid Waste: 20,981 tpy (19,028 mty) • Wastewater Sewage: 962 mgy (3,642 mly)	Under the Proposed Action Alternative, assuming full implementation of the contemplated developments on the tracts within 10 years, the total estimated increases in utility usage would be: • Electrical Use: 32 gwh • Peak Power: 6 mw • Natural Gas: 459 mcf (13,000 mly) • Water: 382 mgy (1,446 mly) • Solid Waste: 2,385 tpy (2,163 mty) Increases in discharges could be 132 mgy (500 mly) for the Bayo Wastewater Treatment Plant and 41 mgy (155 mly) for the White Rock Wastewater Treatment Plant. The capacity of the electrical power system will be exceeded. Water usage demand is projected to exceed water rights. Natural gas delivery systems may have to be upgraded to handle the increased demand. The existing wastewater treatment capacity also would be exceeded. Solid waste production is expected to reduce the expected life of the regional landfill.

Table 2.5.1-1. Comparison of Impacts of the Alternatives (Continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Noise	Under the No Action Alternative, noise levels associated with activities on the tracts would remain the same as they are currently. Minor increases in ambient noise would be expected due to anticipated increases in vehicle traffic, regional development and construction, and LANL activities such as explosives testing.	Ambient noise levels would be expected to increase above current levels for most of the contemplated land uses. Ambient noise levels associated with cultural preservation may decrease, and noise levels associated with natural areas would be expected to remain the same or increase slightly. Noise associated with transportation and utility corridors would remain the same or could increase with additional infrastructure construction and use. Demolition and construction activities would be expected to temporarily elevate noise levels on the tracts from the No Action Alternative levels to a range of 74 to 95 dBA. Residential uses typically would result in ambient noise levels between 50 and 70 dBA depending on traffic, density, and location. Commercial and industrial land uses typically would result in 60 to 70 dBA. Noise would be present during a greater part of the day than currently on the tracts that are developed for residential, commercial, and industrial land uses. Overall noise from vehicular traffic would increase.
Visual Resources	Under the No Action Alternative there would be no anticipated changes to visual resources. The visual character of the 10 subject tracts reflect the variety of the Los Alamos region. While some of the tracts include visually discordant elements of developed industrial sites, others include large expanses of natural and undeveloped canyon areas.	Under the Proposed Action Alternative, the scenic class objectives for most of the tracts would be met because the visual character would not change substantially. The visual resources of some tracts may be improved by the removal and replacement of industrial buildings. Development on currently undeveloped tracts would negatively impact visual character. Important viewsheds in the vicinity of BNM could be negatively impacted.

Table 2.5.1-1. Comparison of Impacts of the Alternatives (Continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Socioeconomic	Under the No Action Alternative there would be no change in the employment, income, population, and housing associated with the 10 subject tracts. Regional economic growth and efforts toward self-sufficiency would continue but at a slower rate.	Under the Proposed Action Alternative, short-term economic gains due to construction activities would be expected. Long-term gains would be dependent on the intensity and success of the proposed development scenarios. If implemented, 320 businesses could be developed on the tracts, employing up to 6,080 workers and generating a total of 8,957 jobs within the ROI. As many as 2,360 residences would be placed on the tracts, increasing White Rock and Los Alamos population by 6,620 residents. Overall impacts to employment, income, population, and housing would be minor within the ROI, but would be concentrated in the Los Alamos area. Improvements would be expected in the Los Alamos County tax base but would probably not offset the loss of assistance payments, according to information provided by the County (see Chapter 18, Section 18.1).
Ecological Resources	Under the No Action Alternative, responsibility for ecological resource protection would remain with the DOE, and active management of these resources would continue. Regional growth would reduce the amount of undisturbed habitat and increase pressure on remaining ecological resources.	Under the Proposed Action Alternative, responsibility for ecological resource protection and planning would pass to the receiving parties, who may not have regulations that match the Federal review and protection process. Current resource protection and management plans would not be in effect for the subject tracts. Development or redevelopment of 826 acres (335 hectares), as contemplated by the receiving parties, could result in the heavy modification or destruction of approximately 770 acres (312 hectares) of relatively undisturbed habitat, primarily ponderosa pine forest and pinyon-juniper woodland. Development also would be expected to degrade large amounts of habitat near the developed portion of the land tracts. Habitat would be impacted or lost for Federal-protected species such as the American peregrine falcon and Mexican spotted owl. Habitat destruction would affect wildlife through direct mortality and relocation to other lands.

Table 2.5.1-1. Comparison of Impacts of the Alternatives (Continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Cultural Resources	Under the No Action Alternative, responsibility for cultural resource protection would remain with the DOE, and active management of these resources would continue. Possible impacts from natural processes, vandalism, unauthorized collection of artifacts, and disturbance of traditional places and ceremonies would continue. Resource loss associated with regional development would continue.	Under the Proposed Action Alternative, there would be a transfer of over 254 known cultural resources and historic properties from the management and protection of the DOE. The disposition of the tracts may affect the protection and accessibility to Native American sacred sites or sites needed for traditional practices and the disposition of human remains, funerary objects, sacred objects, and objects of cultural patrimony. The subsequent development or redevelopment of approximately 826 acres (335 hectares) of the tracts could result in physical destruction, damage, or alteration of cultural resources on the subject tracts and in adjacent areas and disturbance of traditional religious practices. Increased access and recreational use could result in resource impacts in an area extending far beyond the development boundaries.
Geology and Soils	Under the No Action Alternative, impacts to geology and soils would be limited to natural effects of erosion, wildfires, and earthquakes.	Under the Proposed Action Alternative, soil would be disturbed in areas where development is planned and adjacent areas. Removal of vegetation and increased runoff from impermeable surfaces could increase erosion on some tracts.
Water Resources	Under the No Action Alternative, there would be no new additional impacts to surface water and groundwater quality and quantity. Increased use of groundwater due to LANL activities and regional growth would continue. New regional construction would increase the potential for degradation of surface water quality due to construction activity and increased pollutant loads and surface runoff volumes.	Contemplated residential, industrial, and commercial development would require an additional 382 mgy (1,446 mly) of groundwater, exceeding water rights, potentially accelerating drawdown of the main aquifer, and impacting amounts of cheaply available water. Placement of new water supply wells could impact groundwater quality. Construction activity and the creation of additional impermeable surfaces during development could impact surface water quality by increasing pollutant loads and runoff volumes.

Table 2.5.1-1. Comparison of Impacts of the Alternatives (Continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Air Resources	Under the No Action Alternative, air quality impacts from the 10 tracts would remain the same. Monitoring by the State Air Quality Bureau has demonstrated that Region 3, which includes the 10 tracts, meets all applicable air quality standards. Expected regional growth and planned LANL activities would not impact air quality.	Under the Proposed Action Alternative, there would be increases in criteria pollutants from mobile sources and homes using natural gas or propane. Slight increases in emissions of hazardous air pollutants would be expected from industrial facilities. Development of the tracts would bring members of the public closer to LANL sources of hazardous, toxic chemical, and radioactive air pollutants. In all cases, health-based air quality standards would not be exceeded. Development would be associated with increased use of artificial light, which could impact the visibility of the night sky.
Global Climate Change	Emissions of greenhouse gases in the Los Alamos region from tract activities would remain the same. Expected regional growth and planned LANL activities would cause minor increases in emissions of greenhouse gases due to the combustion of natural gas, diesel fuel, gasoline, and firewood.	Emissions of greenhouse gases related to tract activities would increase more than 25-fold due to motor vehicle traffic and use of fossil fuels. This would represent a shift of impacts from other areas and would not be an important contribution to global climate change.

Table 2.5.1-1. Comparison of Impacts of the Alternatives (Continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Human Health	There are no identifiable human health consequences of the No Action Alternative. The possible human health impacts of radiation exposure, chemical contaminants, facility accidents and natural event accidents would not be affected by implementation of the No Action Alternative.	Under the Proposed Action Alternative, no discernible individual human health effects are anticipated. As many as 900 new residents could be brought into closer proximity to LANL facilities at the DOE LAAO and DP Road Tracts, and another 2,200 residents and lodgers at the White Rock Tract. Commercial development could bring as many as 6,000 private-sector employees into existing radiation buffer zones at the DP Road, TA 21, and Airport Tracts. While the maximally exposed individual radiation doses would not increase, these developments would mean increased total population exposures to radiological and chemical emissions from normal LANL operations and hypothetical accidents. A substantial increase in the public collective radiation dose and latent cancer fatalities would result. Risk of developing excess latent cancer fatalities on the subject tracts from accident events could maximally increase from about 57 excess cancer deaths to about 98 excess cancer deaths. Development of the tracts by the recipients would involve construction risks to workers and also subsequent risks to workers engaged in industrial activities.
Environmental Justice	There are no high and adverse human health impacts to minorities or low-income populations in the area, and there would be no change under the No Action Alternative.	No direct adverse effects on minority or low-income populations are expected under the Proposed Action Alternative. Indirect impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process. The Homesteaders Association of the Pajarito Plateau (as regards all the tracts) and legal counsel for the Pueblo of San Ildefonso (as regards four specific tracts) have expressed their opinions that the conveyance and transfer actions would have additional environmental justice impacts on their populations.

Notes: gwh = gigawatt-hours, mcf = million cubic feet, mgy = million gallons per year, mw = megawatt, tpy = tons per year, mty = metric tons per year

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Rendija Canyon	Land Use	Natural Areas and Residential	Land use would change. Approximately 570 acres (230 hectares) would be disturbed and developed for single- and multiple-family housing, roadways, and community facilities. Approximately 340 acres (137 hectares) would be reserved as natural areas and dedicated to open-space and recreational land uses. Natural areas would be reduced in size and used more intensively. Residential land use may be incompatible with resource protection on adjacent lands and some forms of recreational activity may be curtailed. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party.
		Cultural Preservation	Land use for the entire tract (approximately 910 acres [368 hectares]) would change from passively managed recreational and open-space uses to restricted access cultural preservation land. Future use of this tract by the general public would be eliminated and resources would be managed in a manner determined by the receiving party. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party.
	Transportation	Natural Areas and Residential	Access roads and new streets within the tract would be required to support the residential development. An estimated 12,058 trips per day would be expected to be added to the local transportation system, with an increase of up to 819 trips during peak-hour traffic. The volume of additional trips would be expected to degrade traffic flow and to require improvements to regional transportation infrastructure.
		Cultural Preservation	A decrease in vehicle use would be expected on Rendija Canyon Road as public access is removed or restricted. Easements would be required to permit access to Santa Fe National Forest lands and to maintain or operate existing infrastructure.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Rendija Canyon (Continued)	Infrastructure	Natural Areas and Residential	Residential development would require new utility delivery and wastewater infrastructure. Utility usage would be estimated to increase annually by the following amounts: electricity, 8 gwh; natural gas, 164 mcf (4,644 mly); water, 126 mgy (477 mly); and sewage, 63 mgy (238 mly).
		Cultural Preservation	Current low utility usage would continue or be reduced, and some infrastructure supporting the Los Alamos Sportsman's Club may be removed.
	Noise	Natural Areas and Residential	Noise associated with construction would increase temporarily. Noise associated with residential and vehicle use would be more frequent and could increase from a current maximum of 40 dBA (estimated) to about 60 or 70 dBA. Noise from Los Alamos Sportsman's Club activities would be closer to residential receptors. Should Los Alamos Sportsman's Club activities eventually be relocated, these noise impacts would occur at the new location.
		Cultural Preservation	Noise events would greatly diminish due to restrictions on vehicular access and removal of the Los Alamos Sportsman's Club.
	Visual Resources	Natural Areas and Residential	Residential construction would impact high public value (Scenic Class II) visual resources.
		Cultural Preservation	Visual resources would be maintained; however, access to views within the tract would be reduced.
	Socio-economics	Natural Areas and Residential	The construction of new residential areas would temporarily increase employment in the ROI. Residential development would not impact overall stable growth within the ROI. Overall employment, income, population, housing, and community services would be expected to maintain stable growth within the ROI.
		Cultural Preservation	Current socioeconomic forces are likely to be maintained; however, a slight decrease is possible.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Rendija Canyon (Continued)	Ecological Resources	Natural Areas and Residential	Approximately 570 acres (230 hectares) of ponderosa pine forest and pinyon-juniper woodland habitat would be severely modified or lost due to residential development. The development would effectively disrupt the structure and function of the existing Rendija Canyon ecosystem. After development, impacts to wildlife species, primarily birds, could occur due to predation from domestic animals. There would be a loss of preferred habitat for the Federal-listed American peregrine falcon and Mexican spotted owl. The adjacent habitat would also experience a lost of quality due to segmentation and other effects. The loss of acreage due to development would result in a reduction of breeding and foraging habitat for wildlife currently utilizing the property.
		Cultural Preservation	The transition of this area from bare ground and weedy vegetation to natural vegetation (primarily grassland and ponderosa pine) is anticipated to result from the removal of Los Alamos Sportsman’s Club. Wildlife disturbance, both visual and auditory, from recreational use would be diminished. Consequently, ecological resources would be maintained and slightly improved as access to this area is reduced.
	Cultural Resources	Natural Areas and Residential	Access to cultural resources would increase with the introduction of additional residents, the sanctioning of recreational uses, and any trail enhancements, thereby causing possible destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Residential development would cause large-scale disturbance to the cultural resources of this tract due to construction, grading, and trenching; construction of access roads and new streets associated with this development would have similar impacts. Development may potentially impact natural resources utilized by traditional communities.
		Cultural Preservation	Dedicating the tract to cultural preservation is anticipated to have a beneficial impact on the cultural resources present; restricted access by the general public would help protect the resources. Another positive impact would be the passive preservation of resources and continued access to traditional cultural properties afforded to traditional practitioners of the receiving party. There may be negative impacts to some current traditional users if general access is restricted. Ongoing negative impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Rendija Canyon (Continued)	Geology and Soils	Natural Areas and Residential	Residential development (approximately 570 acres [230 hectares]), transportation networks and sewer and electrical utilities would cause soil disturbances. New structures would be susceptible to a magnitude 7 seismic event and to wildfire episodes. Wildfires, in addition to the potential impact to structures, would remove ground cover vegetation, causing increased soil erosion and transport via surface runoff.
		Cultural Preservation	The current geological conditions would likely remain the same; no impacts are expected. However, removal of the Los Alamos Sportsman's Club facilities may cause soil disturbance; but restricting recreational access may decrease erosion.
	Water Resources	Natural Areas and Residential	Residential development could potentially impact surface water quality and quantity within and downstream of the tract, due to runoff from paved roads and developed areas. Development would contribute to overall regional groundwater drawdown and reduced quantities of cheaply treatable water supplies.
		Cultural Preservation	The current surface water and groundwater conditions would likely remain the same; no impacts are expected.
	Air Resources	Natural Areas and Residential	The canyon air quality would likely remain the same for hazardous and radioactive air pollutants. However, air quality would deteriorate slightly due to increased use of motor vehicles, which emit slight quantities of several criteria pollutants. Homes heated with natural gas, which emits trace quantities of some criteria pollutants, would also contribute to the reduction of air quality. Contributions to global climate change would increase on the tract from 30 tons (27 metric tons) per year to 22,000 tons (20,000 metric tons) per year of carbon dioxide due to increases in motor vehicle traffic and residential use of fossil fuels.
		Cultural Preservation	Dedicating this canyon to cultural preservation would result in fewer visitors, which, in turn, would reduce already negligible emissions of criteria pollutants and greenhouse gases. Air quality would be unchanged, and tract contributions to global climate change would be slightly reduced.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Rendija Canyon (Continued)	Human Health	Natural Areas and Residential	The addition of 3,500 new residents in close proximity to LANL facilities would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. Residential development also would introduce more sensitive receptors, such as children and pregnant females, to an area that currently has a single residence. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities. Physical injury to an increased number of individuals could also occur if any one of three natural events takes place (flood, seismic, or wildfire) in Rendija Canyon.
		Cultural Preservation	The human health consequences would be similar to the No Action Alternative.
	Environmental Justice	Natural Areas and Residential <u>or</u> Cultural Preservation	No disproportionately high and adverse impacts on minority and low-income populations are anticipated from implementing the contemplated land uses on this tract. Rendija Canyon has been identified as a location with TCPs; however, effects to these resources cannot be determined at this time. Legal counsel for the San Ildefonso Pueblo has expressed the opinion that conveyance of the tract and subsequent use would result in environmental justice impacts to the Pueblo's population. Modest economic benefits would arise from the additional jobs created during the construction of new housing in this area. However, restricting public use of roads and trails in Rendija Canyon would hinder public access to National Forest lands, which afford not only recreation opportunities for the general public but serve as traditional firewood gathering and collection areas for other forest products by local Hispanic and Native American populations. Therefore, restricted access to this area could have a disproportionately adverse impact on these minority populations if gathering and collection is sufficiently performed by low-income or minority populations in these areas.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DOE LAAO	Land Use	Residential	Land use would change from professional office to residential, which would be compatible with adjacent land use. An estimated 9 to 10 acres (3 to 4 hectares) of the total 15-acre (6-hectare) tract would be developed for multiple-family residential use. The DOE LAAO Building and steam plant would be removed. This land development would accommodate apartments or condominiums at an average density of 20 dwellings per acre or 180 to 200 dwellings. The remaining acreage would be used for parking, and open areas would be landscaped to maintain the residential character of the development. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party.
		Commercial	Commercial development would represent a continuation of current land use. The existing DOE administrative building would be converted to commercial office space that would accommodate a total of 6 businesses and 15 vehicles. The steam plant would remain, and no additional development is contemplated. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party.
	Transportation	Residential	The proposed residential development would impact the daily commute for the DOE and contractor personnel relocated from the DOE LAAO; some will have a shorter drive to work, but most would have farther to travel. Traffic entering or exiting the area could increase by as many as 86 trips during peak hours of the work week.
		Commercial	Because land use would not change substantially, the current traffic volumes (defined as good operating conditions with stable flow) are anticipated to remain essentially the same with only a slight increase during peak hours.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DOE LAAO (Continued)	Infrastructure	Residential	Residential development would require enhancement of existing infrastructure: electric, gas, water, and sewage lines would need to be extended to service new structures; and new roads parking areas, and structures would be developed. Utility usage would be estimated to increase annually by the following amounts: electricity, 1.3 gwh; natural gas, 26 mcf (736 mly); water, 20 mgy (76 mly); and sewage, 10 mgy (38 mly). These increases are not anticipated to exceed the existing capacity for any utility.
		Commercial	Existing infrastructure would not need to be modified to accommodate commercial land use. Utility usage would be estimated to increase annually by the following amounts: electricity, 0.3 gwh; natural gas, 3 mcf (85 mly); water, 3 mgy (11 mly); and sewage, 1 mgy (4 mly). These increases are not anticipated to exceed the existing capacity for any utility.
	Noise	Residential	Residential use would result in ambient noise levels of 60 to 70 dBA due to vehicular traffic and residential activities. There would be more vehicle traffic into and out of the tract (500 residents versus 130 employees), and it would occur during longer periods of the day. During demolition of existing buildings and construction of residences, ambient noise would increase from about 40 to 50 dBA to about 95 dBA.
		Commercial	The current noise level, which is largely determined by background noises from traffic on nearby Trinity Drive and Los Alamos Canyon bridge, would likely remain the same if the land is commercially used; that is, from 40 to 50 dB.
	Visual Resources	Residential	The developed portions of the tract are considered to be of low public value (Scenic Class IV), while the undeveloped portions are considered to be of moderate public value (Scenic Class III). Residential development would be accomplished without substantial change to the visual character of this tract.
		Commercial	No impacts are expected from this development scenario; the office building would remain, and no roads or other structures would be added.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DOE LAAO (Continued)	Socio-economics	Residential	Construction activities would temporarily increase employment in the ROI, which, in turn, would generate increases in ROI income. However, no impacts on area population and housing would be expected because the majority of new residents on the tract and temporary jobs generated by this development would be filled by the existing ROI labor force.
		Commercial	There would be possible short-term economic gains from minor construction as well as long-term economic gains from the industries using the land. Approximately 120 workers would be employed on the tract and 200 jobs would be generated in the ROI and filled by the existing labor force; therefore, no impacts on area population and housing would be expected.
	Ecological Resources	Residential	Given the limited acreage involved and existing developed nature of the site, impacts are expected to be small. Approximately 6.5 acres (2.6 hectares) of ponderosa pine forest would be lost as the area is converted to housing, roadways, and residential landscaping. After development, impacts to wildlife species, primarily birds, could occur due to predation from domestic animals.
		Commercial	Because no change in land use is expected under this development scenario, no adverse impacts to ecological resources are projected. However, the environmental review and protection processes for future activities would not be as rigorous as those that govern the DOE.
	Cultural Resources	Residential	This tract would be extensively altered by construction activities, including demolition of buildings, grading, and trenching. Two buildings considered potentially eligible to the NRHP would be demolished. Activities also could result in primary impacts to other unidentified historic properties through physical destruction, damage, or alteration.
		Commercial	No discernible impacts to cultural resources are expected because no new development is planned. The use of the DOE LAAO Building, a potentially eligible resource, would continue, and the building would not be demolished although modifications would be likely.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DOE LAAO (Continued)	Geology and Soils	Residential	This development scenario would require extensive ground disturbance to remove existing structures and redesign for residential use.
		Commercial	No soil disturbance or change in availability of resources are anticipated. No impacts from this development scenario are expected.
	Water Resources	Residential	In developed areas, surface water quality may be indirectly affected outside the tract during and after construction. Development will not affect groundwater quality or quantity beneath the tract but may contribute to the overall regional water level decline and possibly result in degradation of water quality within the aquifer.
		Commercial	The current surface water and groundwater conditions would likely remain the same; no impacts are expected.
	Air Resources	Residential	There would be no emissions of hazardous or other chemical air pollutants and no emissions of radioactive air pollutants. However, air quality would deteriorate slightly due to increased use of motor vehicles, which emit slight quantities of several criteria pollutants (primarily trace amounts of carbon monoxide and ozone). Homes heated with natural gas, which emits trace quantities of some criteria pollutants, would also contribute to the reduction of air quality. Contributions to global climate change would increase from about 130 tons (120 metric tons) per year to an estimated 3,300 tons (3,000 metric tons) per year of carbon dioxide due to increases in motor vehicle traffic and residential use of fossil fuels.
		Commercial	The current air quality conditions would likely remain the same; no adverse impacts are expected. Contributions to global climate change will remain at an estimated 130 tons (120 metric tons) per year of carbon dioxide.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DOE LAAO (Continued)	Human Health	Residential	The addition of 500 new residents in close proximity to LANL facilities would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. Residential development also would introduce more sensitive receptors, such as children and pregnant females, to an area that currently hosts only LANL-related workers. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.
		Commercial	Commercial development poses the same human health consequences as those discussed for residential development, but are lessened by three factors: (1) fewer members of the public would use the tract (an estimated 120 workers), (2) workers would be present less often than residents, and (3) the work force would contain fewer sensitive receptors.
	Environmental Justice	Residential <u>or</u> Commercial	No disproportionately high and adverse impacts on minority and low-income populations are anticipated from implementing the contemplated land uses on this tract. Modest economic benefits would arise from the additional jobs created during the construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local government.
Miscellaneous Site 22	Land Use	Commercial	The land use of this tract (less than 0.5 acre [0.2 hectare]) would change from a LANL buffer area used for unauthorized parking to a sanctioned parking area. Activity levels would likely remain same and, therefore, no discernible impacts are expected. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing and cleanup levels may be influenced by this land use scenario and input from the receiving party.
	All Others	Commercial	Commercial development of this tract is not expected to adversely impact any of the remaining resource areas; resource conditions would likely remain the same.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Miscellaneous Manhattan Monument	Land Use	Historic Preservation	Land use proposed for this site would result in the continued historic preservation of the tract. Landscaping and other routine maintenance activities would continue on an as-needed basis, and the general public would have unrestricted access to the site and its surrounding area. No environmental restoration activities are planned.
	Cultural Resources	Historic Preservation	This monument is a contributing element of an NRHP-listed resource and as such, according to the Criteria of Adverse Effect (36 CFR 800.5(a)(1)), would be directly impacted if transferred. Impacts would be limited to the potential of transferring this NRHP-eligible resource out of the responsibility and protection of the DOE, which may result in a less rigorous standard of care.
	All Others	Historic Preservation	Historic preservation of this tract is not expected to adversely impact any of the remaining resource areas; resource conditions would likely remain the same.
DP Road	Land Use	Industrial and Commercial	Land use on the relatively level portions of the tract would change from previously disturbed, but mostly undeveloped, buffer lands. Contemplated development would be compatible with existing and adjacent land uses. Approximately 21 of 50 acres (8 of 20 hectares) would be developed for heavy commercial and industrial land use, and an additional 5 acres (2 hectares) would be developed for office space. When fully developed, this tract would be occupied by 40 new businesses with 900 total employees and 24 vehicles. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party. Site buildings would likely remain; but the RAD wastewater line would be removed.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DP Road (Continued)	Land Use	Commercial and Residential	Land use on the relatively level portions of the tract would change from previously disturbed, but mostly undeveloped, buffer lands. Contemplated development would be compatible with existing and adjacent land uses. Approximately 21 of 50 acres (8 of 20 hectares) would be developed as a residential trailer court that, when fully developed, would be occupied by 160 mobile homes, 400 new residents, and 330 personal vehicles. An additional 5 acres (2 hectares) would be developed for office space that, when fully developed, would be occupied by 10 new businesses with 225 total employees. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party. Site buildings would likely remain; but the RAD wastewater line would be removed.
	Transportation	Industrial and Commercial <u>or</u> Commercial and Residential	For the proposed industrial and commercial development, an estimated 2,312 trips per day would be expected to be added to the local transportation system, with an increase of up to 296 trips during peak-hour traffic. For the proposed commercial and residential development, an estimated 1,941 trips would be expected to be added to the local transportation system, with an increase of up to 178 trips during peak-hour traffic. Consequently, the volume of these additional trips would likely degrade traffic flow and would require improvements to the area transportation infrastructure.
	Infrastructure	Industrial and Commercial	Mixed development would require enhancement of existing infrastructure: electric, gas, water, and sewage lines would need to be extended to service new structures; and new roads, parking areas, and structures would be developed. Utility usage would be estimated to increase annually by the following amounts: electricity, 2.3 gwh; natural gas, 22 mcf (623 mly); water, 20 mgy (76 mly); and sewage, 9 mgy (34 mly). These increases are not anticipated to exceed the existing capacity for any utility.
		Commercial and Residential	Mixed development would require enhancement of existing infrastructure: electric, gas, water, and sewage lines would need to be extended to service new structures; and new roads, parking areas, and structures would be developed. Annual utility usage would be estimated to increase by the following amounts: electricity, 1.6 gwh; natural gas, 26 mcf (736 mly); water, 21 mgy (79 mly); and sewage, 10 mgy (38 mly). These increases are not anticipated to exceed the existing capacity for any utility.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DP Road (Continued)	Noise	Industrial and Commercial	This land use scenario is estimated to result in an increase of as many as 900 new direct jobs, which would increase traffic flow. Although maximum noise from traffic would not be expected to increase significantly, traffic noises would likely be present for a greater portion of the day as the new employees enter and exit this area. Construction activities would temporarily increase ambient noise levels from about 65 dBA to a range of 74 to 95 dBA.
		Commercial and Residential	Commercial and residential development would have no appreciable difference in ambient noise levels. Noise from traffic likely would be present for a greater portion of the day. Construction activities would be expected to temporarily increase noise levels from about 65 dBA to a range of 74 to 95 dBA
	Visual Resources	Industrial and Commercial or Commercial and Residential	These contemplated land use scenarios would result in similar impacts. The current moderate public value (Scenic Class III) and low public value (Scenic Class IV) visual resources would be maintained; no major impacts are anticipated.
	Socio-economics	Industrial and Commercial	The use of this tract for industrial and commercial development would generate additional employment in the ROI, which would increase ROI income. Minor temporary increases in employment are anticipated from the construction of new facilities, which, in turn, would generate increases in regional income. After development is completed, approximately 900 workers would be employed on the tract, and a total of 1,200 jobs would be generated in the ROI. Jobs would be expected to be filled by the existing ROI labor force.
		Commercial and Residential	The impacts of this land use scenario would be similar to the industrial and commercial land use scenario. However, fewer long-term jobs would be generated because there would be fewer businesses on the land. The addition of 400 residents on the tract would not be expected to impact overall ROI population or public services.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DP Road (Continued)	Ecological Resources	Industrial and Commercial <u>or</u> Commercial and Residential	These contemplated land use scenarios would result in similar impacts. Approximately 24 acres (10 hectares) of ponderosa pine forest and pinyon-juniper woodland would be lost; as a result, habitat would be degraded or lost for Federal-protected species such as the American peregrine falcon and Mexican spotted owl. Habitat destruction would affect wildlife through direct mortality and relocation to other lands. In areas near residential development, impacts to wildlife species, primarily birds, could occur due to predation from domestic animals.
	Cultural Resources	Industrial and Commercial	Industrial and commercial development would disturb any cultural resources present due to construction, grading, and trenching. These impacts would include the potential destruction of buildings, archaeological sites, and traditional cultural property locations. Cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions. Development may potentially impact natural resources utilized by traditional communities.
		Commercial and Residential	The impacts of this land use scenario would be similar to the industrial and commercial land use scenario. However, the development of a residential trailer park could increase access to any cultural resources present nearby. Increased access could result in physical destruction, damage, vandalism, or alteration of cultural resources and disturbance of any traditional practices and ceremonies.
	Geology and Soils	Industrial and Commercial <u>or</u> Commercial and Residential	These contemplated land use scenarios would result in similar impacts. Soil would be disturbed to upgrade utilities and roadways, and for any removal of existing structures or construction of new structures. Any structures on this tract would be vulnerable to greater than magnitude 7 seismic events, and the stability of the canyon rim must be considered. In addition, development would increase the susceptibility of soil erosion after the removal of ground cover vegetation.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DP Road (Continued)	Water	Industrial and Commercial or Commercial and Residential	These contemplated land use scenarios would result in similar impacts. Development will not affect groundwater quality or quantity beneath the tract; however, any associated increase in water usage may contribute to the overall regional water level decline, which could result in degradation of water quality within the aquifer. Surface water may be impacted if motor oil, gasoline, or other such contaminants are washed from paved areas into the drainage during storm events. Also, runoff may have more erosive power if it is flowing across areas that have been denuded, thereby transporting more sediment into the drainages.
	Air Resources	Industrial and Commercial	This land use scenario would result in an increase in the emittance of criteria pollutants from mobile sources travelling along Trinity Drive and DP Road. No substantial emissions of hazardous, chemical, or radioactive air pollutants would be expected from this land usage. Air concentrations at the tract would deliver a maximum radiation dose of 2.5 millirem to people residing there year-round. Contributions to global climate change would increase appreciably from 400 to 1,800 tons (350 to 1,650 metric tons) per year of carbon dioxide due to increases in motor vehicle traffic.
		Commercial and Residential	For this land use scenario, ambient air concentrations of criteria pollutants would continue to comply with national and State standards; hazardous chemical and radioactive air concentrations would continue to be below health-based standards. However, residential usage of this tract would have less of an impact on air quality than industrial activities because this scenario would generate less vehicle traffic. Contributions to global climate change would increase from 400 to 3,350 tons (350 to 3,000 metric tons) per year of carbon dioxide due to increases in motor vehicle traffic and residential and office use of fossil fuels.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
DP Road (Continued)	Human Health	Industrial and Commercial	The average occupancy (370 people) would be approximately the same as for the commercial and residential land use scenario and, therefore, impacts would be similar. Consequences from this scenario are lesser, however, by two factors: (1) workers would be present less often than residents, and (2) the work force would contain few sensitive receptors (children and pregnant females). New employees would be brought into closer proximity to LANL facilities, which would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.
		Commercial and Residential	The impacts of this land use scenario are similar to the industrial and commercial land use scenario. However, residential development would introduce more sensitive receptors, such as children and pregnant females, to an area that currently hosts only LANL-related workers.
	Environmental Justice	Industrial and Commercial <u>or</u>	No disproportionately high and adverse impacts on minority and low-income populations would be anticipated from implementing the contemplated land uses on this tract.
		Commercial and Residential	Modest economic benefits would arise from the additional jobs created during the construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local government. These impacts would be positive and would not disproportionately affect any single group.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 21	Land Use	Commercial and Industrial	Land use would change from LANL industrial uses to private commercial and industrial development, and LANL personnel and activities would have to be relocated. A minimum of 55 acres (22 hectares) would be developed or redeveloped for commercial and industrial uses. Commercial uses could include businesses such as office buildings and business parks, warehouses, parking areas, service stations, repair garages, tire shops, motels and hotels, large stores, and drive-in or take-out facilities. Industrial uses could include light fabrication and manufacturing facilities compatible with other uses currently located at and adjacent to the site. When fully developed, the tract would be occupied by 70 businesses, 1,900 employees, and 56 commercial vehicles. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party. Current structures and the RAD wastewater line would be removed.
	Transportation	Commercial and Industrial	For the proposed commercial and industrial development, an estimated 3,471 trips per day would be expected to be added to the local transportation system, with an increase of up to 464 trips during peak-hour traffic. These additional trips would likely degrade traffic flow and would require improvements to the area transportation infrastructure. Transportation effects of relocating TA 21 personnel would include minor increases in traffic congestion in the immediate area of the new facilities during morning and evening hours.
	Infrastructure	Commercial and Industrial	This proposed land use scenario would require enhancement of existing infrastructure: electric, gas, water, and sewage lines would need to be extended to service new structures; and new roads, parking areas, and structures would be developed. Utility usage would be estimated to increase annually by the following amounts: electricity, 4.0 gwh; natural gas, 39 mcf (1,100 mly); water, 35 mgy (132 mly); and sewage, 19 mgy (72 mly).
	Noise	Commercial and Industrial	Typical construction equipment for use in building the new commercial and industrial facilities temporarily would increase ambient noise levels from less than 50 dBA to a range of 74 to 95 dBA. Maximum noise from traffic would not be expected to increase significantly over current conditions, but would likely be present for a greater portion of the day as new employees enter and exit the area.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 21 (Continued)	Visual Resources	Commercial and Industrial	Overall impacts to visual resources would not be expected to be substantial as a result of this land use. Low public value (Scenic Class IV) visual resources would not be affected or would be improved in developed areas.
	Socio-economics	Commercial and Industrial	The use of this tract for commercial and industrial development would generate additional employment in the ROI, which would increase ROI income. Minor temporary increases in employment are anticipated from the construction of new facilities, which, in turn, would generate increases in regional income. After development is completed, approximately 1,900 workers would be employed on the tract, and a total of 3,100 jobs would be generated in the ROI. Jobs would be expected to be filled by the existing ROI labor force.
	Ecological Resources	Commercial and Industrial	Under this proposed development scenario, most of the development footprint would be on previously disturbed land. However, approximately 5 acres (2 hectares) of ponderosa pine forest, pinyon-juniper woodland, shrub, and grassland habitat would be severely modified or lost; as a result, habitat would be degraded or lost for Federal-protected species such as the bald eagle, American peregrine falcon, and Mexican spotted owl. Habitat destruction would extend to adjacent undeveloped areas and would affect wildlife through direct mortality and relocation to other lands.
	Cultural Resources	Commercial and Industrial	Commercial and industrial development would disturb any cultural resources present due to demolition, construction, grading, and trenching. These impacts would include the destruction of archaeological sites, potentially eligible historic buildings, and traditional cultural property locations. Cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions. Development may potentially impact natural resources utilized by traditional communities.
	Geology and Soils	Commercial and Industrial	Soil would be disturbed to upgrade utilities and roadways and for any removal of existing structures or construction of new structures. Any structures on this tract would be vulnerable to greater than magnitude 7 seismic events. In addition, development would increase the susceptibility of soil erosion after the removal of ground cover vegetation.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 21 (Continued)	Water Resources	Commercial and Industrial	Development will not affect groundwater quality or quantity beneath the tract. However, any associated increase in water usage may contribute to the overall regional water level decline, possibly resulting in degradation of water quality within the aquifer. Two sources of surface water would be removed prior to disposition of the tract, thereby reducing the quantity of surface water discharged into the adjacent canyons. Also, runoff may have more erosive power if it is flowing across areas that have been denuded, thereby transporting more sediment into the drainages.
	Air Resources	Commercial and Industrial	This land use scenario would result in a slight increase in the emittance of criteria pollutants from mobile sources and businesses using natural gas or propane. However, the removal of LANL operations from this tract would result in decreased concentrations of hazardous and chemical air pollutants. In short, air quality would improve somewhat. Doses from the inhalation of radioactive air pollutants would continue at approximately 2.5 to 4.0 millirem per year; most of this dose is the result of operations at the Los Alamos Neutron Science Center, not the idled TA 21 operations. Contributions to global climate change would decrease from an estimated 7,800 to 2,500 tons (7,000 to 2,200 metric tons) per year of carbon dioxide, due largely to the cessation of LANL activities. Regionally, carbon dioxide emissions could increase by 2,500 tons (2,267 metric tons) if tritium research is continued elsewhere on LANL.
	Human Health	Commercial and Industrial	As many as 1,900 private-sector employees would be brought into closer proximity to LANL facilities, which would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.
	Environmental Justice	Commercial and Industrial	No disproportionately high and adverse impacts on minority and low-income populations would be anticipated from implementing the contemplated land use on this tract. Modest economic benefits would arise from the additional jobs created during the construction and operation of the new facilities. Secondary effects would include small increases in business activity and would likely increase revenues to local government. These impacts would be positive and would not disproportionately affect any single group.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Airport	Land Use	Airport, Commercial, and Industrial	Proposed land use identified for the Airport Tract north of East Road could include the continued use of approximately 93 acres (38 hectares) for the Airport and other uses. An area of relatively undisturbed land of about 16 acres (6 hectares) also could be developed for heavy commercial land use purposes. Proposed land use to the south of East Road could include the development of about 90 acres (36 hectares) of relatively undisturbed land as an office and business park based on airport-related industry and potential retail uses. When fully developed, lands on both sides of East Road would be occupied by 200 businesses, 3,100 employees, and 120 commercial vehicles. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party.
	Transportation	Airport, Commercial, and Industrial	For the proposed development, an estimated 14,266 trips per day would be expected to be added to the local transportation system, with an increase of up to 1,554 trips during peak-hour traffic. These additional trips would double the traffic on State Road 502, would create traffic jam conditions, and would require improvements to transportation infrastructure.
	Infrastructure	Airport, Commercial, and Industrial	Airport, commercial, and industrial development would require enhancement of existing infrastructure: electric, gas, water, and sewage lines would need to be extended to service new structures; and new roads, parking areas, and structures would be developed. Utility usage would be estimated to increase annually by the following amounts: electricity, 11 gwh; natural gas, 110 mcf (3,120 mly); water, 100 mgy (379 mly); and sewage, 31 mgy (117 mly).
	Noise	Airport, Commercial, and Industrial	Under this land use scenario, construction activities would temporarily increase ambient noise levels from less than 40 dBA to a range of 74 to 95 dBA, resulting from typical construction equipment operation. Once fully developed, traffic from employees and other travelers would comprise the majority of noise in the area. Noise levels along State Road 502 would likely remain the same at about 60 or 70 dBA; however, noises along the northern parts of the tract would increase significantly due to increased traffic along new roads and new commercial and industrial activities, in addition to Airport activities.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Airport (Continued)	Visual Resources	Airport, Commercial, and Industrial	The proposed airport, commercial, and industrial development would maintain moderate public value (Scenic Class III) visual resources. Development in the southern portion of the tract would impact high public value (Scenic Class II) visual resources from the road and Airport.
	Socio-economics	Airport, Commercial, and Industrial	The use of this tract for airport, commercial, and industrial development would generate additional employment in the ROI, which would increase ROI income. Minor temporary increases in employment are anticipated from the construction of new facilities, which, in turn, would generate increases in regional income. After development is completed, approximately 3,100 workers would be employed on the tract, and a total of 4,327 jobs would be generated in the ROI. Jobs would be expected to be filled by the existing ROI labor force.
	Ecological Resources	Airport, Commercial, and Industrial	Under this proposed development scenario, approximately 90 acres (36 hectares) of ponderosa pine forest and pinyon-juniper woodland would be severely modified or lost; as a result, habitat would be degraded or lost for Federal-protected species such as the bald eagle, American peregrine falcon, and Mexican spotted owl. Habitat degradation would extend to adjacent lands and would affect wildlife through direct mortality and relocation to other lands. The loss of acreage due to development would result in a reduction of breeding and foraging habitat for wildlife currently utilizing the property.
	Cultural Resources	Airport, Commercial, and Industrial	Under this land use scenario, portions of the tract would be extensively altered by construction activities, grading, and trenching. These activities could result in primary impacts to eligible resources through physical destruction, demolition, damage, or alteration. In addition, cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions.
	Geology and Soils	Airport, Commercial, and Industrial	Soil would be disturbed to upgrade utilities and roadways and to construct new structures. Any structures on this tract would be vulnerable to greater than magnitude 7 seismic events. In addition, development would increase the susceptibility of soil erosion after the removal of ground cover vegetation.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
Airport (Continued)	Water Resources	Airport, Commercial, and Industrial	The contemplated land use will not affect groundwater quality or quantity beneath the tract; but any associated increased water usage may contribute to the overall regional water level decline, possibly resulting in the degradation of water quality within the aquifer. Development and construction may potentially affect surface water quality within and downstream of the tract because stormwater runoff may increase over areas that have been denuded and carry sediments and surface contaminants into the drainages.
	Air Resources	Airport, Commercial, and Industrial	This land use scenario would result in a slight increase in the emittance of criteria pollutants due to space heating, increased motor vehicle traffic, and, perhaps, steam-generating boilers. However, ambient air concentrations would likely remain with Federal and State standards, and the Los Alamos region would remain an attainment area. Emissions of hazardous other chemical air pollutants are likely to be absent or regulated. Doses from the inhalation of radioactive air pollutants from LANL would continue at approximately 2.1 (western edge) to 5.4 (eastern edge) millirem per year. Contributions to global climate change would increase from an estimated 6 to 6,900 tons (5 to 6,300 metric tons) per year of carbon dioxide, due largely to vehicle use and space and water heating.
	Human Health	Airport, Commercial, and Industrial	As many as 3,100 private-sector employees would be brought into closer proximity to LANL facilities, which would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.
	Environmental Justice	Airport, Commercial, and Industrial	No disproportionately high and adverse impacts on minority and low-income populations would be anticipated from implementing the contemplated land use on this tract. Modest economic benefits would arise from the additional jobs created during the construction and operation of the new facilities. Secondary effects would include small increases in business activity and would likely increase revenues to local government. These impacts would be positive and would not disproportionately affect any minority or low-income populations.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock Y	Land Use	Cultural Preservation	The entire tract would be held in cultural preservation; therefore, access to the tract for public recreation and other uses would be denied, and these recreational opportunities would be lost. This decrease in activity would likely prove beneficial to adjacent land use, including Bandelier National Monument and TA 72 operations. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing and cleanup levels may be influenced by this land use scenario and input from the receiving party. Disposition may include cleanup of the two canyon systems.
		Natural Areas, Transportation, and Utilities	The entire tract would be held as an undeveloped natural area and passively managed. Portions of the tract could be used for additions or improvements to utilities or utility corridors, including construction of roads for improved access. Also, the general public would have access to the tract for recreational purposes. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing and cleanup levels may be influenced by this land use scenario and input from the receiving party. Disposition may include cleanup of the two canyon systems.
	Transportation	Cultural Preservation <u>or</u> Natural Areas, Transportation, and Utilities	These contemplated land use scenarios would result in similar impacts. The possible construction of new roads to improve access to utilities on the tract would have no impact on traffic circulation in the area. Therefore, it is expected that the future operational performance of State Road 502, State Road 4, and East Jemez Road would remain similar to that of the existing performance.
	Infrastructure	Cultural Preservation	Under this land use scenario, no changes are anticipated that would affect the utilities and infrastructure; easements for continued use of utilities and the transportation corridor would likely continue.
		Natural Areas, Transportation, and Utilities	Most of the tract would be maintained as a natural area under this land use scenario; however, some land would be used for additions or improvements to utilities such as well construction or utility corridors.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock Y (Continued)	Noise	Cultural Preservation or Natural Areas, Transportation, and Utilities	Continued use of this tract as a transportation corridor is contemplated under both land use scenarios. Assuming that the two state highways remain in use, ambient noise will probably remain at its currently level, typically ranging from 60 to 70 dBA, with spikes to 90 dBA.
	Visual Resources	Cultural Preservation or Natural Areas, Transportation, and Utilities	This tract would maintain relatively high public value (Scenic Class II) visual resources under both of the land use scenarios; the objective would be to retain the existing visual character of the landscape as much as possible. Access to views within the tract may be limited under the cultural preservation scenario.
	Socio-economics	Cultural Preservation or Natural Areas, Transportation, and Utilities	The contemplated land uses of this tract would have little or no impact on employment, income, population, or housing.
	Ecological Resources	Cultural Preservation	If the tract is culturally preserved, wildlife disturbance, both visual and auditory, from recreational use would be diminished; consequently, habitat for most species would be augmented and improved.
		Natural Areas, Transportation, and Utilities	Under this proposed land use scenario, the general public would have access for recreational purposes. Therefore, impacts to natural resources from recreational use are expected to be minimal, sporadic, and temporary. Minor habitat loss would be expected from development of utility improvements and minor roadway construction.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock Y (Continued)	Cultural Resources	Cultural Preservation	Dedicating this tract to cultural preservation is anticipated to have a beneficial impact on the cultural resources present. The restriction of access by the general public is anticipated to help protect the resources from vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Ongoing negative impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue. There may be negative impacts to some current traditional users if general access is restricted.
		Natural Areas, Transportation, and Utilities	Under this land use scenario, the maintenance of natural areas would allow the passive preservation of cultural resources on the tract. The sanctioning of recreational activities and possible road construction could increase access to resources, increasing opportunities for vandalism and disturbance of traditional practices. Construction activities required for maintaining utilities and establishing new roads could result in physical destruction, damage, or alteration of cultural resources present. In addition, cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions. Development may potentially impact natural resources utilized by traditional communities.
	Geology and Soils	Cultural Preservation	If the tract is culturally preserved, there would be no disturbance from development. However, the tract would remain susceptible to wildfires, which could increase erosion potential.
		Natural Areas, Transportation, and Utilities	Some degree of land disturbance associated with additions or improvements to utilities, utility corridors, and access roads would be expected under this land use scenario. In addition, existing and upgraded structures would be vulnerable to greater than magnitude 7 seismic events and wildfire episodes.
	Water Resources	Cultural Preservation <u>or</u> Natural Areas, Transportation, and Utilities	Neither of these proposed land uses would directly or indirectly affect surface water or groundwater quality or quantity.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
	Air Resources	Cultural Preservation or Natural Areas, Transportation, and Utilities	No additional transportation activities are anticipated with either of these land use scenarios and, as such, there would be no additional emission of air pollutants. Air quality would be expected to remain high, and doses from radioactive pollutants from LANL operations would remain less than 2 millirem per year. No contributions to global climate change would be expected because there would be few or no structures on the tract emitting greenhouse gases.
	Human Health	Cultural Preservation or Natural Areas, Transportation, and Utilities	The contemplated land uses for this tract do not increase, and may decrease, the number of workers or members of the public exposed to radiological and chemical air pollutants emitted by LANL operations.
	Environmental Justice	Cultural Preservation or Natural Areas, Transportation, and Utilities	No disproportionately high and adverse impacts on minority and low-income populations would be anticipated from implementing the contemplated land uses on this tract. The White Rock Y Tract has been identified as a location with TCPs; however, effects to these resources cannot be determined at this time. Legal counsel for the San Ildefonso Pueblo has expressed the opinion that conveyance of the tract and subsequent contemplated uses would result in environmental justice impacts to the Pueblo's population.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 74	Land Use	Cultural Preservation	Land use would change from open space buffer with unsanctioned recreational use to cultural preservation. The entire tract would be held in cultural preservation; therefore, access to the tract for public recreation and other uses would be denied and these recreational opportunities would be lost. Land use would be dominated by cultural practices and activities necessary to meet continuing stewardship needs. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing and cleanup levels and buildings may be influenced by this land use scenario and input from the receiving party. Disposition may include cleanup of the canyon systems.
		Natural Areas and Utilities	Under this land use scenario, the entire tract would be held as a natural area and passively managed. Portions of the tract would be used for additions or improvements to utilities, including well construction, enlargement of sewage treatment facilities, utility corridors, and roadways. Access to the majority of the tract by the general public would be unrestricted. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing and cleanup levels may be influenced by this land use scenario and input from the receiving party. Disposition may include cleanup of the canyon systems.
	Transportation	Cultural Preservation or Natural Areas and Utilities	These contemplated land use scenarios would result in similar impacts. The possible construction of new roads to improve access to utilities on the tract would have no impact on traffic circulation in the area. Therefore, the future operational performance of State Road 502 and State Road 4 would be expected to remain similar to that of the existing performance.
	Infrastructure	Cultural Preservation	Under this land use scenario, no change is anticipated that would affect the existing utilities and infrastructure; easements for continued use of utilities would likely continue.
		Natural Areas and Utilities	Most of the tract would be maintained as a natural area under this land use scenario; however, some land could be used for additions or improvements to utilities, such as well construction, the construction of sewage treatment facilities, or utility corridors or roadways.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 74 (Continued)	Noise	Cultural Preservation	If this tract is culturally preserved, ambient noise levels along the southern edge of the tract, which parallels State Road 502, would remain at an estimated 60 to 90 dBA. The remaining tract would remain largely undisturbed by noise (10 to 20 dBA).
		Natural Areas and Utilities	Under this land use scenario, daytime ambient noise levels would likely increase slightly due to vehicle usage, recreational activities, and utility and road construction.
	Visual Resources	Cultural Preservation <u>or</u> Natural Areas and Utilities	This tract would maintain relatively high public value (Scenic Class II) visual resources under both of the land use scenarios; the objective would be to retain the existing visual character of the landscape as much as possible. Access to views within the site may be reduced under cultural preservation.
	Socio-economics	Cultural Preservation <u>or</u> Natural Areas and Utilities	The contemplated land uses for this tract would have little or no impact on employment, income, population, or housing. Modest economic activity may be associated with improvements to utility infrastructure.
	Ecological Resources	Cultural Preservation	If the tract is culturally preserved, wildlife disturbance, both visual and auditory, from recreational use would be diminished; consequently, habitat for most species would be augmented and improved.
		Natural Areas and Utilities	Under this proposed land use scenario, the general public would have access for recreational purposes; but only minimal impacts to natural resources would be expected from such use. If motorized recreational vehicles are permitted, they could contribute to habitat degradation and impacts to the mortality, reproduction, and range of some animals. Minor or short-term consequences to area wildlife would be expected from the development of utility improvements.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 74 (Continued)	Cultural Resources	Cultural Preservation	Dedicating this tract to cultural preservation is anticipated to have a beneficial impact on the cultural resources present. The restriction of access by the general public is anticipated to help protect the resources from vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Ongoing negative impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue. There may be negative impacts to some current traditional users if general access is restricted.
		Natural Areas and Utilities	Under this land use scenario, the maintenance of natural areas would allow the passive preservation of cultural resources on the tract. The sanctioning of recreational activities and possible road construction could increase access to resources, increasing opportunities for vandalism and disturbance of cultural practices. Construction activities required for maintaining or improving utilities could result in physical destruction, damage, or alteration of cultural resources present. In addition, cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions. Ongoing negative impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue. Development may potentially impact natural resources utilized by traditional communities.
	Geology and Soils	Cultural Preservation	If the tract is culturally preserved, there would be no disturbance from development. However, the tract would remain susceptible to wildfires, which could increase erosion potential. Little potential exists for seismic impacts.
		Natural Areas and Utilities	Some degree of land disturbance related to new construction or improvement of utilities such as well construction and sewage treatment facilities would be expected under this land use scenario. In addition, existing and expanded structures would be vulnerable to greater than magnitude 7 seismic events and wildfire episodes.
	Water Resources	Cultural Preservation <u>or</u> Natural Areas and Utilities	Neither of these proposed land uses would directly or indirectly affect surface water or groundwater quality or quantity.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
TA 74 (Continued)	Air Resources	Cultural Preservation or Natural Areas and Utilities	No emissions of hazardous or radioactive air pollutants are anticipated with either of these land use scenarios. Further, although there could be a slight increase in emissions of criteria pollutants, concentrations would remain well within State and Federal standards. Contributions to global climate change would continue as small emissions of carbon dioxide continue from the highway maintenance facility.
	Human Health	Cultural Preservation or Natural Areas and Utilities	The contemplated land uses for this tract do not increase, and may decrease, the number of workers or members of the public exposed to radiological and chemical air pollutants emitted by LANL operations.
	Environmental Justice	Cultural Preservation or Natural Areas and Utilities	No disproportionately high and adverse impacts on minority and low-income populations would be anticipated from implementing the contemplated land uses on this tract. The TA 74 Tract has been identified as a location with TCPs; however, effects to these resources cannot be determined at this time. Legal counsel for the San Ildefonso Pueblo has expressed the opinion that conveyance of the tract and subsequent use would result in environmental justice impacts to the Pueblo's population.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock	Land Use	Commercial and Residential	The commercial and residential development land use scenario would result in a notable change in land use patterns in the White Rock community. Approximately 20 of 100 acres (8 of 40 hectares) would be commercially developed as a recreational vehicle park for an estimated 160 recreational vehicle spaces. Residential areas would include approximately 5 and 35 acres (2 and 14 hectares) of medium- and high-density development, respectively. When the tract is fully developed, there would be 760 new dwelling units, 2,200 new residents, and 1,730 personal vehicles, including recreational vehicles and their occupants. The additional 40 acres (18 hectares) surrounding and between developed areas would be maintained as open space. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party. Disposition may include cleanup of the canyon systems.
		Cultural Preservation and Commercial	This contemplated land use scenario would include the use of less than 10 acres (4 hectares) of the tract for rental storage space or retail businesses, which would, for the most part, represent a continuation of existing and adjacent land use. When fully developed, this portion of the tract would contain 4 businesses with 60 employees and 2 commercial vehicles. Preserved portions of the tract would result in the elimination of public access to the site. However, site activities are already limited by access restrictions on adjacent LANL land and, therefore, no significant change would be anticipated. Planned environmental restoration activities would occur prior to conveyance or transfer; but decisions on timing, cleanup levels, and inclusion of certain buildings may be influenced by this land use scenario and input from the receiving party. Disposition may include cleanup of the canyon systems.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock (Continued)	Transportation	Commercial and Residential	For the proposed development, an estimated 5,815 trips per day would be expected to be added to the local transportation system, with an increase of up to 378 trips on State Road 4 and State Road 502 during peak-hour traffic. These volumes and additional trips would be expected to create traffic jam conditions on State Road 4; widening of this road would be required to accommodate the additional traffic volume. Pajarito Road would continue to operate at maximum capacity under this land use scenario.
		Cultural Preservation and Commercial	The contemplated land use of this tract would result in no significant changes in traffic volume on State Road 4 or Pajarito Road near the site.
	Infrastructure	Commercial and Residential	Commercial and residential development would require enhancement of existing infrastructure: electric, gas, water, and sewage lines would need to be upgraded to service new structures; and new roads, parking areas, and structures would be developed. Utility usage would be estimated to increase annually by the following amounts: electricity, 5.2 gwh; natural gas, 99 mcf (2,800 mly); water, 81 mgy (307 mly); and sewage, 41 mgy (155 mly).
		Cultural Preservation and Commercial	Under this land use scenario, no utility upgrading would be necessary due to the small number of anticipated businesses; however, some extension of existing utility lines could be required. Utility usage would be estimated to increase annually by the following amounts: electricity, 0.2 gwh; natural gas, 2 mcf (57 mly); water, 2 mgy (8 mly); and sewage, 1 mgy (4 mly).
	Noise	Commercial and Residential	Noise levels on the tract would increase due to increased traffic and number of residents. Although noise levels along State Road 4 would likely remain in the range of 60 to 70 dBA, significant noise increases would occur on the remaining parts of the tract; that is, existing noise levels of 20 to 30 dBA would increase from 40 to 50 dBA. During construction, noises levels would be expected to range from 74 to 95 dBA.
		Cultural Preservation and Commercial	Under cultural preservation, tract noise levels would remain the same as they are currently; however, during commercial construction, noises levels would be expected to range from 74 to 95 dBA.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock (Continued)	Visual Resources	Commercial and Residential or Cultural Preservation and Commercial	This tract would maintain relatively low public value (Scenic Class IV) visual resources under both of the land use scenarios. However, commercial development under either land use scenario would impact existing moderate public value (Scenic Class III) visual resources on the northwest side of State Road 4, with lesser impacts under the cultural preservation and commercial land use scenario.
	Socio-economics	Commercial and Residential	The use of this tract for commercial and residential development would generate increases in area income; however, these changes would be temporary, lasting only during the construction period. Minor temporary increases in employment are anticipated from the construction of new facilities, which would, in turn, generate increases in regional income. A small number of jobs would be generated by the operation of the recreational vehicle park. Jobs would be expected to be filled by the existing ROI labor force.
		Cultural Preservation and Commercial	Under this land use scenario, there would be short-term increases in area employment and income associated with the construction of limited commercial development and long-term increases once the facilities are operational. These impacts would be greater than those for the commercial and residential land use scenario in that, after development is completed, 60 workers would be employed on the tract and a total of 100 jobs would be generated in the ROI. Jobs would be expected to be filled by the existing ROI labor force.
	Ecological Resources	Commercial and Residential	Approximately 60 acres (24 hectares) of pinyon-juniper woodland would be severely modified or lost under this proposed land use scenario. Habitat would be degraded or lost for Federal-protected species such as the bald eagle, American peregrine falcon, and southwestern willow flycatcher. Habitat destruction would affect wildlife through direct mortality and relocation to other lands. After development, impacts to wildlife species, primarily birds, could occur due to predation from domestic animals.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock (Continued)	Ecological Resources	Cultural Preservation and Commercial	Under this land use scenario, the potential impacts to natural resources would be similar but less compared to the commercial and residential development scenario. Commercial development would be limited to less than 10 acres (4 hectares) near the highway. Lands culturally preserved would not undergo construction, thus preserving the current vegetation and wildlife habitat. In addition, impacts to wildlife disturbance from recreational use would be diminished due to limited public access. Consequently, habitat for most wildlife species would be augmented and improved.
	Cultural Resources	Commercial and Residential	Under this proposed land use scenario, approximately 60 acres (23 hectares) would be directly disturbed by construction activities. Commercial and residential development would cause large-scale disturbance to any cultural resources present due to construction, grading, and trenching. These activities could result in primary impacts to cultural resources through physical destruction, demolition, damage, or alteration. In addition, cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions. Development may potentially impact natural resources utilized by traditional communities. In addition, access to cultural resources would increase with the introduction of additional residents, thereby causing possible destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
White Rock (Continued)	Cultural Resources	Cultural Preservation and Commercial	Dedicating the tract to cultural preservation is anticipated to have a beneficial impact on the cultural resources present; restricted access by the general public would help protect the resources. Another positive impact would be the passive preservation of resources and continued access to traditional cultural properties afforded to traditional practitioners of the receiving party. There may be negative impacts to some current traditional users if general access is restricted. Ongoing negative impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue. Commercial development, although limited, would cause disturbance to any cultural resources present due to construction, grading, and trenching. These impacts could include the destruction of archaeological sites and traditional cultural property locations. In addition, cultural resources avoided by construction may become isolated or have their setting disturbed by elements out of character with the resource, such as visual or audible intrusions.
	Geology and Soils	Commercial and Residential	The contemplated land use identified for this tract would result in a total of approximately 60 acres (24 hectares) of disturbed land. Any structures would be susceptible to a magnitude 7 seismic event.
		Cultural Preservation and Commercial	The cultural preservation land use scenario limits commercial development, resulting in fewer ground disturbing impacts.
White Rock (Continued)	Water Resources	Commercial and Residential	The contemplated land use will not affect groundwater quality or quantity beneath the tract; but any associated increased water usage may contribute to the overall regional water level decline, possibly resulting in the degradation of water quality within the aquifer. Development and construction may potentially affect surface water quality within and downstream of the tract because stormwater runoff may increase over areas that have been denuded and carry sediments and surface contaminants into the drainages.
		Cultural Preservation and Commercial	The contemplated land use will not affect groundwater quality or quantity beneath the tract; but any associated increased water usage may contribute to the overall regional water level decline, possibly resulting in the degradation of water quality within the aquifer. Development and construction may potentially affect surface water quality within and downstream of the tract because stormwater runoff may increase over areas that have been denuded and carry sediments and surface contaminants into the drainages.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE
	Air Resources	Commercial and Residential	Increase in criteria pollutants from mobile sources, homes, and businesses using natural gas or propane. No new sources of hazardous or radioactive air pollutants are expected. The current baseline would remain unchanged: dose is 1.0 millirem from LANL operations. Contributions to global climate change from tract activities would increase considerably from nearly zero to approximately 14,000 tons (12,600 metric tons) per year of carbon dioxide due to the increase in motor vehicle traffic and commercial and residential fossil fuel use.
		Cultural Preservation and Commercial	No discernible difference in air quality is expected. Emissions of criteria pollutants will increase slightly but remain within State and Federal standards for ambient air quality. Contributions to global climate change from tract activities would increase slightly, from nearly zero to about 150 tons (130 metric tons) per year of carbon dioxide.
White Rock (Continued)	Human Health	Commercial and Residential	As many as 2,200 new residents and lodgers including sensitive receptors would be brought into closer proximity to LANL facilities, which would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.
		Cultural Preservation and Commercial	A small number of private-sector employees would be brought into closer proximity to LANL facilities, which would increase the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The closer proximity would slightly increase the radiation dose received by the collective population within the ROI. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.
	Environmental Justice	Commercial and Residential <u>or</u> Cultural Preservation and Commercial	No disproportionately high and adverse impacts on minority and low-income populations would be anticipated from implementing the contemplated land uses on this tract. The White Rock Tract has been identified as a location with TCPs; however, effects to these resources cannot be determined at this time. Legal counsel for the San Ildefonso Pueblo has expressed the opinion that conveyance of the tract and subsequent use would result in environmental justice impacts to the Pueblo's population.

Table 2.5.1-2. Summary of Impacts by Land Tract, Resource Area, and Land Use Scenario (Continued)

LAND TRACTS	RESOURCE AREA	LAND USE SCENARIO	SUMMARY OF IMPACTS OF THE PROPOSED ACTION ALTERNATIVE

Notes: Acreages are approximate and may differ from actual ground surveys conducted later in the conveyance and transfer process.
DBA = decibel A-weighted scale, gwh = gigawatts per hour, mcf = million cubic feet, mgy = million gallons per year, mly = million liters per year, mty = metric tons per year.

3.0 OVERVIEW OF THE AFFECTED ENVIRONMENT

This chapter discusses the regional and local setting associated with the land tracts being considered for conveyance or transfer. Each aspect of the environment or resource area (for example, air quality, water resources) is discussed in Section 3.2 of this chapter.

3.1 Introduction

Because most of the subject tracts are currently part of LANL, the discussion of the regional and local settings for the tracts is tiered to the discussions contained in the LANL SWEIS (DOE 1999c). The exceptions are the Rendija Canyon and the Miscellaneous Manhattan Monument Tracts, which, while administered by the DOE, are not part of LANL, and therefore, were not discussed in the LANL SWEIS. Each resource area summarizes and references the LANL SWEIS where additional data and references can be found. The discussion of each resource area concentrates on those elements that are relevant to the tracts. Additional LANL information is available in annual Environmental Surveillance Reports, which are posted on the LANL web site (http://lib-www.lanl.gov/pubs/Environment.htm).

3.2 Regional and Local Setting

3.2.1 Land Use

Los Alamos is located in a region of north-central New Mexico where the very old and very new adjoin. The active Pueblos of Native Americans, the ruins of prehistoric Indian cultures, and old high-mountain Hispanic villages highlight the natural setting and features of the land. The area is dominated by the Jemez Mountains to the west and the Sangre de Cristo Mountains to the east and contains Santa Fe, the oldest capital city in the nation (see Figure 3.2.1-1). This predominantly undeveloped area supports land uses that range from the protected wilderness areas of Bandelier National Monument (BNM) and Santa Fe National Forest, to the research and development activities carried out at LANL. The LANL facility, located in Los Alamos and Santa Fe Counties, rests on the Pajarito Plateau on the eastern slope of the Jemez Mountains.

Los Alamos County (the County) encompasses approximately 70,400 acres (28,500 hectares). LANL occupies an area of approximately 27,832 acres (11,272 hectares), or 43 square miles (111 square kilometers) of which 86 percent (23,951 acres or 9,700 hectares) lies within Los Alamos County. The remaining 14 percent of LANL lies within Santa Fe County. Los Alamos County, the DOE, U.S. Forest Service (USFS), and National Park Service (NPS) represent the four major governmental bodies that determine land use and provide stewardship of the land within Los Alamos County. In addition, the State of New Mexico, the Bureau of Land Management, and several Native American Pueblos also provide stewardship of additional lands located near Los Alamos.

Land uses on these properties include the following:

- **Los Alamos County.** 29 percent of County land is dedicated to land use associated with the Los Alamos townsite; another 26 percent lies within the community of White Rock where uses range from residential to commercial and retail development; the remaining 45 percent of county

3.0 OVERVIEW OF THE AFFECTED ENVIRONMENT

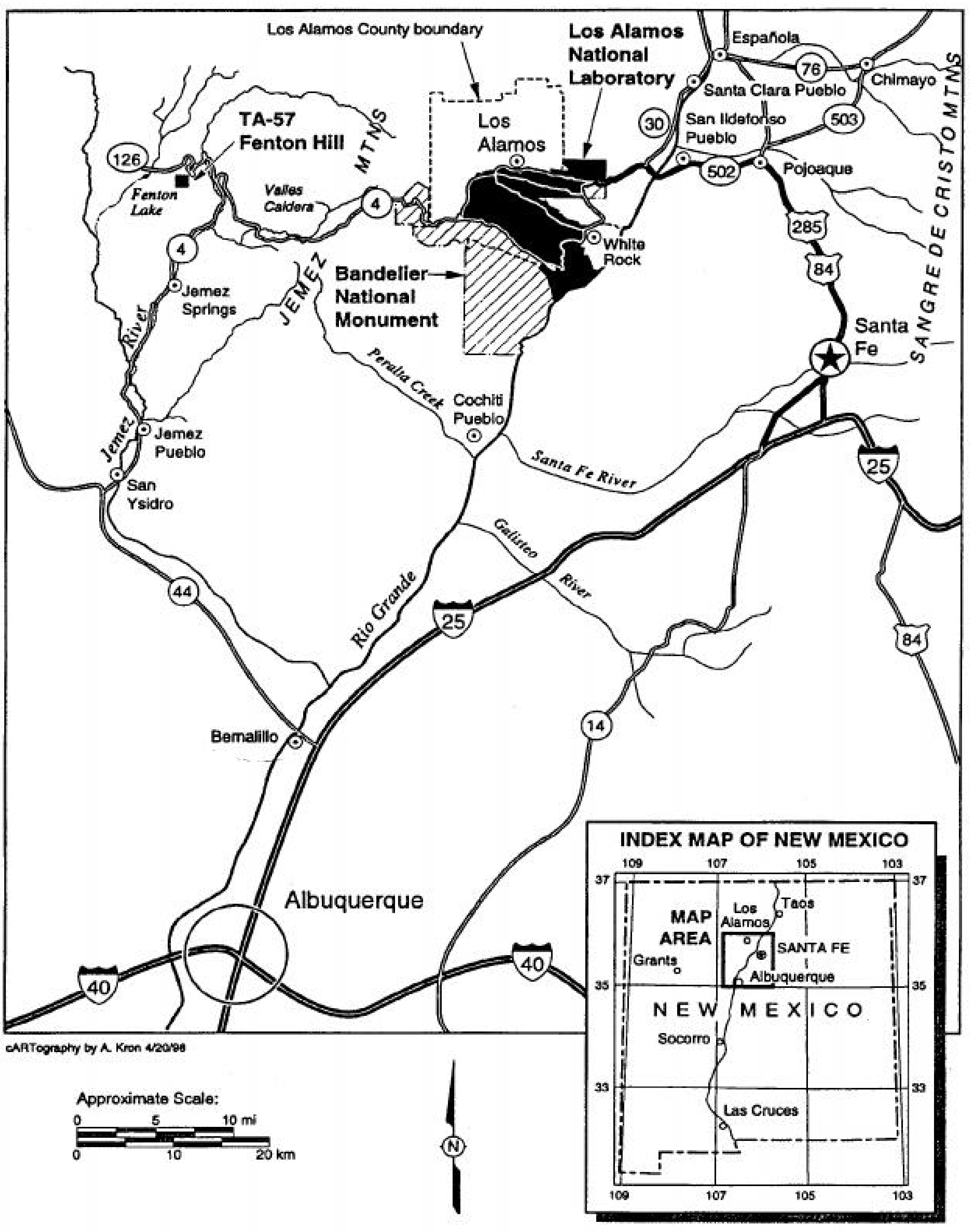

Figure 3.2.1-1. Location of the Los Alamos National Laboratory.

land is undeveloped and dedicated to recreational uses and open space (DOE 1999c).

- **U.S. Department of Energy.** Land use is based primarily on the support, research and development (R&D), R&D waste disposal, explosives waste disposal, and buffer land activities associated with LANL (DOE 1999c).
- **U.S. Forest Service.** Management of the Santa Fe National Forest is directed toward the wise use of land and resources in order to provide optimum long-term public benefits. Guided by the principles of multiple use and sustained yield, the Santa Fe National Forest strives to meet the needs and desires of present and future generations. Existing uses of the Santa Fe National Forest lands in the vicinity of the 10 subject land tracts include tourism; mining; recreational activities, including hiking, hunting, fishing, camping, climbing, and skiing; and other traditional uses such as firewood gathering and tree cutting for vigas and latillas.
- **National Park Service.** Land use activities at BNM in the vicinity of the 10 subject land tracts are dominated by resource management and tourism. BNM consists of two units under the responsibility of the NPS. The larger unit, which is located south of the Los Alamos townsite, is the primary destination for the park's 440,000 annual visitors and includes park headquarters, campgrounds, employee residences, and a visitor center. Seventy percent of this unit is legislated wilderness. The second unit, Tsankawi, is located to the east of Los Alamos, across State Road (SR) 4 from Technical Area (TA) 74 and White Rock Y Tracts. Tsankawi is essentially undeveloped and is visited for its solitude and the opportunity for visitors to explore the archeological resources. Both units contain the cultural remains of present day Pueblo people whose ancestors had occupied the area for centuries. BNM has a legislated mandate to protect the natural and cultural resources of these lands, and to provide for visitor enjoyment and education.
- **State of New Mexico.** Land use on State lands is recreational, based primarily on open space (DOE 1999c).
- **Native American Pueblos.** Lands of the Pueblo of San Ildefonso are located adjacent to the communities of Los Alamos and White Rock, and share the eastern border of LANL in Santa Fe and Sandoval Counties. Land use is based on a mixture of residential use, gardening and farming, cattle grazing, hunting, fishing, food and medicinal plant gathering, firewood production, and general cultural and resource protection. Other Native American lands are located in Sandoval, Santa Fe, and Rio Arriba Counties and have similar uses, together with some commercial and light industrial land use (DOE 1999c).

Land use in Los Alamos County and in the overall region is linked to the economy of northern New Mexico and depends heavily on tourism, recreation, and the State and Federal Governments for its economic base. Area communities are generally small, such as the Los Alamos townsite with approximately 12,000 residents. These communities primarily support residential, commercial, and light industrial land uses. Recreational resources such as hiking trails, cliff faces, parks, and athletic facilities are abundant in the County and highly valued by the residents of local communities (Figure 3.2.1-2).

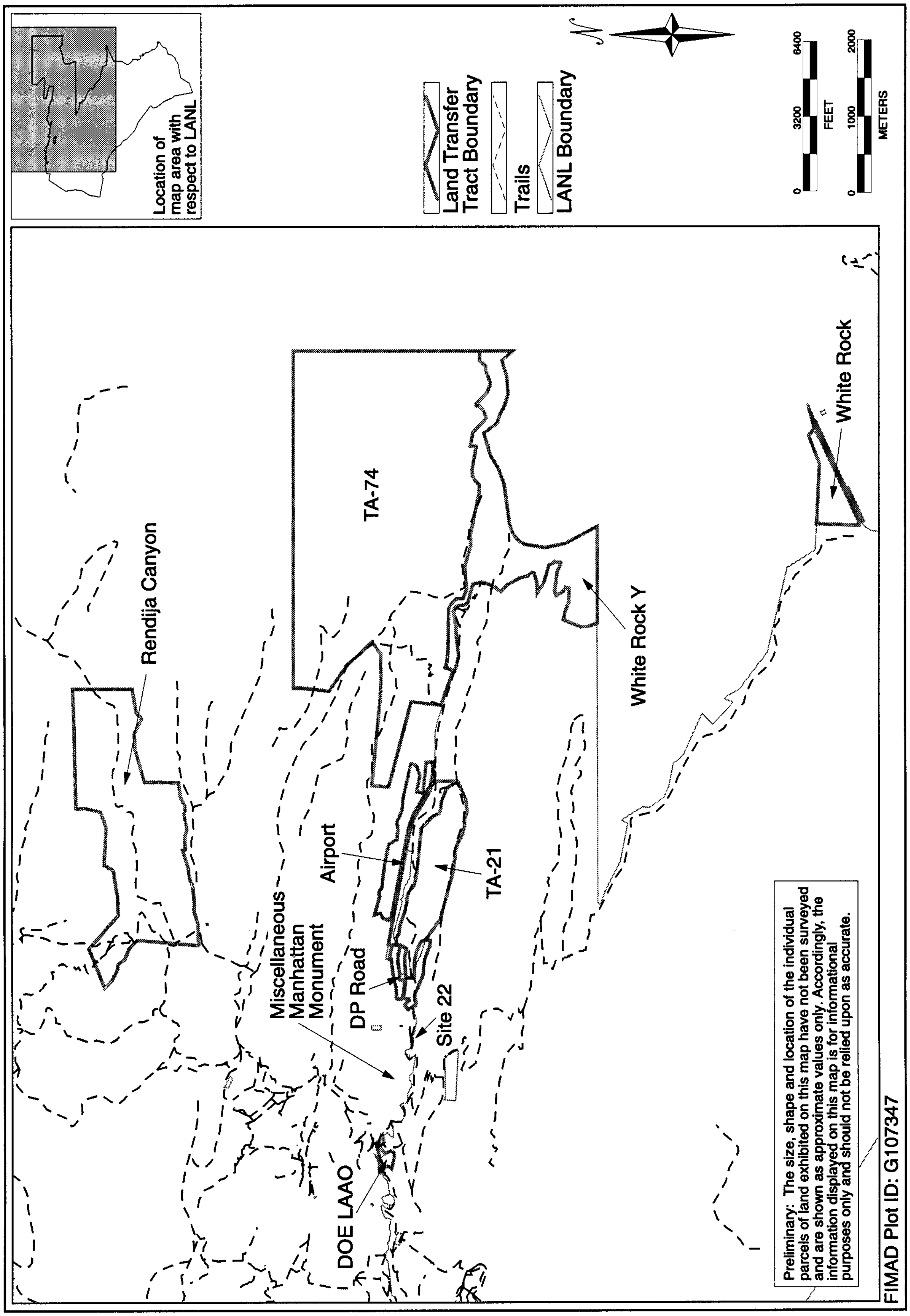

Figure 3.2.1-2. Recreational Trails in the Los Alamos Area.

3.2.1.1 Environmental Restoration

The Environmental Restoration (ER) Project at LANL was established by the DOE in 1989 to assess and remediate sites that were known or suspected to be contaminated because of historical operations and that either were or still are under DOE control. By 1992, the ER Project had reviewed existing historical records and interviewed long-time employees, which resulted in the identification of approximately 2,120 of such sites, called “potential release sites” (PRSs). LANL’s PRSs are diverse and include historically used material disposal areas (MDAs), canyons, outfalls, drain lines, firing sites, industrial sites, and miscellaneous other sites, such as locations of historic spills. By 1994, detailed work plans were being implemented to characterize LANL’s PRSs in accordance with the requirements of the U.S. Environmental Protection Agency’s (EPA) *Resource Conservation and Recovery Act* (RCRA) and Hazardous and Solid Waste Amendments (HSWA) regulations governing the cleanup of hazardous wastes.

In 1996, the DOE Office of Environmental Management initiated a complex-wide strategy to accelerate site cleanup and enhance performance of the cleanup program. In particular, the strategy focuses on completing work at as many sites as possible by the end of fiscal year 2006. Known as *Accelerating Cleanup: Paths to Closure* (DOE 1998c), the plan includes input from all major field sites, including LANL, to support the Office of Environmental Management’s program planning process.

As of September 1998, the LANL ER Project was in some phase of characterization for more than 1,100 PRSs and had reported results on 774 of these PRSs. In addition, the ER Project had conducted cleanups at 120 sites and had recommended 822 sites for no further action (NFA) to the DOE and an additional 586 such sites to New Mexico Environment Department (NMED). The DOE has concurred with 425 such recommendations at the sites over which it has oversight authority, and the NMED has concurred with 102 recommendations and removed 99 sites from Module VIII of LANL’s RCRA permit. The DOE currently estimates that most environmental restoration activities at LANL will be completed by 2008.

In addition to remediating LANL’s PRSs, the ER Project encompasses another important component: decontamination and decommissioning (D&D) of DOE facilities that are contaminated as a result of historical operations and are considered to be surplus. Since 1990, more than 40 such structures have been decommissioned. Approximately 100 additional structures have been slated for D&D in the future, on a schedule determined annually on the basis of budget allocations. Unlike the component of the ER Project related to PRSs, which has a projected year of completion, D&D activities are expected to be ongoing throughout the life of LANL.

Environmental Restoration Activities Associated with the Land Transfer Parcels

There are about 200 PRSs and about 150 DOE structures located within the 10 parcels tentatively identified by the DOE for conveyance and transfer[1]. One of the parcels, the Miscellaneous Manhattan Monument Tract, has no PRSs associated with it and, consequently, the environmental restoration issues associated with it are minimal. At the other end of the spectrum, the TA 21 Tract contains 154 of the 200 PRSs and 125 of the 152 structures. The environmental restoration issues associated with this parcel are the most complex and will be the most costly of all of the tentatively proposed land transfer parcels. Certain of the other parcels, including the

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[1] Additional structures may be present onsite that do not belong to the DOE. The total number of PRSs, buildings, and structures on each tract may change when the tract boundaries are surveyed.

Rendija Canyon Tract, the White Rock Y Tract, the White Rock Tract, and the TA 74 Tract, are situated within one or more canyon drainage systems and could, potentially, have been the recipients of contaminant migration in the past from mesa top or up-canyon locations.

Table 3.2.1.1-1 summarizes the number of PRSs and structures located in each parcel, and identifies other important issues related to LANL ER Project activities.

The issues associated with each of the 10 parcels are presented in detail in Appendix B of this CT EIS, as are the DOE's estimates of total remediation and decommissioning durations.

Environmental Restoration Worker Health and Safety

Environmental restoration activities, which include D&D activities, are undertaken with the intent of reducing the long-term public and worker health and safety risks associated with contaminated sites or with surplus facilities and to reduce risk posed to ecosystems.

Environmental restoration cleanup workers are often the most vulnerable to hazardous exposure and risk. Such workers are frequently engaged in activities that involve radioactive and toxic wastes and under conditions that are conducive to industrial accidents. Protection of worker health and safety is built into the planning of each cleanup project. Decisions regarding whether and how to undertake an environmental restoration action are made after a detailed assessment of the short-term and long-term risks and benefits for options specific to the site in question, and, at LANL, they are made primarily within the framework of the RCRA.

Environmental restoration activities can involve heavy equipment, trenches and other excavations, solvents and other chemicals, and other hazards. Worker health and safety risks are mitigated with work plans, safety

Table 3.2.1.1-1. Summary of Environmental Restoration Sites and Issues Tentatively Identified for Land Transfer Tracts

TRACT	NUMBER OF POTENTIAL RELEASE SITES	NUMBER OF DOE BUILDINGS AND STRUCTURES[a]	OTHER ENVIRONMENTAL RESTORATION ISSUES
Rendija Canyon	4	0	None
DOE LAAO	3	2	None
Miscellaneous Site 22	0	1	Construction debris
Miscellaneous Manhattan Monument	0	1	None
DP Road	10	9	Canyon contamination
TA 21	154	125	Canyon contamination
Airport	25	4	Canyon contamination
White Rock Y	0	6	Canyon contamination
TA 74	4	3	Canyon contamination
White Rock	0	1	Canyon contamination

[a] The number of buildings and structures presented in the Environmental Restoration Report (DOE 1999b) has been slightly modified where possible to exclude structures that are temporary in nature or that do not belong to the DOE.

programs, protective equipment, and similar administrative, education, and physical protection measures.

Because there are no individual or specific environmental restoration actions that have reached a stage where specific remediation work plans, methodologies, tasks, or labor-hour estimates have been developed, any impact analyses of these actions can only be presented in general terms at this time. The short-term risks and controls associated with the environmental restoration activities include the following:

- **Fugitive Dust.** The amount of material suspended in air and the associated risk to human health and the environment is controlled by frequently wetting the ground at the cleanup site.
- **Surface Runoff.** The potential for contaminant transport by surface water flow off of a cleanup site is controlled by collection, flow barriers, or contouring the ground.
- **Soil and Sediment Erosion.** This potential risk is minimized by covering cleanup sites with tarps during storm events.

The environmental restoration activities associated with these tracts are part of the totality of future environmental restoration activities discussed in the LANL SWEIS (DOE 1999c). The risks associated with the transport, treatment, storage and disposal of this waste are included in the LANL SWEIS analyses (in particular, refer to Sections 3.1.14, 3.1.15, 3.2.14, 3.2.15, 3.3.14, 3.3.15, 3.4.14, 3.4.15, 3.6.3.1, 5.2.9, 5.3.9, 5.4.9, and 5.5.9 of the LANL SWEIS).

3.2.2 Transportation

Two state roads, SR 501 and SR 502, serve the County and the immediate LANL area. SR 501, also known as West Jemez Road, enters the region from the south. SR 502 enters the region from the east. SR 4 is a state road that loops around the region to the south and east (see Figure 3.2.1-1).

SR 501 branches north from SR 4 about 5 miles (8 kilometers) southwest of Los Alamos, while SR 4 intersects with SR 502 approximately the same distance east of Los Alamos. South from Española, SR 30 also joins SR 502 approximately 2 miles (3 kilometers) east of the SR 502 and SR 4 intersection and approximately 8 miles (13 kilometers) west of the U.S. 84 and U.S. 285 interchange. Two other roads enter from the east and also provide access to SR 4: East Jemez Road, the designated truck route for entering Los Alamos, and Pajarito Road (Figure 3.2.1-1).

Due to the relative remoteness of LANL and its location on the top of the Pajarito Plateau, the roads into the region have some sharp curves. Although improved in recent years, SR 502 is a winding, rather steep, two- to five-lane highway as it rises up from the canyon floor. Prior to the ascent up the canyon to the mesa, SR 502 is a four- and five-lane road. The other roads into the area, SR 501, East Jemez Road, and Pajarito Road are all two-lane roads.

In general, the traffic into the region is light, although there are substantial peaks in traffic flows due to employment at LANL. A significant number of LANL employees living in White Rock, Española, Jemez Springs, and elsewhere contribute to the traffic levels entering the region during the peak hours of the morning and evenings. Traffic during the noon hour also is dense. Although this causes heavy localized congestion, this congestion is generally experienced for only a limited duration (less than 30 minutes). This localized congestion is inconvenient and frustrating to motorists; however, it would be difficult to justify significant system-wide improvements when the transportation system operates satisfactorily the vast majority of the time.

The SR 4 and SR 502 intersection was reconstructed recently as a grade-separated interchange to accommodate the volume of traffic entering and exiting the region via this intersection.

Although the transportation network near each of the subject tracts may have additional lanes in some areas, the carrying capacity of the roadway is limited to the number of cars that can be accommodated on the narrowest section of road. For instance, SR 502 is a five-lane highway in one section prior to the interchange with SR 4; however, as SR 502 climbs the mesa into Los Alamos it is only a two-lane road. The capacity of SR 502 is therefore limited to the available capacity of the two-lane section even though it could carry significantly more traffic near the interchange.

3.2.3 Infrastructure

Utility systems at LANL and Los Alamos County include electricity service, natural gas, water, sanitary wastewater, and solid waste. Ownership and distribution of these services are split between the DOE and the County and are summarized below for each utility system.

Electricity service comes from the Los Alamos power resource pool and is delivered to LANL and the communities of White Rock and Los Alamos via two regional 115-kilovolt transmission lines. The installation of an additional transmission line is under consideration currently by DOE (see Chapter 1, Section 1.5.4). This third line would split the existing power between three lines instead of two to increase reliability and could be adapted to provide additional delivery capacity when new power sources become available. A steam/power plant at LANL's TA 3 can generate additional power on an as-needed basis. There also are hydroelectric facilities at Abiquiu and El Vado Reservoirs.

The natural gas system includes a DOE-owned high-pressure main, a distribution system, and pressure reducing stations to LANL facilities. The County owns the gas distribution systems to the Los Alamos townsite and White Rock.

The water system includes supply wells, water chlorination and pumping stations, storage tanks, and distribution piping. The DOE is currently in the process of transferring ownership of water rights, wells, rights-of-way, and distribution equipment to the County. Following transfer, the County would generally own all water production and distribution facilities except distribution systems within LANL technical areas. For a detailed discussion of the transfer of water rights to the County, see Section 3.2.3.1.

The Sanitary Wastewater Systems Consolidation (SWSC) Plant handles wastewater from most LANL buildings. The County-owned Bayo Wastewater Treatment Plant and White Rock Wastewater Treatment Facility handle sewage for the Los Alamos townsite and White Rock, respectively. Solid waste from LANL and the County is disposed at the DOE-owned, County-operated landfill. The landfill also receives waste from the City of Española. Santa Clara Pueblo has petitioned to send their solid waste to the DOE landfill and is awaiting approval from the DOE. The County has decided to close the current landfill and is planning the development of a new regional solid waste facility (PC 1999c).

Table 3.2.3-1 shows the current annual usage of utilities by LANL and the County and the existing system capacity. For more detailed information on LANL utilities and infrastructure, please refer to the LANL SWEIS, Section 4.9.2 (DOE 1999c).

3.2.3.1 LANL and Los Alamos County Water Rights

Until September 8, 1998, the DOE supplied all potable water for LANL, BNM,

Table 3.2.3-1. Annual Usage and Capacity of Utilities

	PEAK POWER mw	ELEC. gwh/yr	GAS mcf (mly)	WATER mgy (mly)		SEWAGE mgy (mly)			SOLID WASTE tpy (mty)
				COUNTY	LANL	SWSC	BAYO	WHITE ROCK	
System Limits[a]	107	937	8,100 (229,400)	1,260[b] (4,770)	540 (2,044)	220 (833)	500 (1,893)	300 (1,136)	None
Baseline Usage									
LANL[c]	95	628	2,020 (57,200)	---	693[d] (2,624)	187 (708)	---	---	2,860 (2,600)
County + BNM	14	94	1,040 (29,500)	963 (3,645)	---	---	365 (1,382)	146 (553)	15,990 (14,500)
Total	109	722	3,060 (86,700)	963 (3,645)	693 (2,624)	187 (708)	365 (1,382)	146 (553)	18,850 (17,100)
Remaining Capacity	-2	215	5,040 (142,700)	297 (1,125)	-153(-579)	33 (125)	135 (511)	154 (583)	7 years[e]

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mgy = million gallons per year, mly = million liters per year, tpy = tons per year, mty = metric tons per year

[a] For electricity, this is the sum of the contractual import limits and onsite generation; for gas, this is the contract limit; for sewage, this is the design limit of the system; for water, this is the legal water rights.

[b] Does not include Los Alamos County's rights to 391 mgy (1,400 mly)of San Juan-Chama River water, for which there is currently no mechanism for delivery.

[c] Projected usage from the LANL SWEIS No Action Alternative. Figures reflect a decrease in the anticipated peak power usage of the Low Energy Demonstration Accelerator (LEDA) Project.

[d] Includes 20 mgy (75 mly) of water use for Strategic Computing Complex (SCC). The SWEIS assumes 100% of SCC water needs will be met with treated wastewater. Here, it is assumed that only 2/3 of the water needs will be met with wastewater, and the other 1/3 will come from fresh water.

[e] Expected life of the landfill at current solid waste generation rates.

and Los Alamos County, including the towns of Los Alamos and White Rock. On that date, the DOE leased or conveyed portions of its water production and distribution system to the County of Los Alamos. The delineation between County and the DOE's water rights, production, and distribution system under this agreement is essentially as follows: the lease of the Los Alamos Water Production System, including all water distribution lines up to the main distribution point at the boundary of each TA; the lease of surface and groundwater rights amounting to 5,541.3 acre feet (1,805 million gallons [or 6,833 million liters]) of water per year (DOE 1999c, Section 4.9.2.1); and the conveyance of DOE's contracted annual right obtained in 1976 to 1,200 acre feet (391 million gallons [or 1,480 million liters]) of San Juan-Chama Transmountain Diversion Project water (DOE/LAC 1998a). Neither the DOE nor the County has constructed a delivery system for the San Juan-Chama River waters from El Vado Lake and Abiquiu reservoirs to the County or LANL. The lease agreement "shall terminate on the earlier of the 7th day of September, 2001 or upon delivery by the Government of a quitclaim deed conveying the Leased Premises to the Lessee." The ultimate intent, pending indemnification, is for the DOE to convey to Los Alamos County 70 percent of the DOE water right and lease to Los Alamos County the remaining 30 percent. Per the lease agreement, the DOE would have purchase rights from the County for the 30 percent of the water right.

On several occasions since 1986 through 1998, LANL operations have exceeded 30 percent of the total DOE annual water right (not including San Juan-Chama Transmountain Diversion Project water). The agreement between the DOE and the County does not preclude provision of additional waters in excess of the 30 percent agreement, if available. However, the agreement states that should the County be unable to provide water to its customers, then the County shall be entitled to reduce water services to the DOE in an amount equal to the water rights deficit (DOE/LAC 1998b).

3.2.4 Noise

Noise is traditionally defined as unwanted sound. Vibrations include air blasts (also known as air pressure waves) and ground vibrations. Higher frequency air blast vibrations are audible, while lower frequency air blast and ground vibrations may cause a secondary and audible noise within structures. The characteristics of sound include parameters such as amplitude (loudness), frequency (pitch), and duration. The decibel (dB), a logarithmic unit that accounts for large variations in amplitude, is the accepted standard measurement for sound. The threshold for human hearing is between 1 and 5 dB. The threshold of pain, at the other end of the audible scale, occurs at approximately 140 dB (GSA 1997).

Humans are capable of hearing only a limited range of frequencies, from 20 to 20,000 hertz. In addition, the human ear is not equally sensitive to all frequencies over this range. In order to take this characteristic into account when measuring noise, a frequency-weighting known as A-weighting is commonly applied to sound levels. Because the A-weighted scale closely describes the response of the human ear, it is most commonly used in noise measurements. A-weighted sound levels are expressed as dBA. Examples of typical A-weighted sound levels are shown in Table 3.2.4-1.

Sounds also can be measured in C-weighted decibels (dBC), a measurement that reflects a nearly uniform response to frequencies from 30 to 10,000 hertz. C-weighted sound measurements tend to be larger than their A-scale equivalents. In addition, while the A-weighted scale is best for human noise response, the C-weighted scale is more representative of sounds heard by animals.

Table 3.2.4-1. Comparative A-Weighted Sound Levels

COMMON OUTDOOR SOUNDS	SOUND LEVEL (dBA)	COMMON INDOOR SOUNDS
Jet flyover at 1,000 feet (300 meters)	110	Rock band
Gas lawn mower at 3 feet (0.9 meter)	100	Subway train
Diesel truck at 50 feet (15 meters)	90	Food blender or garbage disposal at 3 feet (0.9 meter)
Major urban center, daytime	80	Shouting at 3 feet (0.9 meter)
Gas lawn mower at 100 feet (30 meters)	70	Vacuum cleaner at 10 feet (3 meters)
Heavy traffic at 300 feet (90 meters)	60	Large business office; dishwasher in the next room
Urban center, daytime	50	Background noise in large conference room
Urban center, nighttime	40	Background noise in a library
Suburban area, nighttime	30	Bedroom at night
Rural area, nighttime	20	Background at a recording studio; average whisper
Rustle of leaves in the wind	10	Threshold of hearing

Source: DOE 1996b

Regulatory noise and vibration limits in the Los Alamos region are outlined in depth in the LANL SWEIS (DOE 1999c, Section 4.1.3.1).

3.2.4.1 Existing Noise Levels

Common sources of noise in the region include traffic, sirens, construction, lawnmowers, ventilation fans, refrigeration units, and other commercial noises. Less frequently encountered sounds include those from firearms practice, thunder, and LANL explosives testing. Noise and air and ground vibrations, even noise created by traffic, are intermittent aspects of the Los Alamos area. Although the receptor most often considered for these environmental conditions is human, noise and vibration also are perceived by animals and may be perceived by plants. Vibration also may contribute to physical damage of property.

Some studies of ambient noise levels in the Los Alamos region have been performed. Readings ranged from 31 to 35 dBA at the entrance to BNM on SR 4, and from 38 to 51 dBA in White Rock (DOE 1995, page 4-16). The White Rock readings of 40 to 50 dBA are within expected sound levels for residential areas.

Traffic noise from trucks and automobiles within the County contributes heavily to background noise in the region. Although some measurements have been made, these sound levels are found to be highly dependent upon the measurement location, time of day, and meteorological conditions such as wind direction and strength. Therefore, there is no single representative measurement for ambient traffic noise.

Intermittent noise and vibrations are experienced in the Los Alamos area due to explosives testing and summer thunderstorms. Studies conducted to assess the noise and vibration impact of explosives testing conclude that local noise limits are not being exceeded by these tests. The air blasts and ground vibrations generated by explosives testing would not be expected to damage either sensitive historic or prehistoric structures or other buildings in the region (DOE 1999c, page 4-21).

3.2.5 Visual Resources

The area that includes the Los Alamos townsite and the subject tracts for this CT EIS are located within a region of great visual diversity and resources. Visual resources include scenery in the near, middle, and distant landscape. Views throughout the region include mountains, mesas, mesa side slopes, rolling hills, flat areas, and canyons. Vegetation ranges from fairly dense forest to rugged, rocky, less vegetated areas. This creates another level of visual interest with color and texture. The visual character of the region also includes residential communities and highly developed building complexes and associated facilities. A large variety of views may be seen at almost any location in the region.

3.2.5.1 Physical Characteristics of the Visual Environment

The topography of this part of northern New Mexico is rugged, especially in the vicinity of Los Alamos. Mesa tops are cut by deep canyons, creating sharp angles in the landforms. In some cases, slopes are nearly vertical with exposed geology in striking, contrasting horizontal planes of color varying from bright orange-red to almost white. Terrain alteration has been relatively limited in the region, and disturbance has occurred for the most part on the level plateau areas. The most obvious terrain alterations in this area are the side-hill cuts needed for roadways. However, these steep cuts are not as out of character with the surrounding sharply angled terrain as they would be in more gentle topography.

A variety of vegetation occurs in the region, adding to the visual interest. The range of vegetation communities include low-lying meadows (grasslands and recent burn areas), mixed grass, shrub and savannah lands, and dense conifer evergreen forests. The height and density of trees may obscure many views and partially screen others. Portions of LANL located along mesa tops at the lower elevations of the facility toward the eastern site boundary are covered with grasslands, mixed shrubs, or short trees with sparsely distributed taller trees, allowing greater visibility from within the viewshed. In contrast, portions of LANL located at the upper elevations toward the western boundary are more densely covered by tall mixed conifer forests that lessen the visibility of these areas.

The most obvious modern alteration of the natural environment is development. Within LANL and the Los Alamos townsite, much of this development is austere and utilitarian in appearance, contrasting greatly with nature (DOE 1999c). Because both LANL and the townsite were established in response to a national emergency, many buildings were built as temporary structures. Overcrowded conditions, due to the limited amount of land, often have resulted in an unplanned, visually discordant assembly of structures and functions, equipment, parking, and outside storage. More recent development, however, includes many facilities with designs and materials that are more visually appropriate and compatible with the natural environment.

Visibility related to air quality is an important facet of the visual environment within the Los Alamos viewshed. Smoke is produced in the viewshed by residential burning, controlled forest management burns, and the periodic burning of high explosives waste material at LANL. Similarly, light pollution from various sources within the Los Alamos viewshed is an important facet of the nighttime visual environment with regard to the visibility of LANL and the visibility of celestial features.

The visual assets of the 10 subject tracts reflect the variety of the Los Alamos region. While some of the tracts include the visually discordant elements of developed industrial sites, others include large expanses of natural and undeveloped canyon areas. For more detailed information on the visual resources of the Los Alamos region, please refer to the LANL SWEIS, Section 4.1.2 (DOE 1999c).

3.2.6 Socioeconomics

This section presents an overview of current socioeconomic conditions within the region of influence (ROI). The ROI for this analysis is a three-county area that includes Los Alamos, Santa Fe, and Rio Arriba Counties.

3.2.6.1 Los Alamos County Self-Sufficiency

Los Alamos County is a unique municipality. The vast majority of the property and economic activity (LANL) in the County is exempt from taxation but generates significant demands for public services. In light of this serious constraint to revenue generation, the County faces the dilemma of how to continue to provide services while dealing simultaneously with declining revenues resulting from the loss of Federal assistance payments and increasing costs arising from accepting and operating DOE facilities.

Los Alamos County has long been economically dependent on assistance payments from the DOE. As a result of budget constraints, these assistance payments have ended. The County has been, and continues to be, greatly restricted in efforts toward diversification of its economy to reduce dependence upon LANL. Any discussion of self-sufficiency for Los Alamos needs to recognize the factors that have significantly hindered economic development to date, such as rugged topography, a location remote from materials or markets, a high cost of living, revenue generation restrictions, and a limited workforce.

3.2.6.2 Employment and Income

The ROI has historically depended in a large part on government employment. Because the ROI includes the cities of Los Alamos and Santa Fe, both the Federal and State Governments generate many jobs within this area. However, as shown in Table 3.2.6.2-1, the private sector has been gaining in importance. In 1996, government employment was second to the service sector in terms of the percentage of jobs provided in the ROI. The service sector is the largest employer in the ROI, providing 34.9 percent of the jobs in the ROI, while government provides 25.8 percent of the jobs in the ROI, and the wholesale and retail trade sector provide 19 percent. Historically, these three sectors have been the dominant employers (BEA 1998).

Traditionally, the unemployment rate in the ROI has been lower than the unemployment rate in New Mexico and has remained steady, as shown in Table 3.2.6.2-2. The 1997 unemployment rate in the ROI ranged from 1.7 percent in Los Alamos County to 10.7 percent in Rio Arriba County, averaging 5.2 percent. The unemployment rate in New Mexico averaged 6.2 percent in 1997 (BLS 1998).

The average per capita income in the ROI was $22,861 in 1996, a 31 percent increase over the 1990 level of $17,398. Average per capita income levels in the ROI ranged from a low of $12,243 in Rio Arriba County to a high of $32,257 in Los Alamos County. The

Table 3.2.6.2-1. Employment by Sector in the Region of Influence

SECTOR	PERCENTAGE		
	1980	1990	1996
Services	26.7	32.3	34.9
Government and Government Enterprises	37.2	29.4	25.8
Wholesale and Retail Trade	16.1	18.1	19.0
Finance Insurance and Real Estate	5.7	5.9	6.4
Construction	5.4	5.9	5.9
Manufacturing	3.1	3.6	3.4
Transportation and Public Utilities	2.4	2.0	1.9
Farm Employment	2.1	1.5	1.3
Other	1.3	1.3	1.4

Source: BEA 1998

Table 3.2.6.2-2. Unemployment in the Region of Influence and New Mexico

AREA	1990	1995	1997
Los Alamos County	1.5%	2.0%	1.7%
Rio Arriba County	13.5%	11.9%	10.7%
Santa Fe County	3.3%	4.3%	4.1%
ROI	5.0%	5.4%	5.2%
New Mexico	6.5%	6.3%	6.2%

Source: BLS 1998

1996 average per capita income in New Mexico was $18,814 (BEA 1998).

3.2.6.3 Population and Housing

Population

The ROI population grew steadily from 1980 to 1994, with annual growth rates ranging between 2.1 and 3.1 percent. The rate of growth has slowed since 1994 and averaged just 0.1 percent between 1996 and 1997. Population growth is expected to remain slow. Population projections for the ROI through 2025 are shown in Table 3.2.6.3-1 (Census 1994 and Census 1998).

Table 3.2.6.3-1. Population Estimates for the Region of Influence

COUNTY	1990	1995	2000	2005	2010	2015	2025
Los Alamos	18,134	18,605	21,121	22,852	24,482	26,098	29,113
Rio Arriba	34,507	36,853	40,897	44,250	47,406	50,535	56,374
Santa Fe	99,498	112,807	125,848	136,163	145,877	155,504	173,470
ROI	152,139	168,265	187,866	203,265	217,765	232,137	258,957

Sources: Census 1998 and BEA 1998

Housing

In 1990, there were a total of 21,125 housing units in the ROI, 17,216 of which were occupied. The majority of these were single-family, detached houses. Rental vacancy rates ranged from 12.3 percent in Los Alamos County to 21.8 percent in Santa Fe County, while owner-occupied vacancy rates ranged from 2.2 percent in Los Alamos County to 5.6 percent in Santa Fe County (Census 1992). ROI housing characteristics are shown in Table 3.2.6.3-2.

3.2.6.4 Community Services

This section discusses the following community services in the ROI: medical services, education, law enforcement, and fire protection.

Medical Services

The ROI contains five hospitals with a total capacity of 428 beds. Three of these hospitals are located in Santa Fe County. All of the hospitals operate at well below capacity (AHA 1995). There are 427 doctors serving the ROI, the majority of whom are located in Santa Fe County (AMA 1996).

Education

The ROI encompasses four school districts with over 23,700 students and about 1,377 teachers (see Table 3.2.6.4-1). Student enrollment in the Los Alamos School District increased 6.5 percent during the period from 1990 to 1995, although enrollment decreased during the 1996-1997 school year. Student enrollments at the other ROI school districts have remained stable with increases of about 4 percent during the period from 1990 to 1995. None of the school districts in the ROI is at full capacity. The Los Alamos School District owns four facilities that are currently leased to other parties, while the Pojoaque School District actively recruits students from other districts.

There are several private, post-secondary educational institutions located in the ROI and one public institution, the University of New Mexico, Los Alamos.

Law Enforcement

Police protection within the vicinity of LANL is provided by the Los Alamos County Police Department, which is staffed with 39 officers and 4 detention personnel. The department, with a budget of about $3.7 million, responds to over 1,700 service calls per month and is involved in various community programs. Both Santa Fe and Rio Arriba Counties have a Sheriff’s Office with a staff of 87 and 42, respectively (DOE 1999c). In addition, the Santa Fe Police Department supports a staff of 192, while the Chama Police Department in Rio Arriba County has a staff of 5 employees (HPI 1998).

Table 3.2.6.3-2. Region of Influence Housing Characteristics (1990)

COUNTY	TOTAL NUMBER OF HOUSING UNITS[a]	NUMBER OF OWNER-OCCUPIED UNITS	OWNER-OCCUPIED VACANCY RATES	MEDIAN VALUE	NUMBER OF OCCUPIED RENTAL UNITS	RENTAL VACANCY RATES	MEDIAN MONTHLY CONTRACT RENT
Los Alamos	7,766	4,836	2.2	$126,100	1,961	12.3	$403
Rio Arriba	6,902	3,856	3.0	$58,800	2,135	11.6	$191
Santa Fe	6,457	3,247	5.6	$103,300	1,181	21.8	$425
ROI	21,125	11,939	—	—	5,277	—	—

[a] This number includes housing units that are only used for seasonal, recreational, and other uses.

Source: Census 1992

Table 3.2.6.4-1. Public School Statistics in the LANL Region of Influence (1995-1996 School Year)

SCHOOL DISTRICT	STUDENT ENROLLMENT[a]	TEACHERS[a]	TEACHER/ STUDENT RATIO	OPERATIONAL EXPENDITURES PER STUDENT
Los Alamos	3,606	253.8	1:14.2	$6,640
Santa Fe	12,789.5	706.1	1:18.1	$3,665
Española	5,130	283.5	1:18.1	$3,986
Pojoaque	1,852.5	103.5	1:17.9	$4,011
State Average	—	—	1:17.0	$4,009

[a] These are full-equivalent figures.

Source: DOE 1999c

Fire Protection

The Los Alamos County Fire Department facilities and equipment are owned partially by the DOE, operated by Los Alamos County, and staffed by County employees. Recent disposition of several fire department facilities from the DOE to the County have occurred. The fire department provides medical and rescue emergency response, and fire suppression and prevention services to both LANL and the Los Alamos County communities. The department operates (on a full-time basis) five fire stations, including two at LANL, and a training facility at the fire department headquarters (DOE 1999c).

3.2.7 Ecological Resources

The following ecological resource description and discussion is intended to provide the reader with a general ecological overview of the organisms present in the LANL region and their relationship with their environment. Specific tract information is addressed in Chapters 5 through 14. This information was primarily extracted and condensed from the LANL SWEIS (DOE 1999c).

3.0 OVERVIEW OF THE AFFECTED ENVIRONMENT

The biodiversity of the LANL region is shaped by the variety and dynamic interactions of elevation, climate, topography, soils, water, vegetation, and animal life, along with historic and current land use practices. Variation in precipitation and temperature and differences in the amount of sunlight that reach the north-facing and south-facing canyon slopes have resulted in a diversity of plant life, wildlife, and soils. The mosaic of mesa tops, mountains, canyon bottoms, cliffs, and steep slopes within this region support the habitats of numerous Federal-and State-protected species.

The LANL SWEIS used two organizational themes to address ecological resources within the LANL region: watershed units and major vegetation zones. As mapped, the LANL region includes 14 regional watersheds bounded by Guaje Canyon on the north, Frijoles Canyon on the south, the crest of the Jemez Mountains on the west, and the Rio Grande on the east (see Figure 3.2.7-1, Watersheds and Vegetation Zones in the Los Alamos Area). The watersheds potentially affected from the Proposed Action Alternative are Barrancas, Bayo, Cañada del Buey, Guaje, Los Alamos, and Pueblo watersheds.

While watersheds traverse all or part of the elevational gradient, major vegetation zones are organized into elevation- and aspect-defined bands across this gradient. Increasing temperature and decreasing moisture along the approximately 12-mile (19-kilometer) wide, 5,000-foot (1,500-meter) elevational gradient from the peaks of the Jemez Mountains to the Rio Grande are primarily responsible for the formation of five broad bands, containing six major vegetation zones. These vegetation zones consist of montane grasslands, spruce-fir forest, mixed-conifer forest (with aspen forest), ponderosa pine forest, pinyon-juniper woodland, and juniper savannah. The vegetation zones and associated ecotones provide habitat, including seasonal and year-round breeding, foraging, calving, fawning, and denning habitat, and migration routes for a diversity of resident and migratory wildlife species. This diversity is illustrated by the presence of over 900 species of vascular plants; 57 species of mammals; 200 species of birds, including 112 species known to breed in Los Alamos County; 28 species of reptiles; 9 species of amphibians; and over 1,200 species of arthropods. No fish species have been found within LANL boundaries. Land tracts proposed for conveyance or transfer primarily support ponderosa pine forest, pinyon-juniper woodland, or juniper savannah vegetation.

In some of these land tracts, long-term fire suppression coupled with a lack of forest management has resulted in the unnatural heavy accumulation of live and dead vegetation. High fuel loads (vegetation) pose a severe wildfire hazard to natural resources, cultural resources, and structures. The County is a member of the Los Alamos Wildfire Cooperators and Interim Fire Management Team. The goals of these organizations are to develop a cooperative urban interface plan and to develop wildfire protection requirements. The Pueblo of San Ildefonso is not a member of either organization.

The primary large-scale components of the watersheds are the mesa tops and canyons. Mesa tops provide important foraging habitat, wildlife corridors that are especially important for canyon-to-canyon travel, and provide differing seasonal climatic conditions (such as temperature) compared to other habitats.

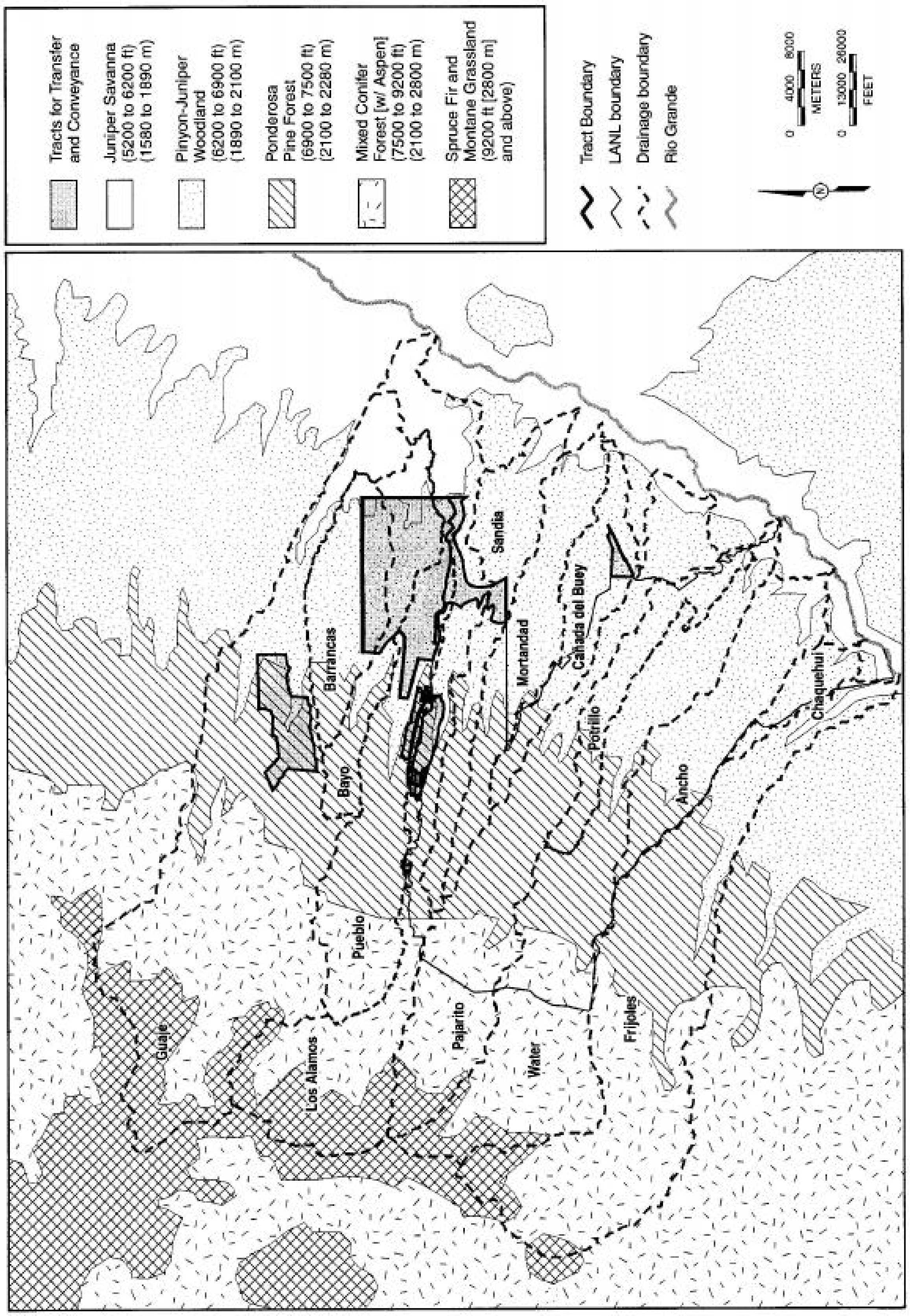

Figure 3.2.7-1. Watersheds and Vegetation Zones in the Los Alamos Area.

The canyons within each of these watersheds contain an abundant and diverse array of wildlife. The canyons contain a more complex mix of habitats than the adjacent mesa tops and provide nest and den sites, food, water, and travel corridors. Mammals and birds are especially evident in these environments. Large and medium mammals, such as black bears (*Ursus americanus*), mountain lions (*Felis concolor*), bobcats (*Lynx rufus*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), elk (*Cervus elaphuis nelsoni*), and mule deer (*Odocoileus hemionus*) are known to use some portion of nearly all regional canyons. Regional canyon systems also are essential to a variety of Federal-and State-protected species. The north-facing slopes of these canyons provide habitat for rare species, like the State-endangered yellow lady slipper orchid (*Cypripedium calceolus L.* var. *pubescens* [*Willd.*] *Correll*), as well as the Jemez Mountain salamander (*Plethodon neomexicanus*), a Federal species of concern and State-threatened species. Mexican spotted owls (*Strix occidentalis lucida*), which are Federal-listed as threatened, and American peregrine falcons (*Falco pereginus anatum*), which are Federal-listed as endangered, are known to nest in the regional canyons. Wetlands are found in each of these vegetation zones, and the majority of wetlands on LANL 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. Wetlands provide habitat, food, and water for a wide variety of fauna including Federal- and State-protected species. Of the tracts proposed for conveyance or transfer, the Airport, Rendija Canyon, White Rock, White Rock Y, TA 21, and TA 74 Tracts contain wetlands (LANL 1998d). See Appendix D of this CT EIS for further description of the wetlands.

A number of regionally protected and sensitive (rare or declining) species potentially are present in the LANL region (see Table 3.2.7-1, Protected and Sensitive Species). These consist of 5 Federal endangered species, 2 Federal threatened species (USFW 1998), 1 candidate species, and 20 species of concern[2] (USFWS 1998). The black-footed ferret (*Mustela nigripes*), Federal-listed as endangered, was once widely distributed between Saskatchewan, Canada, and Arizona, New Mexico, and Texas where it lived in close association with prairie dog colonies. It has not been sighted in New Mexico since 1934. The Arctic peregrine falcon (*Falco peregrinus tundrius*), Federal-listed as endangered, breeds in the Arctic tundra and inhabits coastlines and mountains from Florida to South America in winter. In New Mexico it is considered a rare migrant, having been verified only in the Roswell area. An experimental population of endangered whooping cranes (*Grus americana*), consisting of four individuals, migrates along with sandhill cranes (*Grus canadensis*) in October through mid November and from March through April following the Rio Grande through northern and central New Mexico to overwinter in southern New Mexico. The whooping cranes roost on sandbars along the way, including those in White Rock Canyon and the upper sections of Cochiti Reservoir. This is the only known period when whooping cranes might occur on or near LANL (LANL 1998a).

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[2] Federal-listed endangered and threatened species and their critical habitat are provided legal protection under the *Endangered Species Act*. Candidate species are taxa for which the U.S. Fish and Wildlife Service (USFWS) has sufficient information to propose that they be added to the list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities. Species of concern are those that may be of concern to the USFWS but do not receive recognition under the *Endangered Species Act* and that USFWS encourages agencies to include in NEPA studies.

Table 3.2.7-1. Protected and Sensitive Species

SPECIES	FEDERAL STATUS	STATE STATUS	HABITAT NEEDS	COMMENTS
Animal Species				
American Peregrine Falcon *(Falco peregrinus anatum)*	Endangered	Threatened	• Uses the juniper savannah, pinyon-juniper woodland, ponderosa pine forest, and mixed-conifer forest biotic zones • Requires cliffs for nesting	• Observed breeding and foraging on LANL and adjacent lands
Arctic Peregrine Falcon *(Falco peregrinus tundrius)*	Endangered due to similarity of appearance to the American Peregrine Falcon	Unlisted	• Rare migrant	• Verified only in the Roswell, New Mexico area
Whooping Crane *(Grus americana)*	Endangered	Endangered	• Requires rivers and marshes • Roosts on sand bars	• Migratory visitor along the Rio Grande and Cochiti Lake
Southwestern Willow Flycatcher *(Empidonax traillii extimus)*	Endangered	Threatened	• Requires riparian areas • Requires willows and cottonwoods	• Observed in Jemez Mountains • Potential breeding areas on LANL lands • Observed in Rio Grande Valley near Española
Black-Footed Ferret *(Mustela nigripes)*	Endangered	Unlisted	• Requires grasslands in association with prairie dogs	• Regional habitat could support the species • Last confirmed sighting in New Mexico occurred in 1934
Mountain Plover (*Charadrius montanus)*	Candidate Species	Unlisted	• Moderate elevation, open plains especially short grass prairie and sage brush	• Two potential sightings of flocks of mountain plovers during 1995 and 1996 fall migrations (PC 1999a)

Table 3.2.7-1. Protected and Sensitive Species (Continued)

SPECIES	FEDERAL STATUS	STATE STATUS	HABITAT NEEDS	COMMENTS
Animal Species				
Bald Eagle *(Haliaeetus leucocephalus)*	Threatened	Threatened	• Riparian areas	• Observed as a migratory and winter resident along the Rio Grande and on adjacent LANL lands
Mexican Spotted Owl *(Strix occidentalis lucida)*	Threatened	Unlisted	• Uses the pinyon-juniper woodland, ponderosa pine forest, and spruce-fir forest biotic zones • Prefers mature and old-growth forests	• Breeding resident on LANL, County, BNM, and Santa Fe National Forest lands
Jemez Mountain Salamander *(Plethodon neomexicanus)*	Species of Concern	Threatened	• Uses the mixed-conifer forest biotic zone • Requires north-facing, moist slopes	• Permanent resident on LANL, County, BNM, and Santa Fe National Forest lands
Bairds Sparrow *(Ammodramus bairdii)*	Species of Concern	Threatened	• Uses the pinyon-juniper woodland, ponderosa pine forest and mixed-conifer forest biotic zones	• Observed on Santa Fe National Forest lands
Spotted Bat *(Euderma maculatum)*	Species of Concern	Threatened	• Uses the pinyon-juniper woodland, ponderosa pine forest, and spruce-fir forest biotic zones • Requires riparian areas • Roosts in cliffs near water	• Permanent resident on BNM and Santa Fe National Forest lands • Unconfirmed reports on LANL lands
New Mexico Jumping Mouse *(Zapus hudsonius luteus)*	Species of Concern	Threatened	• Uses the mixed-conifer and spruce-fir forest biotic zones • Requires riparian areas • Requires water nearby	• Permanent resident on County and Santa Fe National Forest lands • Overwinters by hibernating
Flathead Chub *(Platygobio gracilis)*	Species of Concern	Sensitive	• Requires access to perennial rivers	• Permanent resident of the Rio Grande between Española and the Cochiti Reservoir

Table 3.2.7-1. Protected and Sensitive Species (Continued)

SPECIES	FEDERAL STATUS	STATE STATUS	HABITAT NEEDS	COMMENTS
Animal Species				
Ferruginous Hawk *(Buteo regalis)*	Species of Concern	Sensitive	• Uses the juniper savannah and pinyon-juniper woodlands biotic zones	• Observed as a breeding resident on County, LANL, BNM, and Santa Fe National Forest lands
Northern Goshawk *(Accipiter gentilis)*	Species of Concern	Sensitive	• Uses the mixed-conifer, ponderosa pine, spruce-fir forest biotic zones	• Observed as a breeding resident on County, LANL, BNM, and Santa Fe National Forest lands
White-Faced Ibis *(Plegadis chihi)*	Species of Concern	Sensitive	• Requires perennial rivers and marshes	• Summer resident and migratory visitor on the Rio Grande and Santa Fe National Forest lands
Loggerhead Shrike *(Lanius ludovicianus)*	Species of Concern	Unlisted	• Uses the juniper savannah, pinyon-juniper woodland, Ponderosa pine forest, and mixed-conifer forest biotic zones	• Observed on County, BNM, and Santa Fe National Forest lands
Big Free-Tailed Bat *(Nyctinomops macrotis)*	Species of Concern	Sensitive	• Uses the juniper savannah, pinyon-juniper woodland, and ponderosa pine forest, and mixed-conifer forest biotic zones • Roosts on cliffs	• Migratory visitor on County, BNM, and Santa Fe National Forest lands
Fringed Myotis *(Myotis thysanodes)*	Species of Concern	Unlisted	• Uses the juniper savannah, pinyon juniper woodland, ponderosa pine forest biotic zones • Roosts in caves and buildings	• Observed on LANL, BNM, and Santa Fe National Forest lands
Long-Eared Myotis *(Myotis evotis)*	Species of Concern	Sensitive	• Uses the ponderosa pine forest, mixed-conifer, and spruce-fir forests biotic zones • Roosts in dead ponderosa pine trees	• Summer resident on LANL, BNM, and Santa Fe National Forest lands

Table 3.2.7-1. Protected and Sensitive Species (Continued)

SPECIES	FEDERAL STATUS	STATE STATUS	HABITAT NEEDS	COMMENTS
Animal Species				
Long-Legged Myotis *(Myotis volans)*	Species of Concern	Sensitive	• Uses the pinyon-juniper woodland, ponderosa pine forest, and mixed-conifer forest biotic zones • Roosts in dead conifer trees	• Summer resident on LANL, County, BNM, and Santa Fe National Forest lands
Small-Footed Myotis *(Myotis ciliolabrum)*	Species of Concern	Sensitive	• Uses the juniper savannah, pinyon-juniper woodland, ponderosa pine forest, and mixed-conifer forest biotic zones • Roosts in cliffs and caves	• Observed on LANL, BNM, and Santa Fe National Forest lands • Overwinters by hibernating
Yuma Myotis *(Myotis yumanensis)*	Species of Concern	Unlisted	• Uses the juniper savannah and pinyon-juniper woodland forest biotic zones • Roosts in cliffs and caves near water	• Summer resident on LANL, County, and Santa Fe National Forest lands
Occult Little Brown Bat *(Myotis lucifungus occultus)*	Species of Concern	Unlisted	• Uses the pinyon-juniper woodland and ponderosa pine forest biotic zones • Requires riparian areas • Forages over water	• Observed on Santa Fe National Forest lands
Pale Townsends Big-Eared Bat *(Plecotus townsendii pallescens)*	Species of Concern	Sensitive	• Uses the pinyon-juniper woodland, ponderosa pine forest, and mixed-conifer forest biotic zones • Roosts in caves	• Observed on LANL and BNM lands • Overwinters by hibernating
Goat Peak Pika *(Ochotona princeps nigrescens)*	Species of Concern	Sensitive	• Uses the mixed-conifer and spruce-fir forests biotic zones • Requires boulder piles and rockslides	• Observed on County and BNM lands
Common Blackhawk *(Buteogallus anthracinus anthracinus)*	Unlisted	Threatened	• Uses the juniper savannah, and pinyon-juniper woodland forests biotic zones	• Observed on BNM lands

Table 3.2.7-1. Protected and Sensitive Species (Continued)

SPECIES	FEDERAL STATUS	STATE STATUS	HABITAT NEEDS	COMMENTS
Animal Species				
Gray Vireo *(Vireo vicinior)*	Unlisted	Threatened	• Uses riparian areas in the juniper savannah and pinyon-juniper forests biotic zones	• Observed on County, BNM, and Santa Fe National Forest lands
New Mexico Silverspot Butterfly (*Speyeria nokomis nitocris*)	Species of Concern	Unlisted	• Requires mountain meadows with violets or other riparian areas with associated meadows	• Confirmed sightings in the Taos area and east of Santa Fe • No confirmed sighting in Los Alamos County or on DOE/LANL lands, however, appropriate habitat is present (PC 1999b)
Plant Species				
Grama grass cactus *(Pediocactus papyracanthus)*	Species of Concern	Unlisted	• Grows in the juniper savannah and pinyon-juniper forests biotic zones • Prefers sandy soils in basalt areas	• Observed on County, BNM, and Santa Fe National Forest lands
Wood lily *(Lilium philadelphicum* var. *andinum)*	Unlisted	Endangered	• Grows in the ponderosa pine forest, mixed-conifer, and spruce-fir forests biotic zones • Requires riparian areas	• Observed on County, BNM, and Santa Fe National Forest lands
Yellow lady's slipper orchid *(Cyprepedium calceolus* var. *pubescens)*	Unlisted	Endangered	• Requires riparian areas • Grows in the mixed-conifer forest biotic zones • Requires moist soil	• Observed on BNM lands
Helleborine orchid *(Epipactis gigantea)*	Unlisted	Rare and sensitive	• Requires riparian areas • Grows in the juniper savannah and pinyon-juniper woodland forests biotic zones • Requires springs, seeps, or other wet areas	• Observed on County lands

Table 3.2.7-1. Federal- and State-Listed Species (Continued)

SPECIES	FEDERAL STATUS	STATE STATUS	HABITAT NEEDS	COMMENTS[a]
Plant Species				
Great plains ladiestresses (*Spiranthes magnicamporium)*	Unlisted	Endangered	• Grows in riparian areas in Plains and Great Basin grassland • This grassland type is widespread in New Mexico valley elevations below 7,500 feet (2285 meters)	• Observed in Española • Unconfirmed reports from White Rock Canyon

Note: This listing was developed with information and guidance provided by biologists from LANL; the U.S. Fish and Wildlife Service; the USFS; the NPS; the National Biological Service; the New Mexico Department of Game and Fish; the New Mexico Energy, Minerals, and Natural Resources Department; and the New Mexico Natural Heritage Program, as well as consultations with independent consultants and reviews of the technical literature.

These species are not addressed further in this CT EIS due to the extremely remote possibility of their presence at or near the subject tract locations. The remaining Federal-protected species—American peregrine falcon (*Falco peregrinus anatum*) (endangered), bald eagle (*Haliaeetus leucocephalus*) (threatened), Mexican spotted owl (*Strix occidentalis lucida*) (threatened), and southwestern willow flycatcher (*Empidonax trailii extimus*) (endangered)—are all known to occur at the LANL area and are considered fully in the CT EIS analysis.

Each species habitat, as part of the development process for the LANL Threatened and Endangered Species Habitat Management Plan, has been identified and areas of environmental interest (AEI) have been designated. There are two components to each AEI: core zone and buffer zone. AEI core zones contain important breeding or wintering habitat for a species, while AEI buffer zones are areas designated to protect the core zone from disturbances that would degrade the value of the area to a protected species (LANL 1998a).

The breeding territories of American peregrine falcons center on cliffs that are in wooded or forested regions. All of Los Alamos County is within the foraging range of identified suitable nesting habitat. Several American peregrine falcon nesting areas are located in the LANL region. Reproduction at these nesting sites has been similar to the State as a whole. One nesting area has been occupied each year since 1994, and at least four young were fledged during this period. There are four American peregrine falcon AEIs on LANL. In general, the AEI core zones are centered on deep canyons on the eastern side of LANL or lands adjacent to LANL. The canyons with AEIs are Pueblo, White Rock, Frijoles, and Los Alamos Canyons (LANL 1998a). Two of the AEIs in Frijoles and White Rock Canyons are not affected by the Proposed Action Alternative; no occupied nesting sites for the American peregrine falcon are present on the subject tracts.

In New Mexico, the bald eagle is primarily a winter inhabitant in the San Juan, upper Rio Grande, Pecos, Canadian, San Francisco, Chama, Gila, and Estancia

Valleys. Bald eagles also occur sporadically in New Mexico during the summer months. In the LANL region, bald eagles roost throughout much of White Rock Canyon from November until late March or mid April. Since 1979, these wintering populations have doubled in size and have extended their occupancy from the Cochiti Lake area upriver to include the Rio Grande in White Rock Canyon. They have been commonly observed at roost sites near Water Canyon. While most often they forage in the vicinity of Cochiti Lake, they use all of White Rock Canyon regularly and the entire Pajarito Plateau occasionally (LANL 1998a). There is one bald eagle AEI, located along the eastern boundary of LANL in conjunction with the Rio Grande, and this AEI would not be affected by the Proposed Action Alternative.

The Mexican spotted owl is found in most of the mountain ranges of New Mexico, Arizona, and in portions of Colorado, Utah, Texas, and northern Mexico. Spotted owls occupy mixed conifer forests or ponderosa pine forests that are intermixed with firs and oaks. In the LANL region, the Mexican spotted owl is a year-round resident of forested areas. The owls nest in canyons vegetated by mixed conifer forest. Nesting usually begins in late March or early April. The owls forage in adjacent areas that are vegetated by a variety of community types, including open grasslands, ponderosa pine forest, and pinyon-juniper woodland. Most individual owls and pairs of owls remain in their summer territory throughout the year; however, some individual owls move to lower elevations during winter months, and about 10 percent travel as far as 35 miles (56 kilometers) from the nesting area. The reproductive success of Mexican spotted owls that nest in the LANL region has been good to excellent. One pair of owls on LANL property has fledged two chicks per year for the last 4 years. Successful nests also have been maintained in Los Alamos County, at BNM, and elsewhere in the Jemez Mountains.

There are six Mexican spotted owl AEIs at LANL. In general, the AEI core zones are centered in canyons on the western side of LANL. The canyons with AEIs are Cañon de Valle, Pajarito, Los Alamos, Pueblo, Sandia-Mortandad, and Threemile Canyon (LANL 1998a). While some of the subject tracts contain or are near Mexican spotted owl AEIs, no occupied nesting sites are present within the tracts currently.

The southwestern willow flycatcher breeds in riparian habitats from southern California to Arizona and New Mexico, extending northward to southern Utah and Nevada. It winters in southern Mexico, Central America, and northern South America from September to May. Breeding habitat is characterized by dense stands of willows (*Salix* spp.), tamarisk (*Tamarix pentandra*), buttonbush (*Cephalanthus occidentalis* var. *pubescens*), and other riparian shrubs with open canopies of cottonwoods (*Populus* spp.). In the Los Alamos region, southwestern willow flycatchers have been observed in BNM; but there has been no indication that they have successfully nested there. The nearest known nest site is along the Rio Grande near Española, upstream from LANL. Willow flycatchers occasionally have been observed in White Rock Canyon, and one sighting of a migrating individual occurred on LANL property in the wetlands of Pajarito Canyon. LANL has one AEI for the southwestern willow flycatcher. It is composed of two core zones with associated buffer zones. The AEI core zones are located in the bottom of Pajarito Canyon (LANL 1998a). No occupied southwestern willow flycatcher nesting sites are known to be present within the subject tracts.

Species listed as endangered, threatened, or rare or sensitive by the State of New Mexico are also included in Table 3.2.7-1. The New Mexico "sensitive" taxa are those taxa that, in the opinion of the New Mexico Department of Game and Fish, deserve special consideration in management and planning, and these are not listed as threatened or endangered by the State of New Mexico.

The County does not have a natural resource management plan that would be in effect for conveyed or transferred lands (PC 1998a). Similarly, the Pueblo of San Ildefonso has no resource management plan; however, the Pueblo is beginning development of a plan, which could take about 2 years to complete (PC 1998b).

3.2.8 Cultural Resources

Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. Cultural resources include expressions of human culture and history in the physical environment (such as prehistoric or historic sites, buildings, structures, objects, districts, or other places, including natural features and biota) that are considered to be important to a culture, subculture, or community. Cultural resources also include traditional lifeways and practices, community values, and institutions. The cultural resources present within the LANL region are complex because of the long and intensive prehistoric use of the area, the continuity of traditional cultural practices among Hispanic and Native American groups, the diversity of cultural groups in the area, and the unique importance of the historic events that have occurred at LANL. Information presented in this section on the cultural resources of the LANL region is based on extensive discussions found in the LANL SWEIS (DOE 1999c).

3.2.8.1 Culture History

Human occupation of the Upper Rio Grande, Jemez Mountains, and Pajarito Plateau region is believed to date back to the Late Pleistocene, approximately 10,000 years ago. Most archaeologists believe that bands of early, mobile hunter-gatherers hunted the large game of that era and collected wild plant foods. Later, in response to warmer and drier climatic conditions and the subsequent loss of large game, hunter-gatherers practiced a more diverse subsistence strategy by targeting smaller game and increasing their plant gathering activities. More sedentary adaptations and labor specialization occurred with the development and refinement of agriculture and the use of bow and arrow technologies. As larger communities evolved, a succession of settlement changes occurred in response to more climatic shifts and population pressures. Prior to the arrival of the Spanish, principal settlements had moved from the mesa tops and cliffs to the Rio Grande floodplain where Pueblo groups still reside. As a greater number of Spanish moved into the region, the puebloan populations suffered from the incursions of settlers, epidemics of disease, and attacks by Apaches. During this period, puebloan populations declined dramatically and Hispanic villages were established that continue today. After an interval of Mexican rule, the United States took control of New Mexico in 1849. Ranching, homestead, agricultural, and recreational uses of the land in the LANL area continued until 1943 when the U.S. Government’s program to develop nuclear weapons for the war effort was established at Los Alamos. New facilities were constructed and new missions continued at LANL through the Cold War to the present. Further discussion of regional cultural prehistory and history is presented in Appendix E of the LANL SWEIS (DOE 1999c).

The cultural resources identified within LANL boundaries reflect the patterns of human use over the last 10,000 years (see Table 3.2.8.1-1). No Paleo-Indian materials have been reported at LANL; but these sites are rare in the region in general. Archaic period hunter-gatherer adaptations are represented by scatters of stone tools and flakes, grinding implements, and burned rock

Table 3.2.8.1-1. Timetable for Cultures in the LANL Region

TIME PERIOD	DATES
Paleo-Indian	10,000 to 4,000 B.C.
Archaic	4,000 B.C. to A.D. 600
Developmental	A.D. 600 to 1100
Coalition	A.D. 1100 to 1325
Classic	A.D. 1325 to 1600
Spanish Colonial	A.D. 1600 to 1849
Early U.S. Territorial/Statehood	A.D. 1849 to 1942
Nuclear Energy	A.D. 1942 to present

Source: DOE 1999c

features. Sites dating to the Developmental period on LANL are scarce but include some pithouse, adobe, and crude masonry structures near the Rio Grande in the vicinity of Chaquihui Mesa and lower Water Canyon. Most Pueblo ruins recorded at LANL date to the Coalition period. During that time, habitation typically was in fairly small Pueblos, distributed widely on the mesa tops. The settlement pattern shifted during the Classic period when the smaller mesa top Pueblos were abandoned and populations concentrated at major Pueblos, such as Tsirege and Otowi on land currently held by LANL. By 1600, however, these communities were also largely abandoned and local puebloan populations had moved to the Rio Grande Valley. Few sites reflecting the use of LANL property during the Spanish Colonial period are documented, possibly indicating seasonal and nonintensive utilization. Structural remains and ranching and agricultural features have been recorded from the U.S. Territorial and Statehood periods. Cultural resources from the Nuclear Energy period include a large number of buildings, structures, and objects that are or may be considered important historic cultural resources because of their association with the Manhattan Project, World War II, or the Cold War. Consultations with Native American groups and traditional Hispanic communities during the preparation of the LANL SWEIS (DOE 1999c) indicate continuing cultural use and the presence of all general categories of traditional cultural properties (TCPs) within the lands controlled by LANL.

3.2.8.2 Cultural Resource Types

For this CT EIS, cultural resources information has been organized into the categories of: prehistoric and historic resources, and TCPs. A cultural resource can fall into more than one of these types due to use through a long period of time or multiple functions. Prehistoric cultural resources refer to any material remains, structures, and items used or modified by people before the establishment of a European presence in the upper Rio Grande Valley in the early 17th Century. Examples of prehistoric resources in the LANL region include Pueblo ruins, rock shelters, cavates, rock art, water control features, game traps, aboriginal trails and steps, campsites, and scatters of prehistoric artifacts (such as pottery sherds or stone tool-making debris).

Historic resources include the material remains and landscape alterations that have occurred since the arrival of Europeans in the region. Examples of historic resources in the LANL area include homestead, ranching, and agricultural features; scatters of historic artifacts; historic trails; Native American resources; and buildings and features associated with Manhattan Project, World War II, and the Cold War.

TCPs are places associated with the cultural practices or beliefs of a living community. These sites are rooted in the community's history or are important in maintaining cultural identity. Examples of TCPs for Native American and Hispanic communities can include natural landscape features; places used for ceremonies and worship; places where plants are gathered that are used in traditional medicines and ceremonies; places where artisan materials are found; or places and features of traditional subsistence systems such as community-maintained irrigation systems and traditionally used fields, grazing areas, and firewood-gathering sites. TCPs also include sacred areas and places required for the practice of religion. A detailed discussion of cultural resource types is presented in Appendix E of this CT EIS.

The 10 parcels considered for conveyance or transfer vary in size, topography, natural resources, and past development. These differences are reflected in the types of cultural resources present or expected on each tract and in trends of land use through time. For example, several of the tracts are located on mesa tops that coincide with prehistoric settlement patterns during the Coalition period. Some of these tracts also are partially developed, and though prehistoric resources are not present, potentially eligible historic buildings are. Both mesa tops and canyon bottoms are areas likely to contain TCPs.

3.2.8.3 National Register of Historic Places Eligibility

The identification of cultural resources and DOE responsibilities with regard to cultural resources are addressed by a number of laws, regulations, executive orders, Pueblo Accords and other requirements, as discussed in Chapter 17 of this CT EIS. One of these laws relevant to the discussion of the cultural resources of the 10 land tracts is the *National Historic Preservation Act* (NHPA) of 1966, as amended (16 United States Code [U.S.C.] Section 470), and its implementing regulations (36 Code of Federal Regulations [CFR] 800) that describe the process for identification and evaluation of historic properties; assessment of the effects of Federal actions on historic properties; and consultation to avoid, reduce, or minimize adverse effects. The term “historic properties” refers to cultural resources that meet specific criteria for eligibility for listing on the National Register of Historic Places (NRHP). The NHPA process does not require preservation of historic properties but does ensure that the DOE’s decisions (as a Federal agency) concerning the treatment of these properties result from meaningful considerations of cultural and historic values and of the options available to protect the properties.

Under NHPA, cultural resources undergo an evaluation process that determines if the resource is eligible for listing on the NRHP. Resources that are already listed, determined eligible for listing, or are undetermined are afforded a level of consideration under the NHPA Section 106 process. Undetermined resources are those for which eligibility cannot be determined based on current knowledge of the resource and where further work is needed to make an evaluation; meanwhile, resources are treated as though eligible until a formal evaluation is completed. Resources that are not yet identified are considered to have undetermined eligibility; these resources include subsurface archaeological deposits, unrecorded burials, and unidentified TCPs.

In order to be determined eligible for listing on the NRHP, a resource must meet one or more of the following criteria (36 CFR Part 60):

- **Criterion A:** associated with events that have made a significant contribution to the broad patterns of our history
- **Criterion B:** associated with the lives of people significant in our past
- **Criterion C:** embodies the distinctive characteristics of a type, period, or method of construction

- **Criterion D:** yielded or may be likely to yield information important in prehistory or history

The resource also must retain most, if not all, of seven aspects of integrity: location, design, setting, workmanship, material, feeling, and association.

A resource also is eligible for listing on the NRHP if it is determined to have traditional cultural significance. This significance derives from the role the resource plays in a community's historically rooted beliefs, customs, and practices. To have this significance, the resource must be associated with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing identity of the community (Parker and King 1990). To be eligible for the NRHP, the resource also must retain integrity as a cultural resource and be at least 50 years of age.

3.2.8.4 Religious Resources

Religious resources such as sacred areas or places needed for the practice of religion are a subset of TCPs. The LANL area has been occupied or utilized for 10,000 years by Native American, Spanish, Mexican, and American cultures. The relationships between these cultures and the land were and are as varied as the cultures themselves. These continued relationships have often resulted in the attachment of spiritual or religious aspects to the land. These resources have attained a position in the religious or spiritual history and activities of the community and are a part of that particular culture's spiritual survival.

There are a number of pieces of legislation that consider or protect religious resources. Under the *American Indian Religious Freedom Act* (42 U.S.C. 1996), Federal agencies must evaluate their policies and procedures to determine changes necessary to preserve Native American religious rights and practices, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites. The *Religious Freedom Restoration Act* (42 U.S.C. 2000bb) stipulates that the government cannot burden a person's exercise of religion without first showing that the action is in furtherance of a compelling governmental interest and that the action is the least restrictive means of furthering that compelling interest. Finally, Executive Order 13007, "Indian Sacred Sites," protects religious resources by directing Federal agencies to protect the physical integrity of sacred sites and accommodate access to and use of these sites by Native American religious practitioners. This order applies to federally owned land, but not to Native American trust lands.

3.2.8.5 Identification of Cultural Resources

The 10 land tracts proposed for possible conveyance or transfer have been completely inventoried for historic and prehistoric cultural resources, but identification of TCPs has not been completed. Methods used to identify the presence of cultural resources and to determine eligibility vary among the resource types.

Prehistoric and historic cultural resources have been identified in all but one of the 10 tracts (Miscellaneous Site 22) (DOE 1998d). A total of 254 cultural sites have been recorded. The number of sites by tract and their NRHP eligibility status is presented in Table 3.2.8.5-1. Prehistoric resource types recorded at these sites include Pueblo ruins, masonry features, rock shelters and cavates, rock art, water control features and game traps, garden plots, aboriginal trails and steps, and scatters of prehistoric artifacts. Historic resource types recorded at these sites include homestead, ranching, and agricultural features; historic trails, historic artifact scatters, and Native American resources; and

Table 3.2.8.5-1. Known Cultural Sites by Tract and Eligibility

TRACT	PREHISTORIC SITES			HISTORIC SITES			TOTAL SITES IN TRACT
	Eligible	Potentially Eligible	Not Eligible	Eligible	Potentially Eligible	Not Eligible	
Rendija Canyon	38	3	7	3	2	--	53
DOE LAAO	--	--	--	--	2	--	2
Miscellaneous Site 22	--	--	--	--	--	--	0
Miscellaneous Manhattan Monument	--	--	--	1	--	--	1
DP Road	1	--	--	--	2	--	3
TA 21	1	--	1	1	41	--	44
Airport	2	--	--	--	2	1	5
White Rock Y	19	7	10	--	4	1	41
TA 74	76	21	--	--	2	1	100
White Rock	3	1	--	--	--	1	5
Total by Eligibility	140	32	18	5	55	4	254
	Prehistoric Sites = 190			**Historic Sites = 64**			

Cold War era LANL properties. Preliminary evaluation of these cultural sites for NRHP eligibility is complete; however, final DOE evaluation recommendations are not expected until after completion of this CT EIS. All but two of the tracts (Miscellaneous Site 22 and Rendija Canyon Tracts) include LANL buildings, structures, or objects that may have historic significance. A total of 51 of these resources have been identified (included in the 254 sites). Forty of these are located in TA 21. Formal evaluation of these sites for NRHP eligibility requires archival research to identify the role that the building may have played in historic events and field documentation to assess its current historical integrity. The NRHP has an additional eligibility requirement of “exceptional importance” that applies to properties less than 50 years old.

More detail regarding the identified cultural sites can be found in Appendix E of this CT EIS.

For the subject land tracts, which all have been inventoried, data collected on resource locations could be incomplete due to human error or conditions such as heavy vegetation cover, which can seriously affect the ability to see resources on the ground. In addition, archaeological resources may be located completely below the surface. There also is the possibility for human burials, especially in areas near major habitation sites. Patterns in the locations and densities of cultural resources in an area can be used to predict if additional resources are likely to be located in an area already inventoried.

The LANL SWEIS process included a review of literature and consultation with Native American and Hispanic groups to determine the presence of TCPs or religious resources (DOE 1999c, Appendix E). This research determined the presence of ceremonial and archaeological sites, natural landscape features, ethnobotanical gathering sites, artisan material gathering sites, and subsistence features generally located within the LANL area. Seven TCPs have been identified within the subject land tracts so far (DOE 1998d). The Pueblo of San Ildefonso has indicated, in general terms, that TCPs are present on the Rendija Canyon, White Rock Y, TA 74, and White Rock Tracts. Additional TCPs may be identified during further consultations with Native American and Hispanic groups. TCPs can undergo the same evaluation of NRHP eligibility as other cultural resources for consideration under NHPA.

3.2.9 Geology and Soils

This section describes the geology, geologic conditions, soils, and mineral and geothermal resources present at LANL and the areas surrounding LANL that are relevant to the subject land tracts. More detailed information is contained in the LANL SWEIS (DOE 1999c). The geologic area includes LANL, extends to the northern-most point of the Jemez Mountains and Española Valley in the north, to the Cerros del Rio Volcanic Field in the east, to Cochiti Lake in the south, and to the Valles Caldera in the west.

3.2.9.1 Geology

LANL (including the subject land tracts) and the communities of Los Alamos and White Rock are located on the Pajarito Plateau (see Figure 3.2.9-1). The Pajarito Plateau is 8 to 16 miles (13 to 26 kilometers) wide and 30 to 40 miles (48 to 64 kilometers) long, lying between the Jemez Mountains to the west and the Rio Grande to the east (DOE 1999c). The surface of the Pajarito Plateau is divided into numerous narrow, finger-like mesas separated by deep east-to-west oriented canyons that drain toward the Rio Grande. The land tracts themselves consist of parts of the mesa tops and the canyons in between the mesas.

A primary geologic feature in the region is the Rio Grande Rift, which begins in northern Mexico, trends northward across central New Mexico, and ends in central Colorado. The north-trending Pajarito Fault system is part of the Rio Grande Rift and consists of a group of interconnecting faults that are nearly parallel (see Figure 3.2.9.1-1).

Rocks in the LANL region were predominantly produced by volcanic and sedimentary processes.

3.2.9.2 Geologic Conditions

This subsection describes the geologic conditions that could affect the stability of the ground and infrastructure in the subject land tracts and includes volcanic activity, seismic activity (earthquakes), slope stability, surface subsidence, and soil liquefaction.

Volcanism

Volcanism in the Jemez Mountains' volcanic field, west of LANL, has a 13-million-year history. The Jemez Mountains currently show an unusually low amount of seismic activity, which suggests that no magma migration is occurring. Seismic signals may be partially absorbed deep in the subsurface due to elevated temperatures and high heat flow. Such masking of seismic signals would add difficulty in predicting volcanism in the

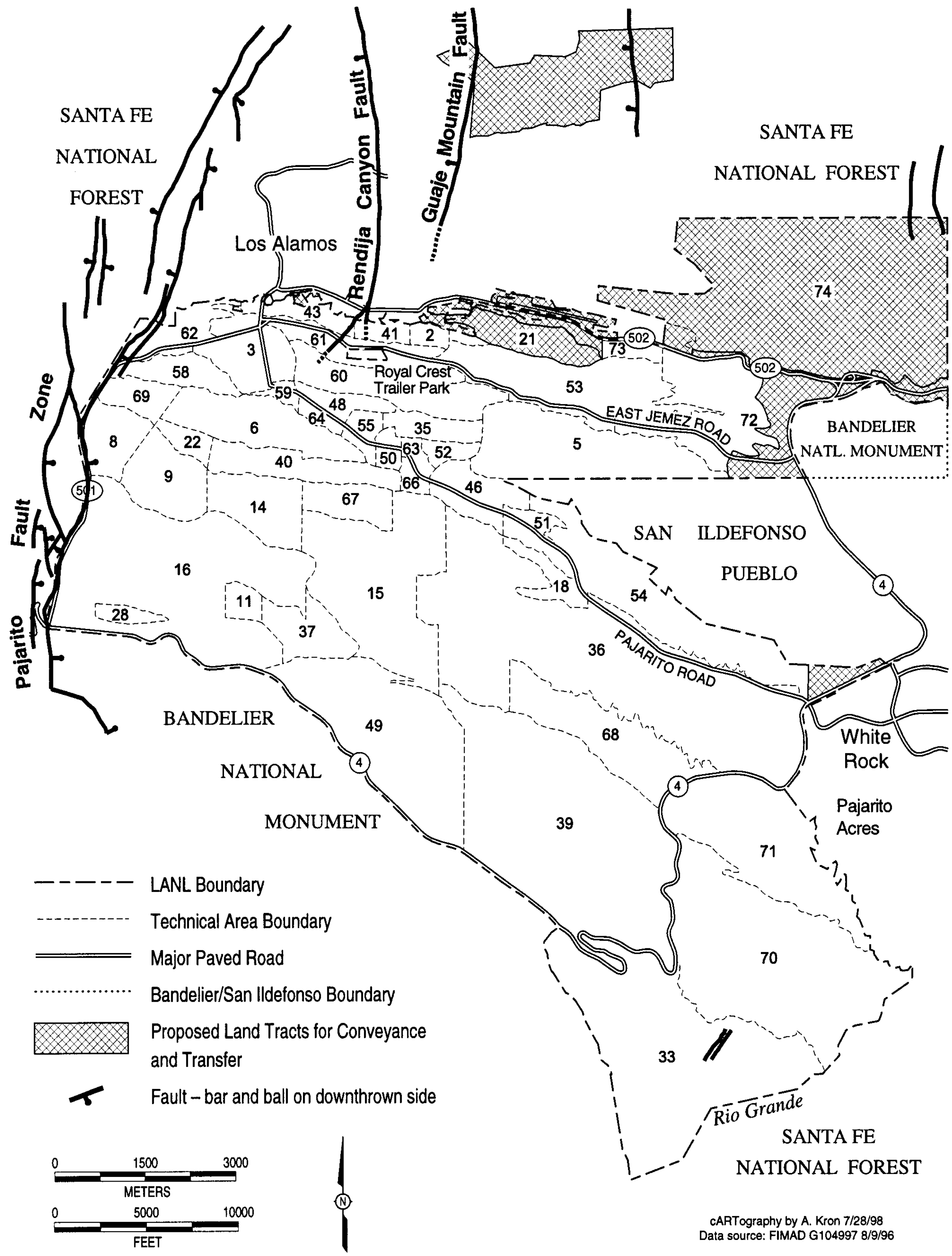

Figure 3.2.9.1-1. Major Surface Faults in the Los Alamos Region.

LANL area. There are plans to install additional seismograph stations in the vicinity of the Valles Caldera to improve predictive capabilities (DOE 1999c).

Seismic Activity

A comprehensive seismic hazards study was completed in 1995 at LANL (DOE 1999c). This study provided estimates of the ground shaking hazards and the resulting ground motions that may be caused by these earthquake sources.

The major faults in Los Alamos County are the Pajarito, Rendija Canyon, and Guaje Mountain Faults, and their characteristics are summarized in Table 3.2.9.2-1. Fault locations are shown on Figure 3.2.9-1.

The seismic hazards results indicate that the Pajarito Fault system represents the greatest potential seismic risk to LANL, with an estimated maximum earthquake Richter magnitude of about 7. Although large uncertainties exist, an earthquake with a Richter magnitude greater than or equal to 6 is estimated to occur once every 4,000 years; an earthquake with a magnitude greater than or equal to 7 is estimated to occur once every 100,000 years along the Pajarito Fault system. Earthquakes of this magnitude may cause considerable damage to structures and underground pipes.

Slope Stability, Subsidence, and Soil Liquefaction

Rockfalls and landslides are two geologic processes related to slope stability in the area. The primary risk factors most likely to affect slope stability are wall steepness, canyon depth, and stratigraphy. Because of this, land near a cliff edge (for example, TA 21) or in a canyon bottom (for example, the White Rock Tract) is potentially susceptible to slope instability. The largest slope instability may be triggered by any process that might destabilize supporting rocks. These processes include, but are not limited to, excessive rainfalls, erosion, and seismic activity.

Subsidence (lowering of the ground surface) and soil liquefaction are two geologic processes that are less likely to affect LANL than rockfalls or landslides. The potential for subsidence is minimal due to the firm rock beneath LANL. Bedrock, soils, and unconsolidated deposits that are unsaturated, such as those that occur beneath LANL, are unlikely to undergo liquefaction.

Table 3.2.9.2-1. Summary of Major Faults in the LANL Region

NAME	APPROXIMATE LENGTH mi (km)	TYPE	MOST RECENT MOVEMENT	MAXIMUM EARTHQUAKE[a] POTENTIAL
Pajarito Fault Zone	26 mi (42 km)	Normal, down-to-the-east[b]	Approximately 45,000 to 55,000 years ago	7
Rendija Canyon Fault	6 mi (10 km)	Normal, down-to-the-west	8,000 to 9,000 or 23,000 years ago	6.5
Guaje Mountain Fault	8 mi (14 km)	Normal, down-to-the-west	4,000 to 6,000 years ago	6.5

Notes: mi = miles, km = kilometers

[a] Richter magnitude.

[b] The crustal block on the east side of the Pajarito Fault slips downward toward the east when fault movement occurs. This results in a fault plane for the Pajarito Fault, for example, that runs under LANL toward the east. A normal west fault involves the crustal block on the west side of the fault slipping downward toward the west.

Source: DOE 1999c

3.2.9.3 Soils

Several distinct soils have developed in Los Alamos County as a result of interactions between the bedrock, topography, and local climate. Soils that formed on mesa tops of the Pajarito Plateau include the Carjo, Frijoles, Hackroy, Nyjack, Pogna, Prieta, Seaby, and Tocal soil series (DOE 1999c).

All of the soils in the aforementioned soil series are well-drained and range from very shallow (0 to 10 inches [0 to 25 centimeters]) to moderately deep (20 to 40 inches [51 to 102 centimeters]), with the greatest depth to the underlying Bandelier Tuff being 40 inches (102 centimeters) (DOE 1999c). The geochemistry, geomorphology, and formation of soils in the LANL area have been characterized in the LANL SWEIS (DOE 1999c).

Soil Monitoring

Soils on and surrounding LANL are sampled annually as a part of the LANL Environmental Surveillance and Compliance Program to determine if they have been affected by LANL operations. Sediments occur along most segments of LANL canyons as narrow bands of canyon-bottom deposits, which can be transported by surface water during runoff events or by LANL outfall effluent flows.

LANL onsite and perimeter soil samples are collected and analyzed for radiological and nonradiological constituents and are compared to the regional (background) locations. In general, the average concentrations of tritium, strontium-90, cesium-137, plutonium-239, plutonium-240, americium-241, and gross alpha and beta activity in soils collected from perimeter stations were not significantly different than radionuclide concentrations and activity in soil samples collected from regional background locations. In contrast, the average levels of uranium, plutonium-238, and gross gamma activity were significantly higher than uranium, plutonium-238, and gross gamma in background soils. Although the average levels of uranium and gross gamma activity in perimeter soils were significantly higher than background, they were still within the regional statistical reference levels (RSRLs) of 4.05 micrograms per gram and 7.3 picocuries per gram, respectively.

Trend analyses show that most radionuclides and radioactivity, with the exception of plutonium-238 and gross alpha, in soils from onsite and perimeter areas have been decreasing over time (DOE 1999c). Tritium, which has a half-life of about 12 years, exhibited the greatest decrease in activity over the 21 years in almost all of the soil sites studied, including regional locations. Plutonium-238 and gross alpha activity generally increased over time in most onsite, perimeter, and even regional background sites; all sites, however, were far from being statistically significant (probability less than 0.05). The source of most plutonium-238 detected in the environment is from nuclear weapons testing in the atmosphere and from the reentry burn-up of satellites containing a plutonium-238 power source (DOE 1999c). Only a few gross alpha readings and a few gross beta readings showed significantly increasing trends (probability less than 0.05) over time. In these cases, however, the measurement period was both early and very short (1978 to 1981).

Soils also were analyzed for trace and heavy metals, and most metals were within RSRLs and were well below LANL screening action levels (SALs) (DOE 1999c). Only beryllium and lead, both products of firing site activities, exhibited any kind of trend; that is, both were consistently higher in perimeter and onsite soils than in background soils. Concentrations over time show that average beryllium in perimeter soils decreased from 1992 to 1995. Lead decreased from 1992 to 1995. Similarly, beryllium in onsite soils decreased from 1992 to 1995. Lead in onsite soils, on the other hand, increased slightly in concentration from 1992 to 1995.

Soil Erosion

Soil erosion can have serious consequences to the maintenance of biological communities and also may have been a mechanism for moving contaminants across LANL and off the site. Soil erosion rates vary considerably on the mesa tops at LANL, with the highest rates occurring in drainage channels and areas of steep slopes and the lowest rates occurring on gently sloping portions of the mesa tops away from the channels (DOE 1999c).

Areas where runoff is concentrated by roads and other structures are especially prone to high erosion rates. High erosion rates appear to be relatively recent, most likely resulting from loss of vegetative cover, decreased precipitation, past logging practices, and past livestock grazing (DOE 1999c).

Runoff and erosion would increase after a wildfire because without a protective ground cover, runoff quantities and velocities are magnified, and soil erosion by water and wind begins immediately. Contributing to this condition is the likely formation of an ash layer that inhibits the infiltration of runoff.

3.2.9.4 Mineral Resources

There are no active mines, mills, pits, or quarries in Los Alamos County or on DOE land at LANL. Sand, gravel, and pumice are mined throughout the surrounding counties.

3.2.9.5 Paleontological Resources

No paleontological sites are reported to occur within LANL boundaries, and the near-surface stratigraphy is not conducive to preserving plant and animal remains (DOE 1999c).

3.2.10 Water Resources

The following sections describe water resources in the vicinity of the 10 subject land tracts based upon the regional hydrogeologic setting, environmental surveillance and monitoring data, and current land uses. A more detailed discussion of water resources at LANL can be found in LANL SWEIS (DOE 1999c). Additional detailed information on water monitoring programs can be found in the annual Environmental Surveillance Reports.

The geography of the Pajarito Plateau strongly influences hydrologic conditions in the vicinity of the 10 subject land tracts. In addition, a relatively arid climate, high evapotranspiration rate (evaporation and water uptake by plants), and thick sequence of unsaturated volcanic deposits underlying LANL have a strong influence on water resources (both quality and quantity) in the area.

3.2.10.1 Surface Water Hydrology

The predominant surface water features at LANL are perennial, ephemeral, and intermittent streams in canyon bottoms that provide drainage. In addition to naturally occurring streams, several National Pollutant Discharge Elimination System (NPDES) outfalls provide sources of surface water at LANL.

Surface water from intermittent streams and drainages is not used for municipal, industrial, or irrigation purposes but supports wildlife living in or migrating through the canyon reaches. The only surface water developed for economic use is contained in the Los Alamos Reservoir. This reservoir is in upper Los Alamos Canyon, west of LANL property, and has a capacity of 41 acre-feet (51,000 cubic meters). It has been used in the past for landscape irrigation in the Los Alamos townsite but is not currently used due to high maintenance costs (DOE 1999c). The Los Alamos municipal storm drain system also contributes to the surface water flow into DP and Los Alamos Canyons. Eleven canyon drainage systems cross the eastern boundary of LANL (toward the Rio Grande), draining a watershed of approximately 82 square miles (212 square kilometers) (LANL 1996a).

Flash flooding in canyons following heavy precipitation is common during July and August. Several of the land tracts proposed for conveyance or transfer contain land in the 100-year and 500-year floodplains. These land tracts include the TA 74, Rendija Canyon, the White Rock Y, and White Rock Tracts.

Surface Water Quality

Surface water quality in the vicinity of LANL is monitored and reported annually in the annual Environmental Surveillance Reports. The LANL SWEIS describes the surface water monitoring program and results (DOE 1999c). Movement of sediments by surface water could be a mechanism for the transport of contaminants.

Radiation (gross alpha, gross beta, and gross gamma) and radionuclide levels in surface waters are generally below or close to analytical detection limits and well below drinking water and public dose standards. Metals in surface water samples are typically below applicable standards when the samples are filtered prior to analysis. However, metals concentrations exceeding drinking water standards are relatively widespread when samples are not filtered. In addition, in 1996 selenium was detected in surface water samples at concentrations greater than the New Mexico Wildlife Habitat Stream Standard.

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 1999c).

National Pollutant Discharge Elimination System Outfalls

Planned releases from industrial and sanitary facility discharges (point sources) are regulated under the *Clean Water Act* and NPDES permits. The LANL SWEIS provides a detailed discussion of NPDES-permitted outfalls (DOE 1999c, Section 4.3.1.3). LANL currently has 87 active NPDES-permitted outfalls that discharge into 10 different watersheds.

Two additional NPDES-permitted outfalls are associated with Los Alamos County water treatment plants and discharge into canyon reaches. NPDES-permitted outfalls may impact specific land tracts proposed for conveyance or transfer and the level of regulatory oversight of stormwater generated surface flows.

3.2.10.2 Groundwater Hydrology

Groundwater hydrology in the LANL region is discussed in detail in the LANL SWEIS (DOE 1999c) and the Hydrogeologic Workplan (LANL 1996a). Additional detailed information on water monitoring programs can be found in the annual Environmental Surveillance Reports produced by the LANL Environmental, Safety and Health Division.

The major economic source for groundwater in the LANL area is the regional aquifer. Groundwater also is present in shallow alluvial systems beneath canyon bottoms and as perched groundwater beneath both mesas and canyons; however, these sources are not present in sufficient quantity for development.

Regional Aquifer

The regional aquifer (or main aquifer) is the only aquifer in the LANL region that can provide large-scale municipal water supplies

(DOE 1999c). Eleven supply wells in the regional aquifer provide water to LANL, the Los Alamos townsite, White Rock, and BNM. Depth to the regional aquifer beneath the mesa tops ranges from about 1,200 feet (366 meters) along the western margins of the Pajarito Plateau to about 600 feet (183 meters) at the eastern margin of the Plateau. The regional aquifer is separated from intermediate perched groundwater zones by approximately 350 to 620 feet (107 to 189 meters) of tuff, basalt, and sediments (LANL 1996a). Mechanisms for recharge to the regional aquifer are not fully understood, but recent studies have indicated that there is minimal recharge to the regional aquifer, and water is being pumped from storage (DOE 1999c).

There has been a decline in water levels in the regional aquifer since pumping began in the 1950s (LANL 1996a), and it is apparent that groundwater withdrawal exceeds recharge in the vicinity of LANL. From 1947 to 1991, water level declines in the four DOE water supply well fields have ranged from 24 to 76 feet (7.3 to 23 meters) (DOE 1999c).

Groundwater Quality

According to requirements of the DOE and LANL Hazardous and Solid Waste Amendments (HWSA) Permits, groundwater quality is monitored annually. Groundwater samples are collected from the regional aquifer, intermediate perched zones, alluvial groundwater, and springs in the LANL region.

In the regional aquifer, drinking water standards were met for all radionuclides in all samples collected from 1990 through 1994. Trace amounts of tritium, plutonium, americium, and strontium have been detected, however, but not in the water supply wells. Organic compounds also have been detected in samples from test wells at TA 49, and nitrate has been detected down-canyon from the Bayo Wastewater Treatment Plant. Contaminants also have been detected in alluvial and intermediate perched groundwater.

- The EPA drinking water standard (40 CFR Part 141) for strontium-90 was exceeded in at least half of the alluvial groundwater samples collected from Mortandad and Los Alamos Canyons from 1990 through 1994, and the EPA standard for tritium was exceeded for 20 of 22 samples (DOE 1999c).
- Standards for some water quality parameters and metals were exceeded in samples of alluvial groundwater from Pueblo Canyon, Pajarito Canyon, and Cañada del Buey.
- High explosives at levels above EPA health advisories have been found in groundwater beneath the southwest portion of LANL (LANL 1999).
- Tritium and nitrates have been detected in intermediate perched groundwater in Pueblo and Los Alamos Canyons at levels below EPA drinking water standards.

In addition, high explosives, volatile organic compounds, and nitrates have been detected in springs in Pajarito Canyon. Primary LANL sources of contamination include historic discharges of treated and untreated waters, discharges from the Radioactive Liquid Waste Treatment Facility into Mortandad Canyon, leaks from the Omega West reactor into Los Alamos Canyon, and past and present releases from the County sewage treatment facility into Pueblo Canyon.

Additional information about groundwater quality can be found in the LANL SWEIS (DOE 1999c), and in the annual LANL Environmental Surveillance Reports.

3.2.11 Air Resources

This section discusses air quality as it exists today in the Los Alamos region. It begins with an overview of the climate and then presents information on the three major types of air pollutants: criteria pollutants, hazardous air pollutants (HAPs), and radioactive air pollutants. A detailed discussion of air quality and climate is presented in the LANL SWEIS (DOE 1999c, Section 4.4).

3.2.11.1 Climate

Los Alamos has a temperate mountain climate with four distinct seasons. Spring tends to be windy and dry. Summer has a 2-month rainy season during July and August, followed by a dry September. In autumn, there is a return to drier, cooler, and calmer weather. In winter, storms keep the ground covered with snow for about 2 months (LANL 1997, page 17).

The record high temperature is just 95 degrees Fahrenheit (°F) (35 degrees Celsius [°C]) and the record low is –18°F (–8°C). The average annual precipitation (rainfall plus the water-equivalent of snow and frozen precipitation) is 18 inches (46 centimeters), with considerable variation from year to year.

The Los Alamos region does not often experience severe weather. Lightning is quite common over the Pajarito Plateau, averaging 57 thunderstorm days annually. These brief downpours also can cause local flash flooding in canyons, streams, and other low spots. Hail falls frequently during the summer, occasionally causing damage.

Adjacent to LANL and within the Los Alamos region, BNM is one of the nine Class I Federal air quality areas in New Mexico. EPA regulations (40 CFR 51.300) require that states "…assure reasonable progress toward meeting the national goal of preventing any future, and remedying any existing, impairment of visibility in mandatory Class I Federal areas." Future actions must thus account for, and avoid, potential degradation of the air quality at BNM.

3.2.11.2 Criteria Pollutants

The *Clean Air Act* (42 U.S.C. 1857-18571) mandates that the EPA establish National Ambient Air Quality Standards (NAAQS) for pollutants of national concern. EPA has identified six criteria pollutants and has issued standards for all six. The criteria pollutants are nitrogen dioxide, carbon monoxide, lead, ozone, particulates, and sulfur dioxide. New Mexico also has enacted standards for three other criteria pollutants: hydrogen sulfide, total reduced sulfur, and total suspended particulates (20 New Mexico Administrative Code [NMAC] 3.109-110).

The Los Alamos region is included in New Mexico Region 3. Monitoring by the State Air Quality Bureau has demonstrated that Region 3 meets all air quality standards, and is an attainment area for all six criteria pollutants.

3.2.11.3 Hazardous Air Pollutants

Many air pollutants threaten human health through toxic effects by causing cancer and/or genetic mutations. Such pollutants are referred to as hazardous air pollutants, even though other pollutants also are "hazardous" to humans and the environment in the general sense of the term.

The State of New Mexico does not monitor ambient air quality for concentrations of HAPs. However, the State does require that stationary sources (such as stacks) obtain air quality permits if they have the potential to emit more than a minimum amount of air pollutants.

For LANL, emissions estimates were made for many different chemicals, some of them HAPs, in the LANL SWEIS (DOE 1999c). Results of the analyses indicated that the highest estimated concentration of each chemical pollutant would be below standards established to protect human health, with an ample margin of safety. It was determined that cancer risk for each pollutant and all receptors was below the guideline value of one in one million (1×10^{-6}) for excess latent cancer fatality (LCF) risk (DOE 1999c). A conservative analysis was performed to calculate the cancer risk from all pollutants combined. For the combined pollutants, only two potential receptors had a cancer risk greater than 1×10^{-6}. These two receptors were located at or near the Medical Center in TA 43. The combined cancer risks for these two receptors were 1.17×10^{-6} and 1.07×10^{-6}, respectively.

3.2.11.4 Radioactive Air Pollutants

In the Los Alamos region, LANL is the only facility that emits radioactive air pollutants. Emission limits are set forth in EPA regulations at 40 CFR 61, Subpart H, "National Emissions Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities." The standard states that emissions "…shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 millirem per year" (40 CFR 61.92).

Radioactive air pollutants emitted by LANL are of four types: (1) particulate matter, (2) vaporous activation products, (3) tritium, and (4) gaseous/mixed activation products (GMAP). About 95 percent of all emissions, however, are GMAP emissions from the Los Alamos Neutron Science Center (LANSCE) at TA 53.

Emissions have been in compliance with the EPA standard (see Table 3.2.11.4-1). In addition, modeling for 1996 emissions shows that doses to residents in White Rock (0.04 millirem) and the Los Alamos townsite (0.05 millirem) are insignificant (LANL 1997, page 51).

Table 3.2.11.4-1. Dose to the Maximally Exposed Individual from Exposure to LANL Radioactive Air Pollutants

YEAR	DOSE (millirem)	PERCENT OF EPA STANDARD
1991	6.5	65
1992	7.9	79
1993	5.6	56
1994	7.6	76
1995	5.1	51
1996	5.3	53
1997	2.2	22

Source for 1991 to 1995 data: DOE 1998a, page 4-93.
Source for 1996 data: LANL 1997, page 50.
Source for 1997 data: LANL 1998d, page 50.

3.2.11.5 Global Climate Change

Although not all scientists are in agreement, there is evidence of an increase in global temperatures, which may be related to human activities that produce greenhouse gases. These gases are believed to absorb radiated energy in the atmosphere, reflecting it back to Earth, causing warming and climate change.

Water vapor (1 percent of the atmosphere) is the most common and dominant greenhouse gas; only small amounts of water vapor are produced as the result of human activities. The principal greenhouse gases resulting from human activities are carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons (CFCs). Other gases of concern are hydrofluorocarbons (HFCs), which are replacing CFCs as refrigerants and air conditioner gases; perfluorocarbons (PFCs), which are a byproduct of aluminum smelting; and sulfur hexafluoride, which is widely used in insulation for electrical equipment (Morrissey and Justus 1998, page 4). These gases are released in different quantities and have different potencies in their contributions to global warming.

Greenhouse gas emissions in the Los Alamos region include carbon dioxide from multiple sources: the burning of natural gas for home and commercial heating; the use of gasoline and diesel to power automobiles, trucks, construction equipment, and other vehicles; and the burning of wood in residential fireplaces, etc. Although there are no power plants in the region, the generation of electricity for private and government use in the region results in carbon dioxide emissions in other parts of the State (for example, the Farmington area) or nation. Globally, power plants account for one-third of all carbon dioxide emissions, space heating (residential, commercial, industrial, government) for another third, and transportation the remaining third (DOE 1999c).

Pipeline leaks from oil and gas processing plants and stations contribute 9 percent to global emissions of methane. There are 65 compressor stations and 2 natural gas plants, most in Rio Arriba County, that are likely contributors to worldwide total methane emissions.

There likely are small emissions of CFCs and HFCs, which are used locally in refrigeration and air conditioning units at residential, commercial, industrial, and government facilities. Emissions of the remaining greenhouse gases are largely absent in the region.

3.2.12 Human Health

The following sections summarize historical and current information on public health in the LANL vicinity. The public health concerns are for the radiological and nonradiological contributions of LANL to the environment in the Los Alamos area. Because this information was recently prepared for the LANL SWEIS (DOE 1999c), the material presented here is summarized from that document. Additional information is in the accompanying Appendix G, reprinted from the LANL SWEIS (DOE 1999c) and the annual LANL Environmental Surveillance and Compliance Reports (for example, LANL 1997).

The public health information is presented in two major topics: (1) the radiological environment in the LANL vicinity and (2) the nonradiological environment in the LANL vicinity. The LANL SWEIS describes emergency preparedness, management, and response programs implemented at LANL for protecting the public and workers. This information is not revisited here, but the reader is encouraged to examine those sections in the LANL SWEIS (DOE 1999c, Sections 4.6.2.5 through 4.6.3.3).

3.2.12.1 The Radiological Environment in the LANL Vicinity

Sources of radiation exposure for individuals in the vicinity of LANL include radon, cosmic and terrestrial radiation, self-irradiation, exposures from medical and dental procedures, and LANL operations.

Background doses are those to which an individual would be exposed regardless of LANL operations. In 1996, the total effective dose equivalent (TEDE) to residents from all background environmental sources was 360 millirem at Los Alamos and 340 millirem at White Rock (see Table 3.2.12.1-1). It is projected that these residents on average would be exposed to an additional 53 millirem per year effective dose equivalent (EDE) from medical and dental sources of radiation (NCRP 1987).

Table 3.2.12.1-1. Total Effective Radiation Dose Equivalent from Natural or Manmade Sources

SOURCE	LOS ALAMOS (millirem per year)	WHITE ROCK (millirem per year)
Radon	200	200
Self-Irradiation[a]	40	40
Total External[b]	120	100
Total Effective Background Dose	360	340
Medical and Dental	53	53

[a] Dose from radionuclides occurring naturally within the body, such as potassium-40.

[b] Includes correction for shielding.

Source: Adapted from DOE 1999c

Release of radionuclides to the environment from LANL operations provides another source of radiation exposure to individuals in the vicinity of LANL. In order to quantify the potential exposure to the public from LANL's radiation, a hypothetical individual who resides at the location receiving the maximum dose is evaluated in the LANL radiation protection program (LANL 1997). This individual is described as the offsite maximally exposed individual (MEI).

Based on data gathered by both LANL's Environmental Surveillance and Compliance Program and the radiological effluent monitoring, LANL operations account for about 1 percent of the total contributions to the 1996 dose for the offsite MEI (DOE 1999c). Of this 1 percent, 68.1 percent is from direct or external penetrating radiation, 29.6 percent is from air immersion, 0.4 percent is from inhalation, and 1.9 percent is from ingestion (LANL 1997).

3.2.12.2 The Nonradiological Environment in the LANL Vicinity

Environmental media and foodstuffs have been selectively analyzed for chemical contaminants since the early 1990s. Appendix C of the LANL SWEIS (DOE 1999c) presents summaries of the numbers of analyses, numbers of samples with detectable concentrations, and average and 95th percentile concentrations of these chemicals. For those chemicals in the LANL Environmental Surveillance and Compliance Program, there are no significant differences in concentration between media at the existing perimeter of the site (currently including the 10 land tracts) and those of the general region (DOE 1999c, Appendix D, Section D.3.4).

Appendix C of the LANL SWEIS also contains summaries of contaminated site concentrations for inorganic and organic chemicals. These onsite data were developed by the LANL ER Project to characterize the contaminated sites in order to determine whether remediation was needed. These contaminated soil sites were determined in the LANL SWEIS as not significant contributors to public exposures by any exposure pathway under the current circumstances (DOE 1999c).

Risk due to Chemicals from Ingestion

Regionally, the human health risk due to chemicals is predominantly from inorganic chemicals and, more specifically, metals. Organic chemicals with ingestion potential are for the most part manmade and not found in the regional or local environment. The potential for ingestion of chemicals by the public is through ingestion of foodstuffs and drinking water. The potential for ingestion of chemicals in the vicinity of LANL is believed to be the same as that posed by ingestion within the general region.

Three chemical elements identified in the LANL Environmental Surveillance and

Compliance Program were identified as having potential health risk: arsenic, beryllium, and lead. None of the identified concentrations in the environmental media were determined to have been derived from current or historic LANL operations.

Risk due to Chemicals from Inhalation

Chemical emissions of HAPs and toxic air pollutants (TAPs) are sufficiently small from LANL operations that they are not routinely measured. HAPs and TAPs from LANL are emitted primarily from laboratory, maintenance, and waste management facilities. The LANL SWEIS (DOE 1999c) provided an extensive analysis of HAPs and TAPs from chemical use and potential emissions for the current condition or affected environment. No recent chemical usage was found to result in emissions of significance from the standpoint of potential human health effects.

3.2.12.3 Cancer Incidence and Mortality in the Los Alamos Region

An extensive discussion of cancer incidence and mortality in the Los Alamos region was presented in the LANL SWEIS (DOE 1999c).

Los Alamos Cancer Rate Study

The Los Alamos Cancer Rate Study was a study of cancer incidence among populations residing near LANL.

Results of the incidence study showed that Los Alamos County experienced a 70 to 80 percent excess of brain cancer as compared with the New Mexico reference population and national statistics.

A review of incidence rates for 22 other major cancers and childhood cancers showed that the incidence of some cancers in Los Alamos County was greater than that observed in the reference populations, while the incidence of other cancers was lower than or comparable to that observed in the reference populations. Cancers with incidence rates consistently elevated in Los Alamos County during 1970 to 1990 included melanoma of the skin, prostate cancer, non-Hodgkin's lymphoma, ovarian cancer, and female breast cancer. Leukemia and major cancers of the respiratory and digestive systems occurred at or below the incidence levels observed in the reference populations.

Several cancers showed distinct temporal patterns of increasing incidence. Most notable was the marked increase in thyroid cancer incidence observed in the mid 1980s. Thyroid cancer incidence in Los Alamos County during 1986 to 1990 was nearly four times higher than that observed in the New Mexico reference population. Based on the findings of the study, a study of the elevated thyroid cancer incidence in Los Alamos County was made (DOE 1999c). Results of the investigation showed the incidence of thyroid cancer in Los Alamos County fluctuated slightly above the statewide incidence between 1970 and the mid 1980s before rising to a statistically significant, four-fold elevated level during the late 1980s and early 1990s.

The investigation described in this report did not identify a specific cause of the unusually high number of thyroid cancers diagnosed in Los Alamos County. The likelihood is that the excess had multiple causes. Potential risk factors for thyroid cancer include therapeutic irradiation, genetic susceptibility, occupational radiation exposure, and weight.

3.2.12.4 Facility Accidents

The DOE maintains equipment and procedures to respond to situations where human health or the environment are threatened. These include specialized response teams such as Radiological Assistance Teams, and specialized training and equipment for the fire department, local hospitals, and State and other government public safety organizations that may participate in response actions. Response programs include notification of local governments whose constituencies may be threatened. A broad range of exercises are run to ensure the systems are working properly, from facility-specific exercises such as fire drills, to regional exercises involving several government organizations. Additionally, the emergency procedures are periodically used in response to actual events, such as the Dome Fire in the spring of 1996.

LANL's emergency planning, preparedness, and response program is required by various Federal regulations. Emergency management and response personnel are responsible for coordinating actions necessary to minimize adverse accident impacts. These personnel are available on a 24-hour basis, and maintain an Emergency Operations Center that is staffed around the clock. Memoranda of Understanding have been established among the DOE, Los Alamos County, and the State of New Mexico to effectively operate during an emergency by providing mutual assistance and open access to medical facilities.

3.2.13 Environmental Justice

Environmental justice impacts occur if there are any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE. Environmental justice impacts are assessed for a 50-mile (80-kilometer) area surrounding LANL. The shaded areas in Figure 3.2.13-1 show 1990 Census tracts where racial or ethnic minorities comprise 50 percent or more of the total population, or where minorities comprise less than 50 percent but greater than 25 percent of the total population in the census tract. Figure 3.2.13-2 shows low-income communities, which are generally defined as those where 25 percent or more of the population is characterized as living in poverty (annual income of less than $8,076 for a family of two).

3.3 General Setting of the Land Tracts

The 10 subject tracts of land within this study total approximately 4,800 acres (1,944 hectares). Of the total, 3,000 acres (1,215 hectares) are located in Santa Fe County, and the remainder are in Los Alamos County. The 10 parcels range in size from less than 0.5 acre (0.2 hectare) for the smallest, to approximately 2,715 acres (1,100 hectares) for the largest. Current land use at seven of the parcels is considered urban, in that they reflect or are adjacent to some urban development and are readily served by urban services. The three remaining parcels (Rendija Canyon, TA 74, and the White Rock Y) are more rural in nature and would require additional infrastructure to accommodate future development (DOE 1999c).

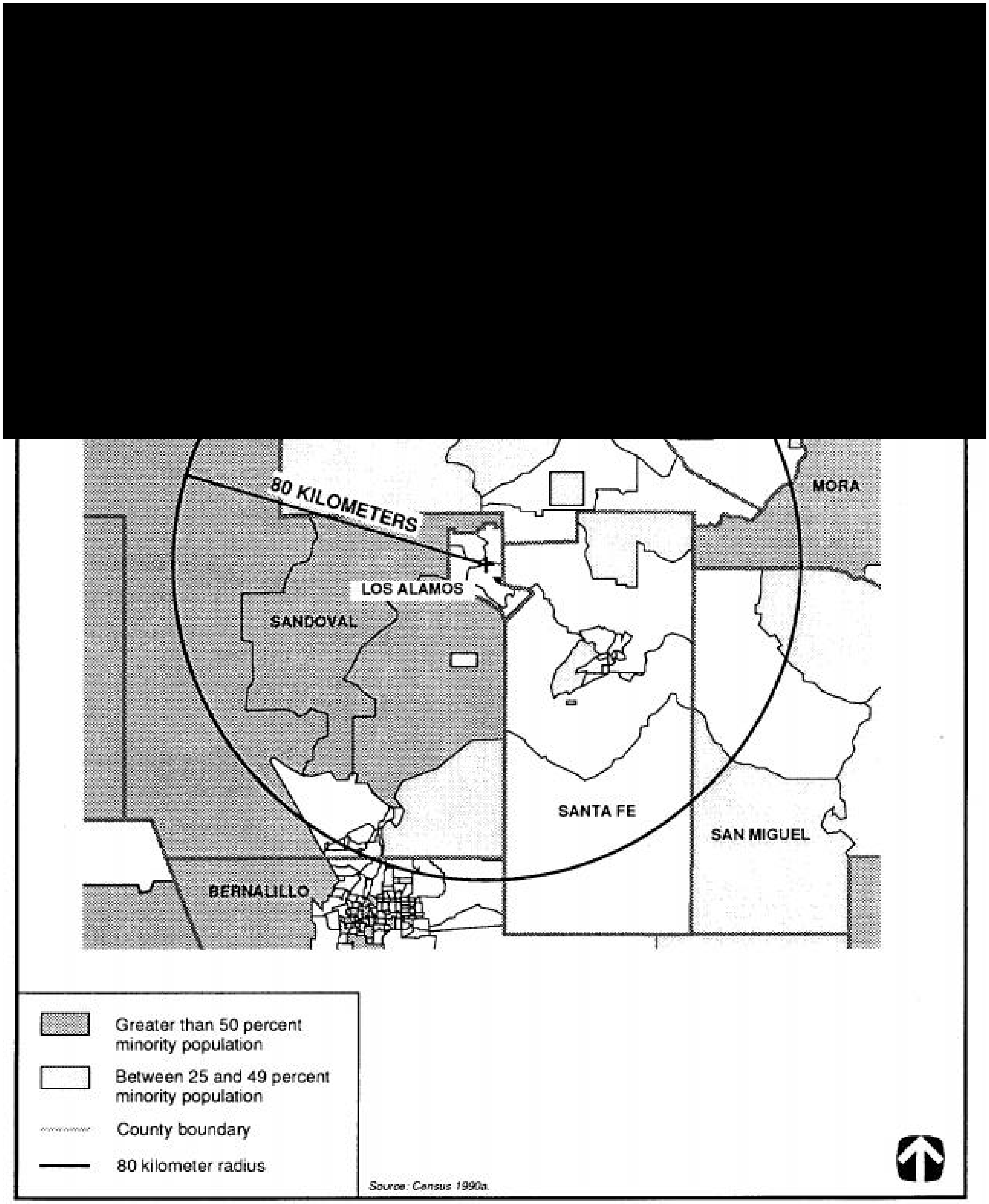

Figure 3.2.13-1. Minority Population Distribution for Los Alamos National Laboratory and Surrounding Counties.

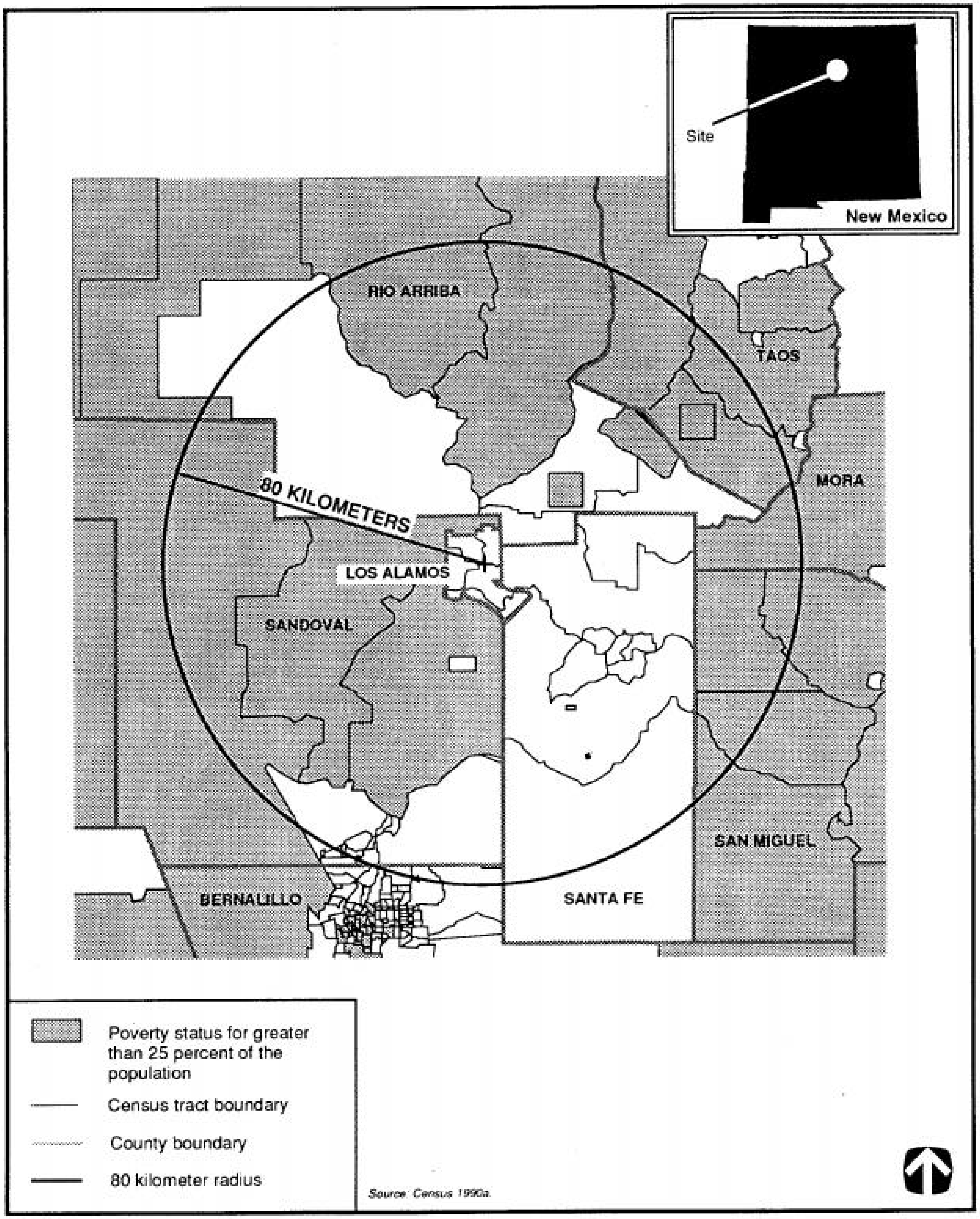

Figure 3.2.13-2. Low-Income Population Distribution by Poverty Status for Los Alamos National Laboratory and Surrounding Counties.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGIES AND ASSUMPTIONS

This chapter discusses the methods and assumptions associated with the evaluation of the proposed conveyance or transfer of the subject land tracts. Section 4.1 contains discussion of the factors affecting the general issues presented in the CT EIS and the overall evaluation process. Section 4.2 presents the methodology and assumptions used in the analysis of each environmental resource and the associated impacts.

4.1 General Evaluation Process and Issues

4.1.1 Format Considerations

The decision process set by Public Law (PL) 105-119 (the Act) requires some minor changes to the EIS format. The Council on Environmental Quality (CEQ) regulations for implementing the NEPA direct Federal agencies to follow the standard format contained in 40 Code of Federal Regulations (CFR) Parts 1550-1508 for preparation of an EIS. However, the regulations allow Federal agencies to use different formats if "the agency determines that there is a compelling reason to do otherwise" (40 CFR 1502.10). Due to the complex, interwoven nature of the decision process contained in PL 105-119, the timing of the different decisions and determinations, and the number of land tracts being discussed in this CT EIS, the DOE has determined that a modified format would better serve the public interest and more efficiently satisfy the regulatory requirement for clear presentation of information.

Given the uncertainty associated with the conditions of conveyance or transfer of each individual tract, this CT EIS has been formatted to provide an individual discussion of the environment of each tract. Chapter 1 provides an introduction to the DOE's role in the conveyance and transfer process, the purpose and need for the DOE's action, and an overview of the alternatives analyzed in this CT EIS. Chapter 2 describes the Proposed Action Alternative and other alternatives considered in detail, as well as the contemplated land uses for each tract. Impacts of the No Action Alternative and the Proposed Action Alternative implementations are summarized in Table 2.4-1. The overall aspects of the environment common to all tracts are discussed in Chapter 3. Chapter 4 discusses the perspectives, assumptions, and methodologies by which the general issues and each of the environmental aspects and the associated impacts were assessed. Chapters 5 through 14 discuss each land tract separately. Each of these chapters discusses the legal or real estate description of the individual land tract, the land use(s) contemplated for the tract, unique aspects of the tract's affected environment, and the potential environmental impacts estimated to result from the postulated use and development of the tract.

4.1.2 Direct Versus Indirect Impacts

Once the land tracts are conveyed or transferred they will pass beyond the administrative control of the DOE, and all subsequent use of the land will be independent of the DOE. Therefore, for the purpose of this CT EIS, all actions and their associated impacts that would be undertaken by the DOE due to the proposed conveyance and transfer of the land tracts are described as direct impacts. An example of direct impacts would be the impacts of moving personnel from the DOE Los Alamos Area Office (LAAO) building to another facility at LANL.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGIES AND ASSUMPTIONS

All subsequent actions and their associated impacts that would be undertaken by the recipients after the proposed conveyance or transfer of the land tracts are described as indirect impacts. An example of an indirect impact would be increased water demand from new development and use of a tract.

4.1.3 Timeframe of Analyses

The schedule for conveyance or transfer of each tract, either in whole or in part, and the potential recipient's eventual development of the tracts cannot be accurately determined at this time. Therefore, the relationship of those schedules to the schedule for full implementation of the activities described in the LANL SWEIS Preferred Alternative also cannot be evaluated. In order to provide bounding analyses, it is assumed in this CT EIS that the SWEIS Preferred Alternative has already been fully implemented and all of the tracts are conveyed or transferred and developed within the next 10 years. This assumption, while ensuring the analyses of impacts bounds those likely to occur, may be overly conservative in some cases. Those cases where the analyses may be overly conservative (for example, in estimating when utility demand may exceed capacities), are identified in the following chapters.

4.1.4 Global Development Assumptions

Evaluation of resource impacts (utilities, air, transportation, etc.) for the Proposed Action Alternative required that development conditions be defined or assumed. These conditions include acreage to be developed, type of development (none, residential, commercial, mixture), number of new dwelling units or businesses, number of new residents or workers, and number of new vehicles. Estimates of the development acreage reflect the best available information on the footprint of contemplated developments. This acreage may include the redevelopment of disturbed land, as well as the new use of relatively undisturbed areas. The impact analysis assumes that these footprints represent an approximation of areas that would be developed but that may not include all areas that would otherwise be disturbed. Likewise, there are no specific acreage estimates for land that may be disturbed or developed for land uses that include undefined improvements to utilities or recreational areas. These areas are qualitatively addressed in the impact analysis.

Both potential recipients of the tracts proposed for transfer were consulted as to their plans for use of the tracts. Neither Los Alamos County nor San Ildefonso Pueblo has development plans for 4 of the 10 tracts: Miscellaneous Site 22, the Miscellaneous Manhattan Monument, the White Rock Y, and Technical Area (TA) 74 Tracts. Three other tracts have but a single development scenario, and the remaining three have two possible development scenarios.

Tracts with a single development scenario include Rendija Canyon, TA 21, and the Airport Tracts. If developed, the Rendija Canyon Tract will become the site of a small community with nearly 1,300 new homes and 3,500 new residents. TA 21 also has one development scenario: commercial and industrial use of 55 acres (22 hectares), which would have been cleared of existing site buildings prior to new development. The Airport Tract also would be destined for commercial and industrial use, in addition to its continued use as an airport. No buildings would be demolished prior to disposition to accommodate the Airport Tract's continued use as an airport facility.

Tracts with two possible development scenarios include DOE LAAO, DP Road, and the White Rock Tracts. Under one development scenario, the DOE LAAO Tract would continue to be used commercially; private firms would supplant the DOE in the existing office building (6 businesses, 120 new employees). The DOE LAAO Tract also may be developed residentially; however, in this case both site buildings would be razed and replaced by 200 dwelling units and 500 new County residents. The DP Road Tract might be developed commercially (40 businesses, 900 new workers), or it could receive a mixture of residential development (160 mobile homes on 20 acres [8 hectares]) and commercial development on 5 acres (2 hectares) (10 businesses, 225 new employees). It is expected that the two site buildings would remain intact and not be razed prior to disposition. Finally, the White Rock Tract could receive minimum commercial development (four businesses on just 8 of 100 acres [3 of 40 hectares] of land), or receive a mixture of residential and commercial development. Plans for the latter include 760 new dwelling units (1,900 new residents) and a 20-acre (8-hectare) recreational vehicle park with capacity for 160 vehicles. Table 4.1.4-1 summarizes information about these potential development scenarios; Table 4.1.4-2 summarizes the assumed structure status at the time of conveyance or transfer. It is assumed that any leases will transfer with the conveyance or transfer of each tract. Only permanent buildings and structures belonging to the DOE would be subject to decontamination; only DOE-owned structures not under lease would be subject to demolition activities.

4.2 Environmental Impact Methodologies

The resource areas and issues addressed in the analysis of the conveyance or transfer of each of these tracts are as follows:

- Land Use
- Transportation
- Infrastructure
- Noise
- Visual Resources
- Socioeconomics
- Ecological Resources
- Cultural Resources
- Geology and Soils
- Water Resources
- Air Resources
- Human Health
- Environmental Justice

A detailed discussion of the specific methodologies and assumptions for each of these areas is provided in the following sections, as appropriate.

4.2.1 Land Use

The approach used in assessing potential impacts to land use is comparative in nature. Impacts are identified based on determinations of compatibility between land use reasonably anticipated to occur as a result of the Proposed Action Alternative; existing adjacent land uses; and management plans, policies, and practices.

Consistency and compatibility of future land use with both ongoing DOE and non-DOE management plans, policies, regulations, and practices are assessed also. Examples of DOE management plans and policies include those related to resource management, public safety, and national security for tracts located adjacent to ongoing LANL operations. Non-DOE plans and policies include related resource management plans and policies for wildlife, parks and monuments, and fire control (for example, by the National Park Service [NPS] and U.S. Forest Service [USFS]). Examples of relevant land use practices include public use of lands adjacent to the tracts for recreational purposes such as hiking, biking, or viewing of wildlife.

Table 4.1.4-1. CT EIS Development Assumptions

TRACT[a]	ACRES (HECTARES)		RESIDENTIAL			COMMERCIAL/INDUSTRIAL		
	Total	Developed	Homes[b]	Residents[c]	Vehicles	Businesses[d]	Workers	Vehicles
Contemplated Land Use:								
Rendija Canyon[e]	910 (369)	570 (231)	1,260	3,500	2,900	0	0	0
DOE LAAO	15 (5)	10 (4)	200	500	420	0	0	0
DP Road	50 (20)	26 (11)	0	0	0	40	900	24
TA 21	260 (99)	55 (22)	0	0	0	70	1,900	56
Airport	205 (80)	105 (43)	0	0	0	200	3,100	120
White Rock[f,g,h]	100 (40)	60 (24)	760	2,220	1,730	1	6	0
	1,540 (613)	826 (335)	2,220	6,220	5,050	311	5,906[i]	200
Alternate Land Use:								
Rendija Canyon[j]	910 (369)	0 (0)	0	0	0	0	0	0
DOE LAAO	15 (5)	10 (4)	0	0	0	6	120	15
DP Road[k]	50 (20)	26 (11)	160	400	330	10	225	6
TA 21			No alternate land use contemplated.					
Airport			No alternate land use contemplated.					
White Rock	100 (40)	8 (3)	0	0	0	4	60	2

[a] Remaining four tracts are not developed: Miscellaneous Site 22, Miscellaneous Manhattan Monument, TA 74, and White Rock Y.

[b] Homes = Dwelling units (houses, apartments, condominiums, or mobile homes).

[c] Residents estimated at the County average of 2.5 per dwelling unit.

[d] Businesses: May be more than one business per structure (several firms in an office building).

[e] Assumes 420 acres (170 hectares) at three homes per acre (hectare), and 148 acres (60 hectares) for streets, etc.

[f] Commercial development consists of RV park (20 acres [8 hectares]) with 160 spaces.

[g] “Residents” are the sum of 1,900 new residents plus 320 average occupancy of the RV park.

[h] Vehicles include 130 RVs (average occupancy of the RV park).

[i] Of 5,900 workers, 3,900 (two-thirds) live in new developments.

[j] Alternate “development” is cultural preservation.

[k] Alternate scenario: Trailer park (160 units) on 20 acres (8 hectares) + 10 businesses on 6 acres (2.4 hectares).

Table 4.1.4-2. Assumed Structure Status at Time of Conveyance or Transfer

TRACT STRUCTURES	LAND USE #1	LAND USE #2
Rendija Canyon:	Residential	Preservation
Los Alamos Sportsman's Club	Intact	Intact
Other Club structures	Intact	Intact
Residences	Intact	Intact
Utilities[a]	Intact	Intact
Environmental[b]	None	None
DOE LAAO:	Commercial	Residential
Office building	Intact	Razed
Steam plant	Intact	Razed
Sewage lift station	Intact	Intact
Utilities[a]	Intact	Intact
Environmental[b]	None	None
Miscellaneous Site 22:	Commercial	
Air monitoring station	Removed	NA
Miscellaneous Manhattan Monument:	Preservation	
Monument	Intact	NA
DP Road:	Industrial	Residential
Buildings (2)	Intact	Intact
Storage sheds (7)	Intact	Intact
Utilities[a]	Intact	Intact
Environmental[b]	Removed	Removed

TRACT STRUCTURES	LAND USE #1	LAND USE #2
TA 21:	Industrial	
Structures (more than 100)	Razed	NA
Utilities[a]	Intact	NA
Environmental[b]	Removed	NA
Airport:	Commercial	
Terminal	Intact	NA
Storage (2)	Intact	NA
Gas meter	Intact	NA
Utilities[a]	Intact	NA
Environmental[b]	Removed	NA
White Rock Y:	Utilities	Preservation
Utilities[a]	Intact	Intact
Environmental[b]	Intact	Intact
TA 74:	Utilities	Preservation
DOT facilities	Intact	Intact
Utilities[a]	Intact	Intact
Environmental[b]	Intact	Intact
White Rock:	Residential	Preservation
Visitor Center	Intact	Intact
Electrical substation	Intact	Intact
Water pump station	Intact	Intact
Utilities[a]	Intact	Intact
Environmental[b]	Removed	Removed

Notes: NA = not applicable, DOT = U.S. Department of Transportation

[a] Utilities: water, electric, gas, sewage lines/equipment, etc.

[b] Environmental: air monitoring station, thermoluminescent dosimeter station, monitoring well, stream gauging station, outfall.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGIES AND ASSUMPTIONS

Ten parcels of land, or tracts, have been initially identified as suitable for conveyance or transfer. The two potential recipients of these lands tracts have been consulted as to their plans for use of these tracts. These plans are at a preliminary stage and encompass a range of potential land uses. Because the decision as to which recipient will receive each tract will be made by the Pueblo of San Ildefonso and the County of Los Alamos after the completion of this CT EIS, the DOE cannot determine which land use might be implemented on any land tract. In order to appropriately analyze the two land uses, the impacts of the contemplated uses were both analyzed in the CT EIS.

4.2.1.1 Environmental Restoration

PL 105-119 directed, in part, that the DOE identify land at LANL for conveyance and transfer. The Act also directed that the DOE identify any environmental restoration or remediation that would be necessary prior to conveyance or transfer of candidate land tracts. In response, the DOE has prepared a report (DOE 1999b) to provide Congress with information needed to make decisions about actions and funding needed for characterization and cleanup of the candidate tracts of land. Information contained in the environmental restoration sections of this CT EIS, including Appendix B, is summarized from the Environmental Restoration Report.

The LANL Environmental Restoration Report (DOE 1999b) identifies potential and confirmed environmental contamination (that is, potential release sites, or [PRSs]) at each land tract; identifies buildings and other structures located within each tract; identifies canyon system areas of concern; and stipulates whether additional sampling or characterization is likely. The LANL Environmental Restoration Report identifies remedial actions likely to prove necessary in order to ready a tract of land for conveyance or transfer and projects the cost and duration for these cleanup activities. Three site cleanup techniques are considered: removal, in situ treatment, and in situ containment of the contamination. Two cleanup techniques are assumed for structures: removal of hazardous materials (such as asbestos insulation) or complete demolition of the structure. Cleanup of canyons systems is assumed to be removal of contaminated soils. Because the details of potential remediation actions are not known at this time, numbers of remediation workers, individual remediation tasks, and duration of each task cannot be determined. Therefore, quantitative risks to remediation workers are not assessed in this CT EIS. Appendix B, Environmental Restoration Data, summarizes this information, but the Environmental Restoration Report should be reviewed for more detailed data. Maps of the 10 subject tracts are included in Chapters 5 through 14 that show, broadly, the areas of each tract where potential contamination issues (PCIs) are located and the areas without PCIs. These maps were furnished by LANL Environmental Restoration (ER) Project personnel for inclusion in the CT EIS. The PCI maps are intended to illustrate the areas of each tract that include the PRSs, contaminated structures, and soil or silt areas that are contaminated either from air or water disbursement. The PCI areas have deliberately been exaggerated beyond the specific location of individual PRSs or known sites of contamination to accommodate the special requirements needed to perform future cleanup activities (which include worker and equipment staging areas, barrel storage areas, site egress requirements, health and safety buffer areas, etc.) and to compensate for site areas that have not been completely investigated or that may not have been field sampled yet (although site contamination is suspected from past uses of the areas or from information known to the LANL ER Project). Therefore, the PCI areas do not reflect actual total site contamination, nor are they intended to do so. Some of the PCI areas reflect site areas that have already been cleaned up but that have not been approved for release to use by the site administrative authority(s).

4.2.2 Transportation

The techniques recommended by the Transportation Research Board's *Highway Capacity Manual Special Report 209* (NRC 1994) are used to evaluate the level of service (LOS) of each transportation link. The LOS is a qualitative measure describing operational conditions within a traffic stream. An LOS describes these conditions in terms of factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The LOS designations range from A to F, with each level defined by a range of volume to capacity ratios. The LOS designations given in Table 4.2.2-1 are based primarily on the Highway Capacity Manual (NRC 1994).

Each transportation link or section is evaluated for two conditions. The first analysis assumes that the proposed disposition of each tract does not take place (the No Action Alternative). The second analysis considers the impacts of the disposition of the tract with the proposed land use(s) as currently contemplated. This allows an evaluation of the potential transportation impacts on the transportation link of the proposed land use(s) of the tract.

The trips generated at each tract for the bounding case land use are estimated. This is done using the procedures of the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (ITE 1997). The trips generated at each tract are then added to the

Table 4.2.2-1. Level of Service Letter Designations and Definitions

LETTER DESIGNATION	OPERATING CONDITIONS	LEVEL OF SERVICE DEFINITION
A	Good	This is a condition of free vehicle flow, accompanied by low volumes and high speeds.
B	Good	This occurs in the zone of stable vehicle flow, with operating speeds beginning to be restricted somewhat by traffic conditions.
C	Good	This is still the zone of stable vehicle flow, but speeds and maneuverability are more closely controlled by the higher volumes.
D	Below average	This LOS approaches unstable vehicle flow, with tolerable operating speeds maintained, though considerably affected by changes in operating conditions.
E	Maximum capacity	This cannot be described by speed alone, but represents operations at lower operating speeds, typically, but not always, in the neighborhood of 30 miles (48 kilometers) per hour, with volumes at or near the capacity of the highway.
F	Traffic jam	This describes a forced-flow operation at low speeds, where volumes are above capacity.

Source: NRC 1994

existing trips on the adjacent transportation system link, and these form the basis for the contemplated land use capacity analyses discussed above.

Background traffic growth rates and the anticipated annual rate of growth of existing traffic are estimated in conjunction with the New Mexico State Highway and Transportation Department (NMSH&TD) and County officials. These background traffic growth rates are applied to the existing traffic counts provided by the County and NMSH&TD to forecast future traffic levels for the baseline (no land disposition) added to this forecast background traffic to evaluate the contemplated land use scenario. An assumption of this analysis is that as background development occurs in the region, localized improvements would be made to accommodate this increased level of traffic.

To assess the indirect impacts of the proposed conveyance or transfer, existing County traffic is projected to increase at a rate of 1.5 percent per year. The County's Traffic Engineering Department provided this growth rate projection. The NMSH&TD Transportation Planning Division provided a growth rate of 2.29 percent for use on the traffic counts (NMSH&TD 1997).

4.2.3 Infrastructure

The approach taken in assessing potential impacts to utilities is comparative in nature. Potential impacts are identified by comparing the existing infrastructure and utility usage and capacities with the estimated needs for no action and proposed future land uses. Utilities considered in the analysis include electricity, water, natural gas, wastewater, and solid waste. Utility needs for each tract were estimated by multiplying the average unit's (dwellings or business) utility requirements by the contemplated number of dwelling units (residential) or businesses (commercial and industrial) to be developed. The average unit utility requirements were derived from actual County and LANL utility usage figures.

Cumulative utility usage includes the sum of contemplated developments on transferred lands, the County's ongoing and future developments on tracts currently under County ownership, and anticipated growth of LANL. The sum of contemplated developments on transferred land includes only one land use scenario from each tract—that is, the scenario that has the highest overall anticipated utility usage. LANL growth is based on the Preferred Alternative of the LANL SWEIS (DOE 1999c).

4.2.4 Noise

The analysis of the impacts of noise and vibration examines projected activities at each of the land tracts, with a focus on changes from existing conditions in the area. The analysis is qualitatively estimated using comparative values shown on the decibel chart provided as Table 3.2.4-1 in Chapter 3.

4.2.5 Visual Resources

Visual resource analyses address those aspects of an area or project that pertain to its appearance and the manner in which it is viewed by agencies and individuals. Visual resource studies review the aesthetic qualities of natural landscapes and modifications to them, the perceptions and concerns of people for the landscape and landscape change, and the physical or visual relationships that influence the visibility of proposed landscape changes.

The inventory method for this CT EIS will follow an approach developed and used by the U.S. Department of the Interior, Bureau of Land Management (BLM), called Visual Resource Inventory (VRI) (DOI BLM 1986). This inventory provides a means for determining visual values. The major components of the VRI methodology include scenic quality, distance zones, and sensitivity levels. These components are individually evaluated and are combined into a ratio of one of four VRI classes. VRI classes represent the relative value of visual resources present and provide a basis for considering visual values during the planning process.

The BLM methodology is used to evaluate the contemplated land uses by measuring the degree of contrast between the proposed activity and the existing landscape. This score is compared with allowable levels of contrast for the appropriate management class. The comparison helps to determine if mitigation may be necessary to reduce visual impacts. The mitigation techniques most appropriate for the project will best be determined when final development proposals for buildings and other facilities are available. However, general suggestions for mitigation techniques can be discussed on a tract-by-tract basis.

Visual resource analysis data for the CT EIS were collected during site visits in August 1998. Other information was obtained through various documents and maps.

VRI Class I is assigned to all special areas where there is a congressional or administrative decision to maintain a natural landscape as essentially unaltered by humans. The objective of this class is to preserve the existing character of the landscape.

VRI Class II, III, and IV assignments are based on a combination of scenic quality, distance zones, and sensitivity levels. The highest scenic quality areas that do not have an administrative designation are assigned to Class II. The objective of this class is to retain the existing character of the landscape, and any changes to the characteristic landscape should be low. For Class III areas, the objective is to partially retain the existing character of the landscape and to make only moderate changes to the landscape. Class IV areas represent the lowest value of visual character; the level of change to the characteristic landscape can be high, but attempts should be made to minimize further visual impacts.

4.2.6 Socioeconomics

The total socioeconomic impact to the region of influence (ROI) is the sum of direct, primary indirect, and secondary indirect impacts. Both the direct and indirect impacts were estimated for the ROI described in Chapter 3, Section 3.2.6, of this CT EIS. Because economic impacts affect a large, economically linked area, no tract has a specific ROI. Impacts for all tracts are assessed for the three-county ROI.

Economic impacts are based on the development assumptions stated in Section 4.1.5. Direct employment impacts represent actual increases or decreases in employment at each tract. Total employment and earnings impacts were estimated using Regional Input-Output Modeling System (RIMS II) multipliers developed specifically for the ROI by the U.S. Bureau of Economic Analysis.

The significance of the actions and their impacts is determined relative to the context of the affected environment. Conditions in the ROI, as presented in Chapter 3, Section 3.2.6 of this CT EIS, provide the framework for analyzing the significance of potential socioeconomic impacts that could result from implementation of any of the alternatives. Employment and population figures represent socioeconomic conditions expected to exist in the ROI through the year 2025.

4.2.7 Ecological Resources

Impact analysis methods and thresholds were developed in concert with Cooperating Agency personnel and other local ecological resource experts. Each subject tract is more fully described in Chapters 5 through 14 in terms of watershed, vegetation zone(s), fauna, and presence or use of the tract by protected or sensitive species. Each land tract was field verified to ensure accuracy of descriptive data. This information provides the foundation data for impact analysis for the Proposed Action Alternative and the No Action Alternative.

Potential impacts to most species are assessed qualitatively and in the general categories of direct mortality from construction, habitat loss, degradation of habitat, potential impacts that would occur after development, and loss of LANL's habitat management and protection plans and their implementation. Impacts to Federal-listed species' are species-specific and primarily determined through an assessment of effect to the species' areas of environmental interest (AEIs) that occur within a tract proposed for development. Any reduction or modification to a species' AEI core zone is considered an adverse impact. The severity of impact to a Federal-listed species resulting from reduction or modification of its AEI buffer zone(s) is dependent upon the proposed land tract scenario. Tract-by-tract information is not available for those Species of Concern, a category for plants and animals that the U.S. Fish and Wildlife Service encourages agencies to include in their NEPA analysis. Therefore, these species are not specifically addressed in the potential environmental impact sections.There is the potential for impacts to the State-listed species presented in Table 3.2.7-1 in Chapter 3 as a result of the proposed actions, either through direct mortality or habitat degradation. However, there is insufficient information on the actual distribution and abundance of these species to make an accurate tract-by-tract assessment of the potential effects from the Proposed Action Alternative (LANL 1998b). Therefore, these species are not specifically addressed in the potential environmental impact sections.

4.2.8 Cultural Resources

The potential for negative or positive impacts to cultural resources are assessed under the No Action Alternative and the Proposed Action Alternative (conveyance and transfer of each tract). Cultural resources that could be directly or indirectly affected by the alternatives are those located on lands within the 10 subject land tracts and in areas surrounding these tracts. Thus, the ROI for cultural resource impact assessment includes the land tracts themselves, plus cultural resources located in surrounding lands.

Cultural resources include prehistoric and historic resources, and traditional cultural properties (TCPs) (as detailed in Chapter 3, Section 3.2.8, and Appendix E of this CT EIS) that are located within the ROI. These resources include those that have been identified and those that could potentially be located within the ROI, such as subsurface archaeological deposits, unrecorded burials, and unidentified TCPs. All cultural resources are considered in the impact analysis; however, information on National Register of Historic Places (NRHP) eligibility of resources is provided for each of the 10 tracts.

Information on cultural resources is derived from the results of systematic cultural resource inventories of the 10 proposed land tracts and review of literature concerning TCPs and traditional uses of the area. A more detailed discussion of the methods employed to gather cultural resource data is provided in Appendix E of this CT EIS. Consultations with Native American tribes were not completed in time for inclusion into this CT EIS. Consultations will be completed prior to conveyance and transfer of any proposed tracts on a government-to-government basis in accordance with DOE Order 1230.2 (see Chapters 16 and 17 of this CT EIS).

Descriptions of activities occurring under the two alternatives are used to analyze potential impacts to cultural resources. The results of consequence analyses for other resource areas (water resources, land resources, ecological resources, environmental restoration, infrastructure, transportation, land use, human health, visual resources, and noise) are used to determine the potential for other impacts to the cultural resources themselves and to traditional practitioners accessing TCPs.

Impacts are discussed as direct (resulting from the DOE's action of conveyance or transfer) and indirect (resulting from the broad categories of land use contemplated by the receiving parties). Potential impacts could be physical effects to cultural resources themselves, effects to people accessing the resources, and effects due to the change in the application of Federal protections to these resources.

Potential impacts to cultural resources are assessed using the "criteria of adverse effect" (36 CFR Part 800.5(a)(1)), as defined in the implementing regulations for the *National Historic Preservation Act* (NHPA) of 1966, as amended (16 United States Code [U.S.C.] Section 470). An adverse effect is found when an undertaking may alter the characteristics that qualify a property for inclusion in the NRHP. These criteria include physical destruction or alteration; removal of a property from its historic location; change of the character of a property's use; introduction of visible, audible, or atmospheric elements out of character with the resource; neglect leading to deterioration and vandalism; isolation and restriction of access; and transfer, lease, or sale of the property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance. The State Historic Preservation Office(r) (SHPO) reviews NRHP eligibility and adverse effect determinations. Activities conducted under the alternatives will be compared against these criteria of adverse effect to determine the potential for impacts to cultural resources.

Potential impacts to TCPs and practices also are addressed in the context of the requirements of the *American Indian Religious Freedom Act*, the *Religious Freedom Restoration Act*, Executive Order 13007: "Indian Sacred Sites," and the *Native American Graves Protection and Repatriation Act*. These laws and executive order provide for Federal protections and considerations for TCPs and religious practices that may be lost or changed under the alternatives analyzed. Potential impacts could include the loss of access to TCPs by traditional practitioners, loss of ownership or control over human remains and certain items found in an archaeological context, the loss of protection for certain classes of resources, and burdens on the practice traditional religions.

4.2.9 Geology and Soils

The methodology used to assess potential impacts to geology and soils is a two-step process. First, past activities are evaluated to see how they have impacted the geology and soils in the study area. The information from this study on the existing environment is presented in Chapter 3, Section 3.2.9. Information from Section 3.2.9 was then used as a basis for assessment of potential impacts that may result from implementing the Proposed Action Alternative and the No Action Alternative. The geology and soils impact analysis focuses on any changes that have the potential for being impacted by seismic events and slope instability, causing soil erosion and changes to mineral resources. For example, observation and studies of the sites in the past have shown where slope stability problems are most likely to occur and under what circumstances. This type of information is used to see if those same indicators leading to soil erosion were present in a new action or in a potential change to an existing activity. This manner of analysis is commensurate with the significance of the potential impacts in this resource area.

Impacts to geology and soils are primarily associated with effects generated by proposed construction activities. Where construction activities would occur outside of existing facilities, they are explicitly addressed.

The effects on soil contamination from contaminants released to the atmosphere, either directly in gaseous effluents or indirectly from resuspension of onsite contamination (for example, fugitive dust), were evaluated. As discussed in Chapter 3, Section 3.2.9, the information provided from the geology and soils studies related directly to the analysis of several other sections within the CT EIS (such as cultural resources, human health, and accidents).

4.2.10 Water Resources

Impacts to water resources are assessed for both the No Action Alternative (continued DOE operations) and the Proposed Action Alternative. Each tract is assessed separately, although cumulative impacts also are considered. Impacts in each tract are assessed separately. In some cases water quality data were not available for the individual tracts. Impacts on the following water resources are assessed:

- Surface water quality (including National Pollutant Discharge Elimination System [NPDES] discharge points)
- Surface water quantity
- Groundwater quality
- Groundwater quantity

Changes in water quality and quantity are described and quantified where information is available. The assessment of potential impacts to water quality includes a comparison of the chemistry of any proposed discharge or its applicable regulatory limits to the existing water. For instance, any proposed discharge to surface water is assessed to determine whether it would affect the quality of the surface water by increasing chemical contaminants (such as nitrate) or water parameters (such as total suspended solids). The effect of changes in surface water discharge on transport of sediments and related contaminants is evaluated also.

Impacts on water quantity are most likely to exist in the form of withdrawals of groundwater for drinking water supplies, although surface water uses also may be planned or result from proposed alternatives. Changes that affect 100-year and 500-year floodplain configurations or that place structures or barriers in historic floodplains are evaluated, as well as any other increases in surface water flow (such as NPDES inputs) that may cause water and contaminants to reach the Rio Grande.

4.2.11 Air Resources

For each alternative, the three categories of pollutants (criteria, hazardous, and radioactive) were each evaluated from two perspectives: contributions by LANL operations and contributions from activities subsequent to disposition of the land tracts. In the No Action Alternative, lands are not transferred and, hence, there are no contributions other than those from LANL operations. These contributions have already been calculated in the LANL SWEIS (DOE 1999c). In the Proposed Action Alternative (convey or transfer):

- Other contributions are estimated individually for each tract and for each contemplated use of each tract.
- LANL contributions are examined for changes from the estimates made in the LANL SWEIS.

For example, disposition of the White Rock Tract would place some members of the public closer to operations at TA 54. Resulting exposures to radiological and chemical air pollutants are, therefore, reexamined.

4.2.11.1 Global Climate Change

A quantitative analysis was performed for emissions of carbon dioxide; other greenhouse gases are discussed qualitatively.

LANL emissions of carbon dioxide from stationary sources are estimated for combustion units on each tract of land being considered for conveyance or transfer. Estimates are based upon estimated annual fuel consumption by steam plants, boilers, and a natural gas water pump at TA 54 (DOE 1999c, Appendix B). Emissions from automobiles are estimated by assuming 4.3 tons (3.9 metric tons) emitted per private vehicle per year (DOE 1999c, page 5-19). The emissions are then summed for the No Action Alternative.

Under the Proposed Action Alternative (conveyance and transfer), LANL activities are replaced by activities of the contemplated land uses. Estimates of carbon dioxide emissions are made for residential and commercial activities, including vehicular emissions.

4.2.12 Human Health

4.2.12.1 General Considerations and Assumptions

Analysis for both CT EIS alternatives is limited to those human health impacts attributable to the DOE and LANL, with the exception of three natural phenomena initiated accidents or events that have area-wide concerns (floods, seismic events, and wildfire). The indirect human health impacts of the activities due to subsequent use by the land recipients are not addressed. This is because it is assumed that all uses after the conveyance or transfer will be in accordance with State and Federal laws and regulations that would be protective of workers and the general public. Also, no human health impact analysis was prepared for LANL ER Project activities (restoration, remediation, waste management, and decontamination and decommissioning) associated with the 10 subject land tracts or adjoining lands in the CT EIS. It is assumed that actions would be conducted in a manner consistent with all Federal and State regulations and, specifically, the DOE and LANL *Resource Conservation and Recovery Act* (RCRA) permit. It is additionally assumed that each land tract would be restored or remediated to a level of residual contamination (consistent with the requirements at the time of conveyance or transfer) that will assure a safe and healthy environment for the uses contemplated under the Act. This assumption may hold true for adjoining lands or upstream and upgradient lands that have potential contamination issues. The need to clean up these adjoining or upstream lands would be dependent upon risk assessment performed by LANL's ER Project during the planning stages of the remedial action. Those potential human health impacts that are addressed in this CT EIS are in the respective land-tract specific sections in Chapters 5 through 14.

4.2.12.2 LANL Operations

The CT EIS addresses the human health impacts of relevant activities associated with LANL operations. "Relevant" in this case means that an activity has the potential to affect the human health of those residing or working on the 10 subject land tracts. Human health impacts associated with LANL facilities and operations are addressed in detail in the LANL SWEIS (DOE 1999c). It should be noted that some LANL operations described in the LANL SWEIS project human health impacts to the public, which are not reflected in the land-tract specific human health analyses because they are unrelated to the 10 subject land tracts.

In the LANL SWEIS, none of the LANL operations for any alternative are expected to produce radiological doses over the next 10 years that would result in any excess latent cancer fatalities (LCFs) to a member of the public (DOE 1999c, page S-22). Additionally, exposures to chemicals under any of the LANL SWEIS alternatives are not expected to result in significant effects to the public (DOE 1999c, page S-22). Consequently, human health impacts to the public from LANL operations do not, by themselves, need further analysis in the CT EIS. However, some operations are examined as a consequence of transferring or conveying land, which may place members of the public in closer proximity to such operations. This same situation is true with regard to some LANL accidents described in the LANL SWEIS. These potential impacts of LANL operations on non-LANL workers or residents on the 10 land tracts are addressed where a potentially viable pathway for exposure may exist. Only two pathways related to LANL operations for offsite human health impacts were identified in the LANL SWEIS. These are air emissions (for example, fugitive dust, stack emissions, and direct radiation from contaminated soils) and water effluents (for example, NPDES discharges for stormwater and process waters).

Bringing a receptor (a recreational user or resident) closer to the source of air emissions may produce higher exposures or doses. Bringing a receptor closer to a source of water effluents will not change the exposure or dose unless the scenario of exposure changes (such as the frequency of drinking water). The CT EIS exposure scenarios are defined as the same used in the LANL SWEIS. Like the air emissions, the LANL SWEIS has evaluated the human health impacts of exposure to water effluents (DOE 1999c). Water effluents in the form of NPDES-permitted discharges are generated on one of the land tracts (TA 21) (DOE 1999c, Chapter 4, Table 4.3.1.3-1).

The assumption about environmental restoration or remediation of all land tracts being completed prior to conveyance or transfer means that the potential sources of radiological or chemical hazards will not be present on the land tracts themselves once they are conveyed or transferred. Therefore, to have a human health impact on the land recipients would require radiological or chemical hazards to be transported to the land tracts from another LANL location. The only pathway that has potential to do that because of the closer proximity to LANL operations is air (via air immersion or inhalation). The airborne pathway is the primary pathway examined in detail in this CT EIS, but only for those operations where the lands to be transferred are close enough to the LANL operations that they could pose a potential risk. The same “closer proximity” situation may be true for some accident analyses also.

The specific methods for calculating radiological doses and LCFs are the same as described in the LANL SWEIS (DOE 1999c). These methods are based upon risk factors and reference values developed by the International Commission on Radiological Protection (ICRP 1977 and ICRP 1991) and the National Research Council (NRC 1990). Information on background radiation was derived from the National Council on Radiation Protection (NCRP) (NCRP 1987). Where applicable, the methods for calculating the exposure and risks to chemicals are the same as described in the LANL SWEIS (DOE 1999c). These methods are based upon standard assessment methodologies, reference doses, and cancer risks (EPA 1991 and EPA 1997a). Exposure factors for ingestion and inhalation are taken from the latest EPA guidance (EPA 1997b).

An evaluation also has been made to determine if tracts lie within one of LANL's one-half mile radiation site evaluation circles, due to one or more LANL operations. These safety circles were intended to be used as planning tools for site developers and other project managers responsible for siting new facilities or operations to inform them of the presence of existing radiation sources and the need to evaluate their proposed action(s) against this information. The concept was defined and required as part of the planning process in LANL's Site Development Plan of 1990 (LANL 1990). This plan states that proposals for new activities or facilities at sites that lie within safety circles must be accompanied, during the siting process, by an evaluation of the potential radiological impacts and possible mitigation actions; the circles themselves are not representative of a particular dose of radiation to site receptors under either normal operations or accident conditions. As part of the human health assessment for the CT EIS, it was determined that four of the 10 subject tracts have portions that are within LANL facility radiation evaluation circles. These four tracts are the DOE LAAO Tract (due to activities at the Health Research Laboratory nearby), the DP Road and Airport Tracts (due to activities at TA 21), and the TA 21 Tract (due to operations both at TA 21 and at the Los Alamos Neutron Science Center [LANSCE] facility located on the next mesa to the south). Maps of the radiation site evaluation circles are provided for these tracts in Chapters 6, 9, 10, and 11 within the discussion of the existing environments for these tracts. The human health analysis included in the CT EIS analysis, by evaluating both chemical and radiological health consequences from normal operations and hypothetical accidents, provides the safety evaluation that must be considered for the conveyance or transfer of the subject tracts.

4.2.12.3 Facility Accidents

Accidents considered for the CT EIS are those presented in the LANL SWEIS, consistent with the DOE's overall approach of relying upon the SWEIS. The methodology for this reliance consists of reviewing the SWEIS accidents, determining which are applicable to the CT EIS, identifying assumptions and data required to analyze the applicable accidents, and then assessing the consequences of the applicable accidents.

SWEIS Accidents

The LANL SWEIS presents 30 accidents of four different types. In addition, the DOE added an additional accident scenario in the LANL SWEIS. (In response to public comments, a scenario in which a wildfire sweeps through LANL property was added.) A summary of accidents is provided in Table 4.2.12.3-1.

For some accidents, more than one hypothetical scenario is presented. For example, accident RAD-15 presents a hypothetical fire at the Chemical and Metallurgy Research (CMR) Laboratory (Building 03-29). Two scenarios are discussed: (1) a fire in a single chemical

Table 4.2.12.3-1. Summary of Potential LANL Accidents Considered in the Human Health Analysis

TYPE	NO. OF ACCIDENTS	NO. OF SCENARIOS
Natural Event	4	5
Chemical	6	16
Radiological	16	22
Worker	5	5
Total	31	48

laboratory room and (2) a fire that consumes an entire wing of the CMR Building. The SWEIS presents consequences for each of these two scenarios.

Applicable Accidents

This pool of 31 accidents was then reviewed for applicability to the proposed disposition of land tracts (see Table 4.2.12.3-1). Some scenarios were screened either because no members of the public would be involved; the scenario is not a credible accident; or the tract is too distant to be affected by the accident. As explained below, a total of 13 accidents and 20 scenarios do not affect any of the land tracts.

Five of the 31 accidents and five of the 48 scenarios involve only LANL workers. For example, accident WORK-04 in the LANL SWEIS evaluates the inadvertent exposure of one or more workers to electromagnetic radiation (x-rays, accelerator particle beams, lasers, or radiofrequency sources). These accidents affect only LANL employees, and have no public consequences. Accordingly, they need not be reevaluated for the CT EIS.

Five of the SWEIS accidents have frequencies of less than 10^{-6} per year, or less than once in a million years:

- **RAD-04:** Inadvertent detonation of a plutonium-containing assembly at the Dual Axis Radiographic Hydrodynamic Test (DARHT) Facility
- **RAD-06:** Aircraft crash into the Radioactive Materials Research, Operations, and Demonstration (RAMROD) Facility
- **RAD-10:** Dropping of a degraded storage container at Plutonium Facility (PF)-4
- **RAD-11:** Containment breach after detonation of a plutonium-containing assembly at the DARHT
- **RAD-14:** Plutonium release due to ion-exchange column thermal excursion (three scenarios)

In recognition of the different purposes that accident analyses play in the LANL SWEIS, the CT EIS evaluates reasonably foreseeable accidents that have a frequency in excess of 10^{-6} per year. For the CT EIS, these five accidents (seven accident scenarios) will not be reevaluated.

Next, the effects of three of the chemical accidents (six scenarios) do not reach any of the 10 land tracts proposed for disposition. Before reaching the tracts, the chemical plume will have decreased in concentration to the point that the chemical is, at worst, an irritant. Therefore, it no longer presents a health concern. The three chemical accidents are:

- **CHEM-04:** Release of toxic gas from a single container at 54-216
- **CHEM-05:** Release of toxic gas from multiple containers at 54-216
- **CHEM-06:** Chlorine gas release from outside the Plutonium Facility

None of the radiological accidents can be screened on the basis of distance from the accident to the tract. Each radiological accident requires an estimation of the maximally exposed individual (MEI) dose, collective dose, and excess LCFs for each of the 10 tracts of land proposed for disposition.

Finally, two of the radiological scenarios from accident RAD-09 were screened as unnecessary to evaluate. Accident RAD-09 evaluates four separate scenarios for dropping or puncturing a drum of transuranic waste. Two scenarios assume cleanup requires 24 hours, and two assume cleanup is accomplished in 1 hour. The 24-hour cleanup scenarios are obviously bounding, because drum contents are available for wind dispersion for a much longer period of time.

These were the only RAD-09 scenarios evaluated.

Assumptions and Data Used in Accident Assessments

Some information was common to the assessment of consequences of all remaining accidents (18) and accident scenarios (28). Distances from each accident to each of the 10 tracts of land proposed for disposition were required. Two distances were measured for each land tract: (1) the distance from the accident to the closest point of the tract and (2) the distance from the accident to the mid-point of the tract. These distances were assumed to be the same for the Miscellaneous Site 22 and Miscellaneous Manhattan Monument Tracts, but differed significantly for the larger tracts, such as the Rendija Canyon and TA 74 Tracts.

Another piece of information essential to assessing accident consequences is the assumed occupancy or population after development (the number of people potentially in the path of the chemical or radiological plume). These data are based upon development scenarios assumed for the 10 tracts subsequent to disposition of ownership, as set forth in the land use sections of this CT EIS. Maximum assumed occupancy was then weighted for assumed average occupancy. For example, Rendija Canyon would house an estimated 3,500 new residents if developed under one of the contemplated scenarios. Should a LANL accident occur during the day, most of these residents would not be at home, so that the consequences of the accident would be much smaller. Similarly, the Airport Tract may be developed commercially, with total estimated employment of 3,100. Should a LANL accident occur during the evening, however, most of these workers would have already gone home, so that the consequences of the accident would be much smaller. Accordingly, weighted occupancy or population was used to assess consequences. Data for each of the tracts are summarized in Table 4.1.4-1.

Assessing the Consequences of Applicable Chemical Accidents

Three chemical accidents were examined for additional potential public consequences in the LANL SWEIS. Two evaluation parameters were used in this examination:

- **ERPG-2:** Emergency Response Planning Guideline, Level 2. This is the maximum airborne concentration of a chemical below which nearly all individuals could be exposed for 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their ability to take protective action.
- **ERPG-3:** Emergency Response Planning Guideline, Level 3. This is the maximum airborne concentration of a chemical below which nearly all individuals could be exposed for 1 hour without experiencing or developing life-threatening health effects.

Chemical accident consequences are expressed in terms of the number of people exposed to air at either of these two chemical concentrations. Exposures to air at lower concentrations result only in irritation or odor detection, and do not present a health threat. The key to analysis of chemical accident consequences, therefore, is estimating the distances traveled by chemical plumes at or above ERPG-2 and ERPG-3 concentrations. These distances were estimated in the LANL SWEIS, using the ALOHA™ computer code.

The ALOHA™ code is designed to be used for emergency responders in the case of chemical accidents. The code predicts the rate at which chemical vapors may escape to the atmosphere from broken gas pipes, leaking tanks, and evaporating puddles, and predicts how the resulting chemical gas cloud disperses horizontally and vertically into the atmosphere. ALOHA^{TM} predicts the distances traveled by the chemical plume before concentrations drop below ERPG-3 and ERPG-2 concentrations. More detailed information about the ALOHA^{TM} code and consequences of the chemical accidents are presented in Appendix G of the LANL SWEIS (DOE 1999c).

The assessment of consequences for the proposed disposition of tracts uses the ERPG-2 and ERPG-3 distances predicted by the ALOHA^{TM} code, as stated in the SWEIS. These chemical plume distances were first compared to the distance between the land tract and the accident location. If the tract fell within the distance estimated for plume travel, then the number of additional public members affected by the accident was assumed to equal the weighted average occupancy of the tract.

Assessing the Consequences of Applicable Radiological Accidents

Three consequence parameters were estimated for each of the 13 applicable radiological accident scenarios: (1) MEI dose at each tract, (2) collective dose for each tract, and (3) excess LCFs at each tract. Estimations start with output data from the LANL SWEIS accident analyses and data generated by running the MACCS 2 computer code.

The MACCS 2 computer code uses a Gaussian plume model and source-term input to predict atmospheric dispersion and ground deposition of radionuclides from an accident that releases a plume of radioactive materials into the atmosphere. The radioactive aerosols and/or gases are presumed to be transported by prevailing winds, while dispersing horizontally and vertically in the atmosphere. MACCS 2 predicts doses at specified locations, ground contamination at specified locations, and collective dose. More detailed information about the MACCS 2 code and consequences of the radiological accidents are presented in Appendix G of the LANL SWEIS (DOE 1999c).

For most accidents, the LANL SWEIS provides information (generated by the MACCS 2 code) about plutonium ground concentration as a function of distance. The method used to estimate MEI doses at the land tracts, therefore, uses this ground contamination data. The method assumes that the relationship of ground contamination versus distance is the same as that for dose versus distance (that is, both decrease as a function of distance from the accident location at the same rate). Thus, if one knows ground concentration and dose at a reference location, and the distance from the accident to the tract, then dose at the tract can be estimated by ratio. MEI doses were estimated through the following steps:

- Distances from the accident location to the nearest point of each land tract were calculated.
- A reference location was selected, one for which the LANL SWEIS had calculated an MEI dose.
- Mean ground contamination level was estimated for this reference location.
- Mean ground contamination level was estimated for each land tract.
- MEI dose was estimated for each land tract.

Tract collective dose was estimated by calculating a mid-point MEI dose at each tract of land for each of the 13 applicable accident scenarios. The methodology was the same as used when estimated MEI dose except that distance was that from the accident to the mid-point of each land tract. This mid-point dose was then multiplied by the weighted average tract population or occupancy to calculate collective tract dose, from which excess LCF was calculated. Excess LCF is the mid-point MEI dose multiplied by 0.0005 latent cancers per Roentgen equivalent man (rem) of dose.

Assessing the Consequences of Applicable Natural Event Accidents

Five natural event accident scenarios triggered by natural phenomena (four earthquakes and one wildfire) are postulated in the LANL SWEIS. These are referred to in the SWEIS as "site-wide accidents" but are identified as "natural event accidents" in the CT EIS. Three of the four earthquake scenarios were not reevaluated for the CT EIS. Instead, only the most severe earthquake is reevaluated, along with the wildfire accident. For these two accidents, the consequences of both chemical and radiological releases were examined.

Sources (such as buildings) of chemical releases are identified for the LANL SWEIS. For most buildings, consequences are evaluated under both conservative (typical) and adverse weather dispersion conditions. For both of these accident scenarios, the SWEIS estimates the ERPG-2 and ERPG-3 distances and the number of people that would be exposed to ERPG-2 and ERPG-3 concentrations. Potential consequences subsequent to land disposition are evaluated, therefore, by determining if any of the land tracts lie within these distances.

Sources (such as buildings) of substantial radiological releases also are identified for the LANL SWEIS. MEI doses are estimated for some of these sources. These same MEI doses are reestimated for each of the 10 tracts of land proposed for disposition (regardless of whether the tract would be developed). The method used was to compare the material-at-risk (MAR) or source term from each building to the MAR or source term of a RAD-only accident, then ratio the MEI dose at each land tract. Collective dose and excess LCFs were estimated for the land tracts in a similar ratio fashion.

4.2.13 Environmental Justice

Pursuant to Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (59 *Federal Register* [FR] 7629 February 16, 1994), this section identifies and addresses any disproportionately high and adverse human health or environmental effects on minority or low-income populations from implementing the Proposed Action Alternative.

Potential environmental justice impacts are assessed using a phased approach. This approach established three thresholds for assessing whether environmental justice issues are likely to arise as a result of proposed DOE activities. The following three questions form the framework and establish the thresholds for the phased approach to environmental justice analysis.

- Are there any potential impacts to human populations?
- Are there any potential impacts to minority or low-income populations?
- Are potential impacts to minority or low-income populations disproportionately high and adverse?

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations.

Environmental justice guidance developed by the CEQ defines "minority" as individual(s) who are members of the following population groups: Native American (American Indian) or Alaskan Native, Asian or Pacific Islander, Black, or Hispanic (CEQ 1997). Minority populations are identified when either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis. Low-income populations are identified using statistical poverty thresholds from the Bureau of the Census (Census 1992).

Environmental justice impacts become issues of concern if the proposed activities result in disproportionately high adverse human and environmental effects to minority or low-income populations. Disproportionately high and adverse human health effects are identified by assessing the following three factors to the extent practical:

- Whether the health effects, which may be measured in risks or rates, are significant (as employed by the NEPA) or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death.
- Whether the risk or rate of exposure by a minority or low-income population to an environmental hazard is significant (as employed by the NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group.
- Whether health effects occur in a minority or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

Section 4-4 of the Executive Order (59 FR 7629, February 16, 1994) directs Federal agencies “whenever practical and appropriate, to collect and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence and that federal governments communicate to the public the risks of these consumption patterns.”

Potential impacts to cultural resources such as TCPs also could have a disproportionate and adverse effect on minority or low-income populations in the area. If TCPs are present on the tracts or in adjacent areas, they could be impacted by the conveyance or transfer and subsequent land uses. Potential impacts to these cultural resources (for example, destruction, alteration of setting, or loss of access to religious sites) also could have human health, economic, or social effects on minority or low-income populations. Depending on the intensity of these effects, impacts may be disproportionately high and adverse, and thus, have environmental justice consequences.

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

6.1 Affected Environment

6.1.1 Land Use

The DOE Los Alamos Area Office (LAAO) Tract consists of approximately 15 acres (6 hectares) and is located within the Los Alamos townsite between Los Alamos Canyon and Trinity Drive. The tract is bound to the north and northwest by single- and multiple-family residential areas and professional services offices facing onto Trinity Drive. The tract is bound to the south, east, and west by the edge of Los Alamos Canyon at the border with Technical Area (TA) 43 (see Figure 6.1.1-1, DOE LAAO Tract Layout). A paved road extending from Trinity Drive provides access into the site (DOE 1998b).

The tract contains a three-story administrative office building, associated parking, and an abandoned steam plant. Potentially sensitive wildlife habitat and structures that may be of historic significance are present at the site (DOE 1998b).

Land use at the tract has been dominated recently by the administrative activities of the DOE. Adjacent land to the north and northwest has residential and professional office uses. To the south, east, and west, land use is for buffer zones related to LANL operations.

The Los Alamos Bench Trail trends southwest to northeast across the northwest edge of the tract (see Figure 3.2.1-2 in Chapter 3). The extent and variety of recreational activities at and in proximity to the tract are limited by adjacent land use.

Figure 6.1.1-2 shows the monitoring facilities or outfall structures located near the subject land tract.

6.1.1.1 Environmental Restoration

The DOE LAAO Tract contains three potential release sites (PRSs), two DOE-owned structures, and no canyon systems. Two of the three PRSs are associated with the operation of the steam plant and are categorized as one surface and one subsurface unit. The third PRS is a sanitary septic system and is categorized as an outfall. The structures

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

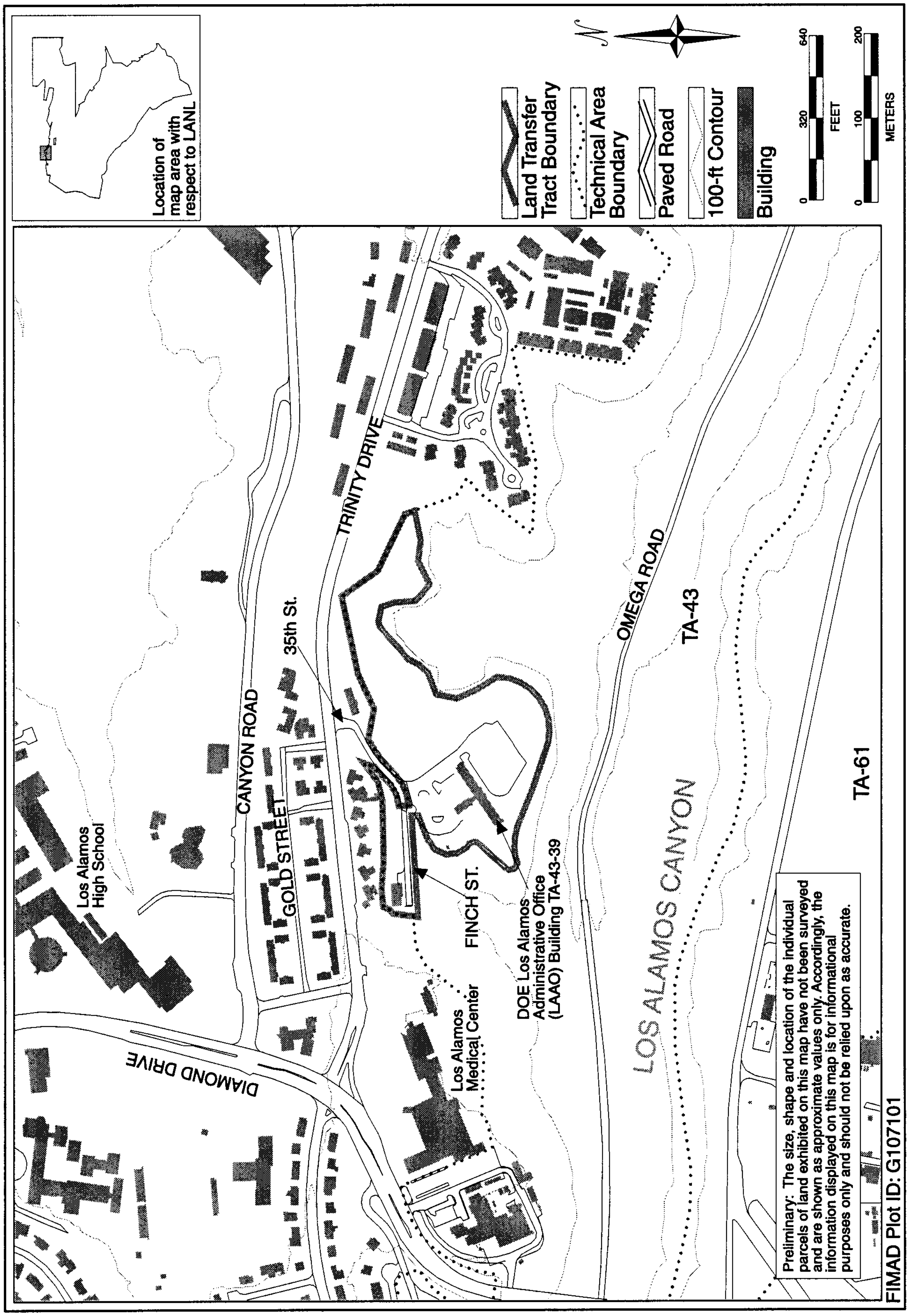

Figure 6.1.1-1. DOE Los Alamos Area Office Tract Layout.

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

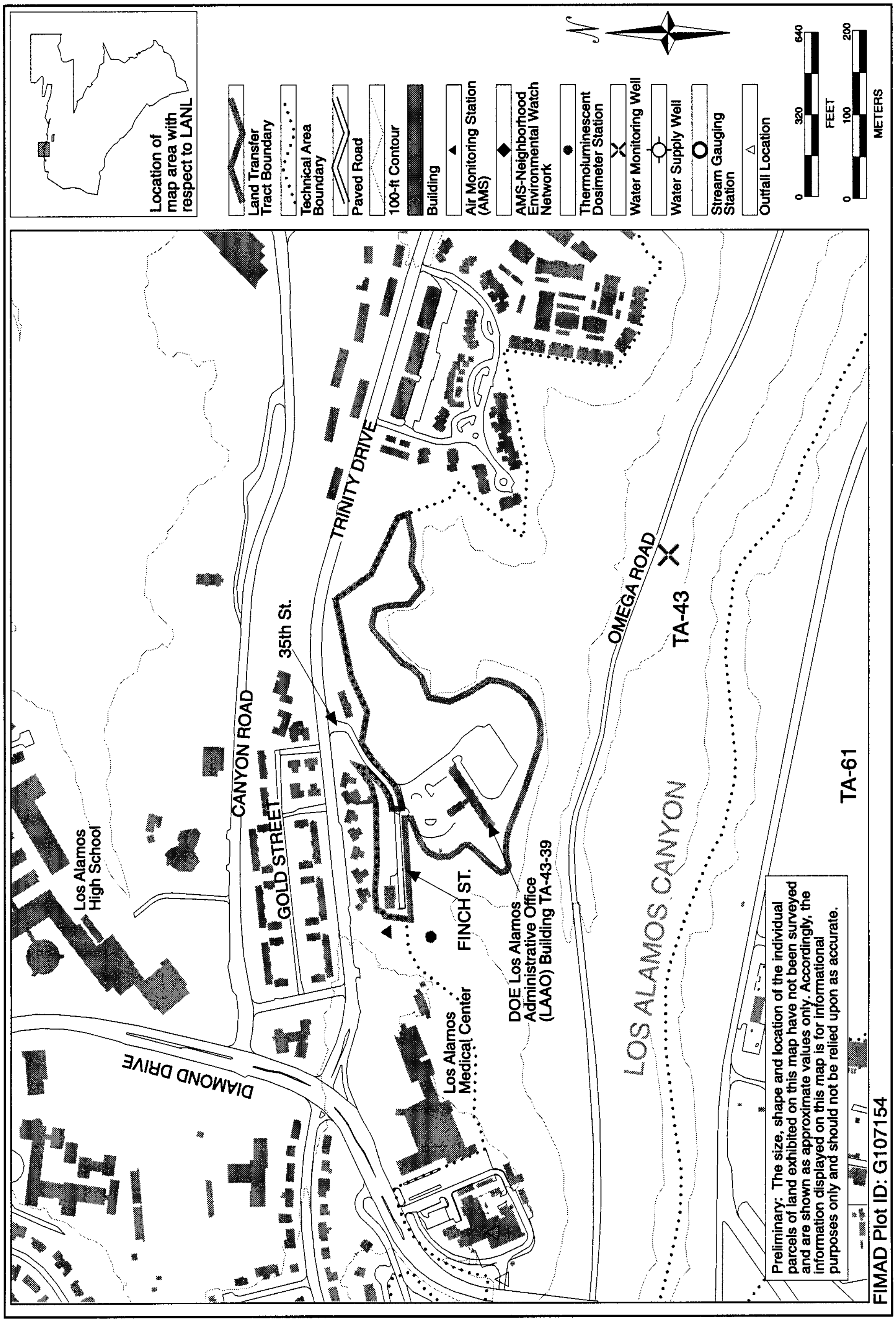

Figure 6.1.1-2. DOE Los Alamos Area Office Tract Monitoring Stations and Outfall Locations.

are the DOE office building and the former steam plant. Sampling of the three PRSs reveals the presence of organic chemicals. There are no other environmental restoration or decommissioning concerns at the tract. Figure 6.1.1.1-1 shows areas with potential contamination issues (PCIs) within this tract, as well as areas with no known contamination. PCI acreage is estimated to total only 2.3 acres (0.9 hectare).

6.1.2 Transportation

This site has access to Trinity Drive via 35th Street, a two-lane street (see Figure 6.1.1-1). 35th Street is essentially an entrance to the site, and due to topography, will likely remain so. Trinity Drive is a four-lane major road near this site that has an approximate capacity of 7,200 passenger cars per hour (pcph). Data provided by the County of Los Alamos show that Trinity Drive carried approximately 2,630 vehicles in the vicinity of 35th Street during the peak hour in January 1998. The average annual daily traffic for Diamond Drive near the site is approximately 19,700 vehicles per day. This results in a level of service (LOS) C for Trinity Drive for the current traffic volumes, which is defined as good operating conditions with stable flow, but speeds and maneuverability are more closely controlled by the higher traffic volumes. Increasing Trinity Drive traffic by 1.5 percent a year to account for expected growth in the general area over the next 20 years maintains the LOS C for Trinity Drive.

6.1.3 Infrastructure

Figure 6.1.3-1 shows the locations of utility lines, roads, and structures on the DOE LAAO Tract. The tract includes two buildings: a two-story building that currently houses DOE LAAO and a smaller abandoned steam plant currently used for general storage. The site is accessed via a residential-sized road (35th Street) from Trinity Drive. All but the eastern part of the tract is accessible by road.

All utilities, including water, gas, electricity, sewage, and steam are available to this site. Electrical power enters the site from the west along the edge of the mesa above Los Alamos Canyon. Water is supplied by lines entering the site near the west end of the tract. This tract is not metered separately for any utilities, and no figures for current utility usage are available. A sewage lift station is present on the tract to the west of the LAAO Building.

6.1.4 Noise

The DOE LAAO Tract has Los Alamos Canyon to the immediate south and Diamond Drive to the immediate north. Private residences bound the tract on both the east and the west. Activities involve the approximately 120 individuals who work in the building, plus visitors. Daytime noise levels, primarily determined by traffic on nearby Trinity Drive and the bridge over Los Alamos Canyon, are an estimated 40 to 50 decibels (dB). Several thousand vehicles per hour can pass along these thoroughfares during busy times of the day.

6.1.5 Visual Resources

The LAAO Building (TA-43-39) and associated parking lots and roads dominate views within the developed areas of the DOE LAAO Tract. Views of the developed area are somewhat obscured from Trinity Drive due to the curved entry road, the lower elevation of the developed portion of the tract, and the vegetation. Undeveloped, forested areas located mainly around the perimeter and between the LAAO Building and Trinity Drive can be viewed from locations in the building and the parking lots. This tract was analyzed by assigning two rating units to the tract based on the visual character of the developed and undeveloped portions of the

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

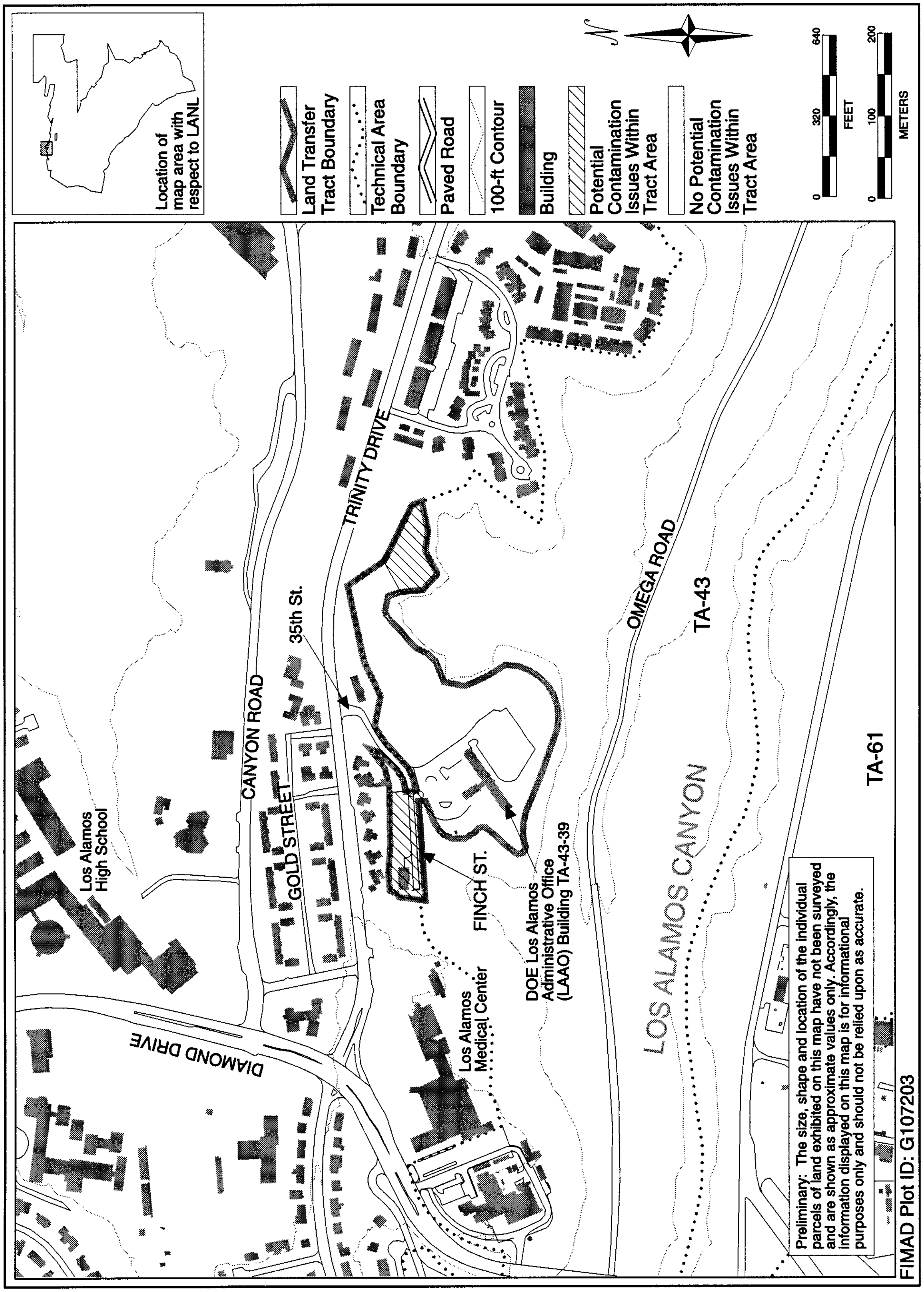

Figure 6.1.1.1-1. DOE Los Alamos Area Office Tract Potential Contamination Issue Areas.

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

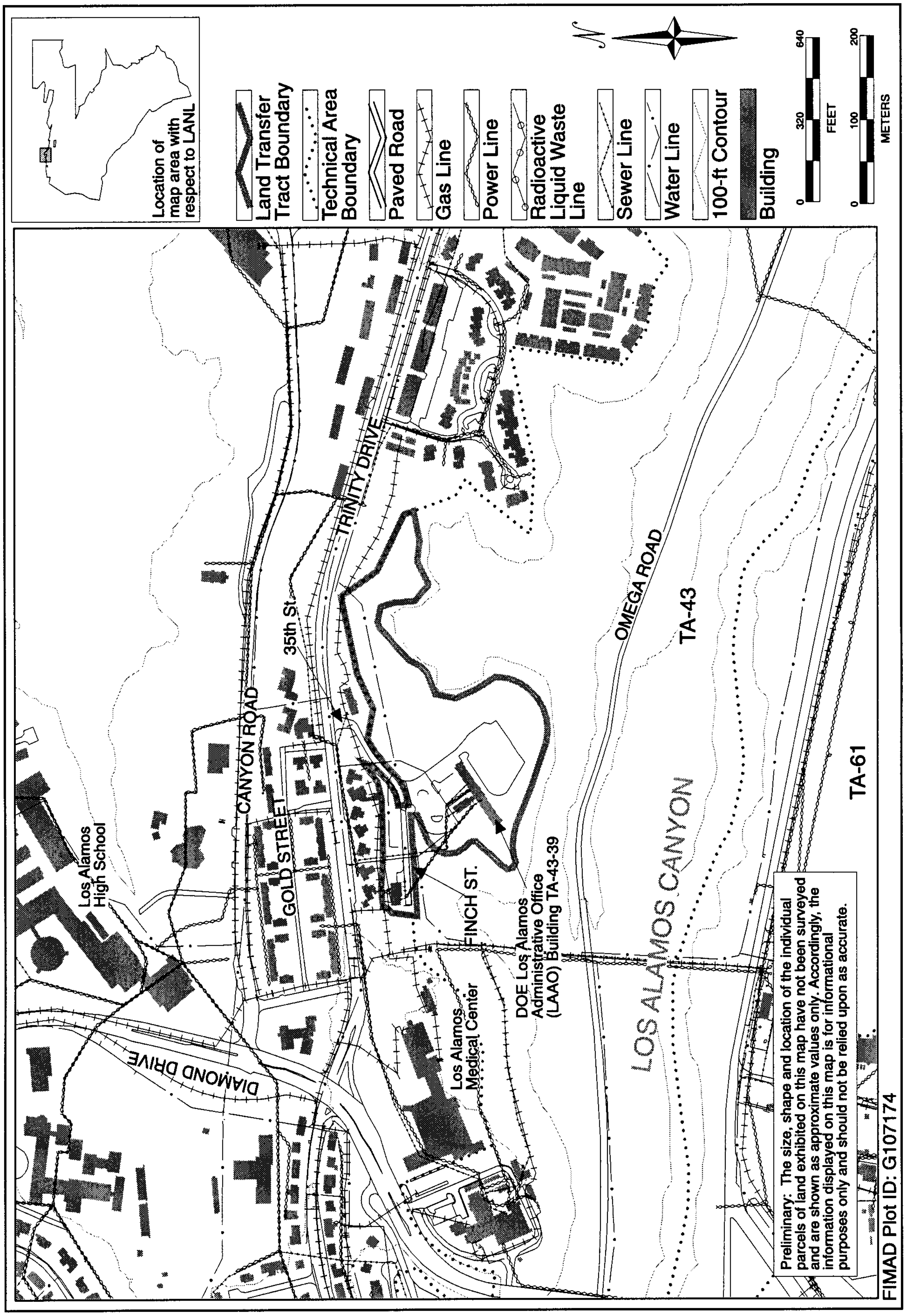

Figure 6.1.3-1. DOE Los Alamos Area Office Tract Utilities and Infrastructure.

site. The developed area was designated as Rating Unit 1. The undeveloped areas were designated as Rating Unit 2.

Three components were analyzed for each of the two rating units: scenic quality, distance zone, and sensitivity level.

After these components were combined using the Inventory Class Matrix, it was determined that the developed portions of the site are assigned to Scenic Class IV, low public value for the visual resources, and the undeveloped portions of the site are Scenic Class III, moderate public value for the visual resources.

6.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the subject tract boundaries.

Existing development on this tract includes the LAAO Building and an abandoned steam plant. Employment is limited to the DOE administrative functions located in the LAAO Building. About 170 people are employed at the site by the DOE.

6.1.7 Ecological Resources

An estimated 35 percent of the DOE LAAO Tract is either roadway, parking lots, building, or artificially maintained landscape. The remaining area is primarily ponderosa pine forest. There are no identified streams, wetlands, or floodplains present within the tract. However, floodplains, surface water, and wetlands are present at the floor of the adjacent Los Alamos Canyon. Flora and fauna in the undeveloped portions of the tract are characteristic of the region. The site contains suitable foraging habitat and is within the Los Alamos Canyon area of environmental interest (AEI) for the Mexican spotted owl and the Pueblo Canyon AEI for the American peregrine falcon (PC 1999d). Because the tract contains DOE LAAO, and because of its location within the Los Alamos townsite, the area is active with personnel entering and leaving the facility, lunch time picnickers, and general recreation walkers. Road noise is evident from passenger vehicles and a variety of light and heavy delivery trucks within the site and from vehicle traffic on Trinity Drive. Lighting sources in the tract include security lighting and lighting from residential and commercial developments.

6.1.8 Cultural Resources

The DOE LAAO Tract was used during the Cold War era. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on LANL and privately held lands.

One hundred percent of the DOE LAAO Tract has been inventoried for historic and prehistoric cultural resources. There are no prehistoric cultural sites recorded within the tract. Two Cold War era structures are present within the DOE LAAO Tract and have been evaluated as potentially eligible for the National Register of Historic Places (NRHP). There is a potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials.

There are no known traditional cultural properties (TCPs) located within the DOE LAAO Tract. Consultations to identify TCP resources have not been conducted, but it is unlikely that resources are present due to past development.

Additional information on the cultural resources of the DOE LAAO Tract is presented in Appendix E of this CT EIS.

6.1.9 Geology and Soils

The DOE LAAO Tract occupies a portion of TA 43 off of Trinity Drive and along the edge of Los Alamos Canyon. Although the site is heavily developed with the DOE LAAO offices and parking lot, it is typified by the Pogna fine sandy loam soil type and steep rock outcrops along the canyon rim. Outcrops are the upper member of the Bandelier Tuff (Tshirege), typical of the Pajarito Plateau. No major surface faulting is evident in TA 43.

6.1.10 Water Resources

The DOE LAAO Tract is located on the mesa top above Los Alamos Canyon, which is an ephemeral drainage in the vicinity of the tract. There are no known springs within the tract nor any known wetlands. There are no National Pollutant Discharge Elimination System (NPDES)-permitted outfalls within the tract. There are no regional aquifer groundwater test or supply wells within the tract or within a distance of 0.5 miles (0.8 kilometers).

There are no stream gages or established surface water or groundwater monitoring stations located within the DOE LAAO Tract. The closest environmental monitoring locations maintained by the LANL Environmental Surveillance and Compliance Program are for surface water and shallow groundwater in Los Alamos Canyon and do not pertain to water quality or quantity associated with this tract.

The DOE LAAO Tract does not lie within the 100-year or 500-year floodplains as modeled by LANL for Los Alamos Canyon.

6.1.11 Air Resources

Air quality at the DOE LAAO Tract is good, affected mostly by traffic on nearby Trinity Drive; several thousand vehicles per hour can pass along this thoroughfare during busy times of the day. Air quality is also affected, to a lesser extent, by emissions from the nearby Human Resources Laboratory (HRL) and LANL as a whole.

The DOE LAAO Tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Except for small amounts of carbon monoxide and ozone resulting from hydrocarbons emitted from motor vehicles, there are no sources of criteria pollutants within the tract itself.

The office activities at the DOE LAAO Tract result in no emissions of hazardous and other chemical pollutants, so that concentrations of these chemicals at the tract are the result of other LANL activities. Emissions from the HRL mostly affect the tract. However, analyses performed for the LANL SWEIS (DOE 1999c) estimate that risk from concentrations of any chemical air pollutant does not exceed health-based standards of one million excess latent cancer fatalities (LCFs) for any point beyond the LANL boundary, including the Los Alamos Medical Center. Because the DOE LAAO Tract is about 900 feet (275 meters) more distant from HRL than the Medical Center is, it can be concluded that concentrations of chemical pollutants at the tract also are likely to be below health-based standards.

Finally, analyses for doses from radioactive air pollutants indicate that air concentrations at the DOE LAAO Tract would deliver a dose of approximately 1.0 millirem per year to people residing there year-round, or about 10 percent of the EPA standard (DOE 1999c). There are no emissions of radioactive air pollutants from activities at the tract itself.

6.1.11.1 Global Climate Change

There are two sources of greenhouse gas emissions from activities on the DOE LAAO Tract: (1) water and space heating needs of the DOE LAAO office building and (2) motor vehicle use. Carbon dioxide emissions from these sources are estimated to be approximately 130 tons (120 metric tons) per year.

6.1.12 Human Health

6.1.12.1 The Radiological Environment for the DOE LAAO Tract

There are no activities or operations at the DOE LAAO Tract that involve radioactive materials, but personnel on the tract do receive radiation doses as a result of other LANL operations. Because the DOE LAAO Tract is several miles west of the location of LANL's offsite maximally exposed individual (MEI), which has historically been located near the Small Business Center Annex (on East Gate Drive), the doses are lower at this tract than at other tracts proposed for transfer. For example, the LANL SWEIS projects doses to the public of 3.1 millirem at the Annex, from 1.4 to 2.0 millirem for TA 21, and approximately 1.0 millirem for the DOE LAAO Tract (DOE 1999c, Chapter 5). These can be compared to the EPA allowable exposure limit of 10 millirem per year.

Background radiation received at the DOE LAAO Tract is the same as that for any location within the Los Alamos townsite—an effective dose equivalent (EDE) of 360 millirem to any individual, plus an average of 53 millirem for medical and dental x-rays and procedures.

The DOE LAAO Tract lies within the edge of one of LANL's one-half mile radiation site evaluation circles (see Figure 6.1.12.1-1), which were included in LANL's 1990 Site Development Plan (LANL 1990). These circles were intended to be used as planning tools for site developers and other project managers responsible for siting new facilities or operations to inform them of the presence of existing radiation sources and the need to evaluate their proposed action(s) against this information. The circles are not representative of a particular dose of radiation to the DOE LAAO Tract under either normal or accident conditions, and are noted herein for the purposes of disclosure with regard to the nearest radiation source location relative to the tract. The quantities of radioactive material and other sources of radiation identified by these radiation evaluation circles were evaluated in the 1999 LANL SWEIS, as already discussed.

6.1.12.2 The Nonradiological Environment for the DOE LAAO Tract

Exposures to nonradiological contaminants from LANL operations via the airborne pathway in the LANL vicinity have already been shown not to be significant for the affected environment (DOE 1999c). PRSs for this tract are not located where visitors would be in proximity to the contaminants. Prior to their remediation, no nonradiological emission sources exist on this tract other than those associated with building infrastructure (such as, lead paint and asbestos) and mobile sources due to vehicular traffic.

While flooding from the 100- and 500-year floods may have little effect on this tract, seismic events and wildfires could have catastrophic impacts to the land tract. Human health impacts to people other than workers would be restricted to visitors. No known hazardous materials are present on this tract that could pose a risk during a natural disaster.

6.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, and 16 different accident scenarios, as discussed in Chapter 4, Section 4.1.12, of this CT EIS. For all but one of the scenarios, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

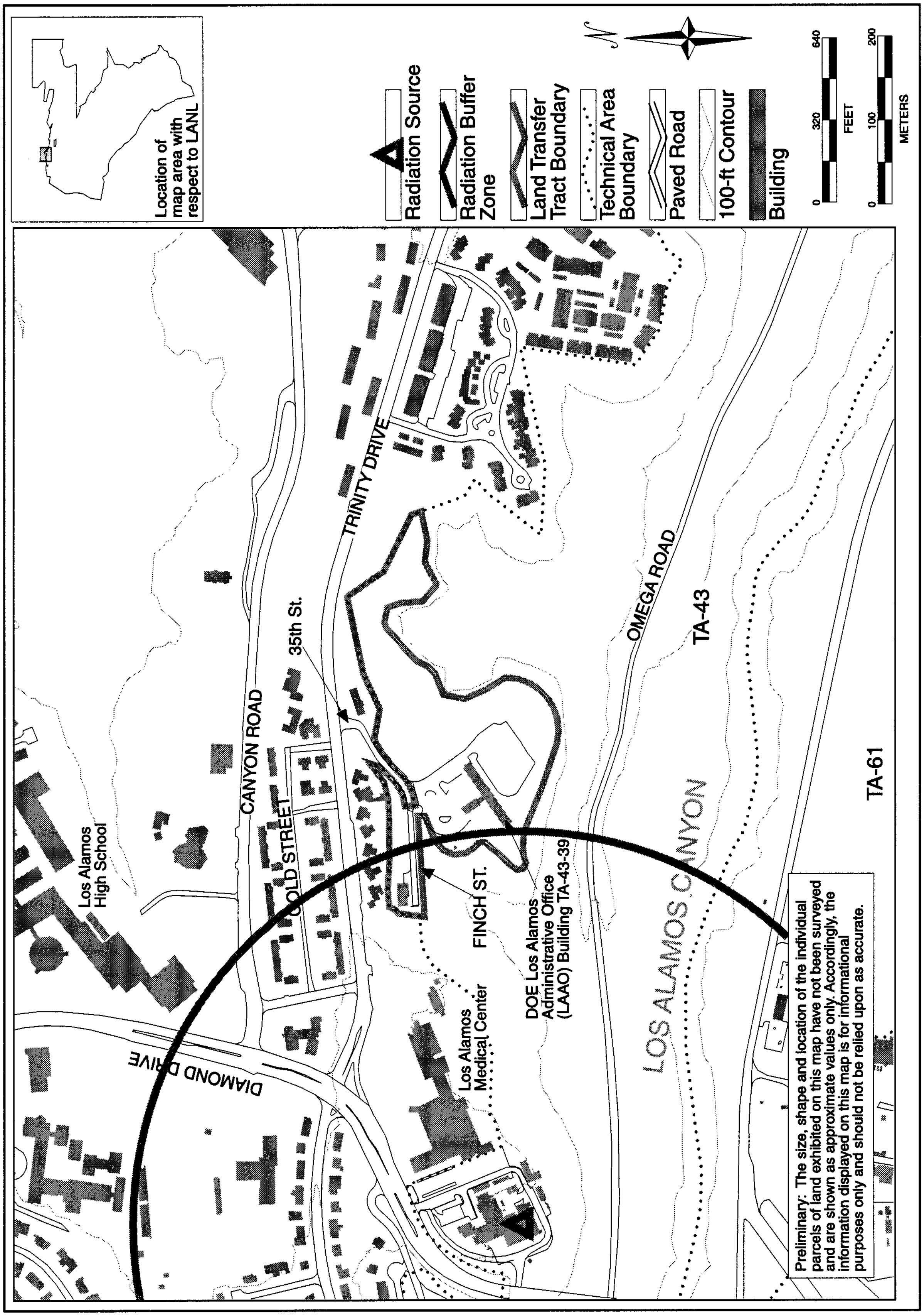

Figure 6.1.12.1-1. DOE Los Alamos Area Office Tract Radiation Site Evaluation Circle.

the air plume reached the DOE LAAO Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract for 15 of the accident scenarios.

The lone scenario in which the chemical plume reached the DOE LAAO Tract is the hypothetical rupture of a chlorine cylinder, during adverse weather dispersion conditions, at the chlorinating station along Diamond Drive in the Los Alamos townsite (Building 00-1109). This scenario has an estimated frequency of 3 x 10^{-5} per year, or once every 330,000 years. Under this scenario, ERPG-3 concentrations are estimated to extend a distance of 1,345 feet (410 meters), and ERPG-2 concentrations a distance of 4,790 feet (1,460 meters). The DOE LAAO Tract is 3,280 feet (1,000 meters) from the accident location and would thus experience ERPG-2 concentrations. The tract is occupied by about 120 DOE employees. Accordingly, no public consequences would result.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the LANL SWEIS, as discussed in Chapter 4, Section 4.1.12. Using data from the LANL SWEIS, doses to the MEI at the DOE LAAO Tract have been estimated for each of these, as shown in Table 6.1.12.3-1.

Accident scenarios result in estimated tract collective doses of 4,400 person-rem for RAD-02, 850 person-rem for RAD-12, 260 person-rem for RAD-15B, and less than 15 person-rem for any other accident. Excess LCF estimates are 2, 0.4, and 0.1 for accidents RAD-02, RAD-12, and RAD-15B, respectively.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe postulated earthquake (accident SITE-03B) has an estimated frequency of 3 x 10^{-5} per year, or once every 330,000 years. The earthquake would release chemicals from a number of facilities, including formaldehyde from the HRL (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed above for chemical accidents, earthquakes would have no estimated public consequences at the DOE LAAO Tract, although DOE employees would be exposed to ERPG-2 concentrations of chlorine. The most severe postulated earthquake, however, would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of nearly 300 Roentgen equivalent man (rem) at the DOE LAAO Tract.

The postulated site wildfire scenario would burn about 8,000 acres (3,238 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at the DOE LAAO Tract is estimated to be less than 0.1 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

The maximum earthquake scenario would result in a significant tract collective dose to DOE employees and as many as five excess LCFs.

6.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that

Table 6.1.12.3-1. MEI Doses for the DOE LAAO Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-2}	38	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	97,000	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	27	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	1	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	210	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	45	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	28	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	17,000	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	41	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	270	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	5,200	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	15	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; CMR = Chemistry and Metallurgy Research; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

6.2 No Action Alternative

6.2.1 Land Use

There would be no anticipated changes to land use at the DOE LAAO Tract as described under the No Action Alternative. Adjacent TA 43 lands would continue to serve as a buffer zone to LANL operations. Similarly, no change in access to the tract would be anticipated to occur.

6.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006, although some LANL sites may take longer. The plan includes input from all major field sites, including LANL.

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

The DOE has developed preliminary information based on current knowledge of contamination at the DOE LAAO Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 6.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report (DOE 1999b).

This information indicates that a range of possible remedies are likely for the tract. While removal actions are likely for all three PRSs, the number of structures razed could differ. Cleanup duration could last up to 18 months for the longest segment. (Multiple sites can be restored simultaneously, so that cleanup duration is determined by the site that requires the most time.) Waste volumes are projected to range from approximately 400 to 3,400 cubic yards (305 to 2,600 cubic meters). Cost estimates for remedial action at this parcel range from about $4,253,000 to $9,680,000. These estimates are based on the information currently available for each PRS or structure, and are subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual "cleanup." Although different cleanup approaches have been identified for the two contemplated land uses, it is possible that the administrative authority could require even more restoration, resulting in greater waste volumes, longer cleanup duration and associated risks to remediation workers, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

6.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on 35th Street or Trinity Drive near the DOE LAAO Tract. It is expected that the future operational performance of 35th Street or Trinity Drive would remain similar to that of the current performance, assuming that the future level of development in the area of the site is 1.5 percent, as predicted by the U.S. Census Bureau.

6.2.3 Infrastructure

The No Action Alternative would result in no substantial changes in the infrastructure or utilities of the DOE LAAO Tract. Operations would continue at DOE LAAO. No appreciable increase in utility usage is expected.

6.2.4 Noise

In the No Action Alternative, the DOE LAAO Tract would continue to be used for an office building. Occupancy would be expected to rise from the current 120 employees but by less than 10 percent. This increase parallels the 20 percent increase in LANL employment from today's levels to levels assumed for the LANL SWEIS Expanded Operations Alternative (DOE 1999c, Chapter 5, Table 5.3.9.1-1). Accordingly, the dominant source of ambient noise would continue to be traffic along Trinity Drive and traffic crossing the Los Alamos Canyon Bridge. Noise levels would be expected to remain about the same, typically 40 to 50 A-weighted decibels (dBA).

6.2.5 Visual Resources

Under the No Action Alternative, it would be expected that the existing visual character of the tract would remain unchanged. The buildings and parking areas would remain somewhat obscured from view from Trinity Drive by the forested areas of the tract.

6.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract. The administrative offices would remain on the tract.

6.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at the DOE LAAO Tract, as described in Section 6.1.1. Therefore, no adverse impact to ecological resources would be projected under the CT EIS No Action Alternative.

6.2.8 Cultural Resources

Under the No Action Alternative, the DOE LAAO Tract would remain the responsibility of the DOE and the treatment of any cultural resources would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. The use of the DOE LAAO Building, a potentially eligible resource, would continue, and the building would not be demolished. Other unidentified or undetermined resources would be passively preserved. Ongoing negative impacts from natural processes (such as erosion and aging) on the physical integrity of cultural resources would continue.

6.2.9 Geology and Soils

Under the No Action Alternative, consequences are limited to existing uses. The tract is already developed; no additional utilities, roadwork, or buildings would be required. No soil disturbance or change in availability of resources would be anticipated. Existing structures are vulnerable to wildfire episodes and greater than magnitude 7 seismic events as measured on the Richter scale.

6.2.10 Water Resources

Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

6.2.11 Air Resources

In the No Action Alternative, the DOE LAAO Tract would continue to be used for an office building. Occupancy would be expected to rise from the current 120 employees but by less than 10 percent. Accordingly, the dominant source of criteria pollutants would continue to be traffic along Trinity Drive. Analyses show that ambient air quality would remain within standards established by EPA and the State of New Mexico for criteria pollutants (DOE 1999c, Chapter 5).

For hazardous and other chemical pollutants, analyses performed for the LANL SWEIS estimate that concentrations of chemical air pollutants would not exceed health-based standards for any point beyond the LANL boundary. The DOE LAAO Tract is near a location where LANL emissions of chemical air pollutants approach guideline values based upon health-based standards. The combined incremental cancer risks from releases of all carcinogenic pollutants are slightly above the guideline value of 1×10^{-6}, or one in one million, at two locations at the Los Alamos Medical Center: 1.17×10^{-6} at an air intake duct and 1.07×10^{-6} at a window (DOE 1999c, Chapter 5). The major contributors to this estimated cancer risk are chloroform, formaldehyde, and trichloroethylene from the HRL, and methylene chloride from multiple sources. Of these, chloroform alone accounts for more than 87 percent of the total risk. The DOE LAAO Tract is about 900 feet (275 meters) more distant from HRL than the Medical Center is, and combined cancer risk at this location would be estimated to be less than the guideline value of one in one million.

Finally, analyses for doses from radioactive air pollutants indicate that air concentrations at the DOE LAAO Tract from LANL operations would deliver a dose of approximately 2.0 millirem per year to people residing there year-round, or about 20 percent of the EPA standard (DOE 1999c, Chapter 5). There are no emissions of radioactive air pollutants from activities at the tract itself.

6.2.11.1 Global Climate Change

In the No Action Alternative, land use for the DOE LAAO Tract would not change. Small amounts of carbon dioxide would continue to be emitted from vehicles and building heating requirements. Carbon dioxide emissions would be estimated to remain at approximately 130 tons (120 metric tons) per year.

6.2.12 Human Health

There would be no identifiable human health consequences of the No Action Alternative for the DOE LAAO Tract. No changes in cancer risk should be expected for this alternative. Radiation doses received at this tract would be estimated to double from today's levels, to approximately 2.0 millirem per year (DOE 1999c, Chapter 5). No significant nonradiological increases in exposures would be expected. Visitors may have adequate time to evacuate the premises for floods or for wildfires. Because warnings are usually not given for seismic events, the human health impacts due to seismic events likely would be greater than the other two natural disasters. The primary type of human health risk for natural disasters would be physical injury from falling building debris and fires from ruptured gas lines.

6.2.12.1 Chemical Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. For 15 of the 16 accident scenarios postulated in the LANL SWEIS, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached the DOE LAAO Tract, even under adverse weather dispersion conditions. ERPG-2 concentrations would reach the tract under the 16th scenario and would affect DOE employees at the tract. Therefore, under the No Action Alternative, chemical accidents would have no estimated public consequences at the tract, but would affect DOE employees under one accident scenario.

6.2.12.2 Radiological Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. MEI doses would be greater than 500 millirem for 3 of 13 scenarios. Estimated tract collective doses would be 4,400 person-rem for RAD-02, 850 person-rem for RAD-12, 260 person-rem for RAD-15B, and less than 15 person-rem for any other accident. Excess LCF estimates would be 2, 0.4, and 0.1 for accidents RAD-02, RAD-12, and RAD-15B, respectively. All doses would be to DOE employees.

6.2.12.3 Natural Event Accidents

Accident assessment would be the same as described for the affected environment. As discussed, earthquakes would have no estimated public consequences at the DOE LAAO Tract, although DOE employees would be exposed to ERPG-2 concentrations of chlorine under adverse weather dispersion conditions. The postulated wildfire accident scenario would have no chemical consequences at the DOE LAAO Tract. The MEI dose resulting from the postulated wildfire would be less than 0.1 rem. The maximum dose from the most severe earthquake would be about 300 rem, however. The maximum earthquake scenario would result in an estimated dose of 270 rem at the DOE LAAO Tract, a collective dose to DOE employees of 12,000 person-rem and as many as six excess LCFs.

6.2.13 *Environmental Justice*

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations that would continue under the No Action Alternative would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from LANL accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts.

6.3 Proposed Action Alternative

6.3.1 Land Use

Direct consequences of the disposition of this tract would include the relocation of DOE and contractor personnel who currently work at the DOE LAAO, and decontamination and decommissioning of the office building and steam plant as required. Current plans are to relocate employees to a new building in TA 3. Detailed plans and location of the new building have not been developed, but it is likely that removal of some trees would be required at any potential building site. It also is possible that employees would be relocated to existing buildings. Any decision regarding construction of new facilities would be preceded by appropriate NEPA review.

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections.

6.3.1.1 Description of Contemplated Uses

Land use proposed for the DOE LAAO Tract includes residential and commercial development. The following paragraphs provide a discussion of each of these scenarios upon which the discussions of direct and indirect impacts are based. Table 6.3.1.1-1 and Table 6.3.1.1-2 summarize the attributes of each of the land use scenarios.

Residential Development Land Use Scenario

Land use proposed under this scenario would develop the DOE LAAO Tract for multiple-family residential use. Land would be developed to accommodate apartments or condominiums at an average density of 20 dwelling units per acre with a population planning factor of 2.5 residents per dwelling. An estimated 9 to 10 acres (3 to 4 hectares) of the tract would be used for dwellings and accessory structures. The remaining acreage would be used for parking and open area landscaped to maintain the residential character of the development (see Figure 6.3.1.1-1). Access to the tract would

Table 6.3.1.1-1. Attributes of Future Land Use for the DOE LAAO Tract Under the Residential Development Scenario

RESIDENTIAL DEVELOPMENT
• The land use proposed would develop the site for multiple-family (very high density) residential use.
• Existing office building and steam plant would be razed.
• The development would be intended to accommodate apartments or condominiums at an average density of 20 dwelling units per acre with 2.5 residents per dwelling.
• An estimated 9 to 10 acres (3 to 4 hectares) of the tract would be used for dwellings and accessory structures; the remaining acreage would be used for parking and open areas landscaped to maintain the residential character of the development.
• When fully developed, there would be 200 new dwelling units, 500 new residents, and 420 personal vehicles.

Table 6.3.1.1-2. Attributes of Future Land Use for the DOE LAAO Tract Under the Commercial Development Scenario

COMMERCIAL DEVELOPMENT
• The land use proposed would utilize the DOE LAAO administrative building for commercial office space.
• Total of 6 businesses and 15 commercial vehicles.
• No additional development is contemplated.

remain unrestricted. The current DOE LAAO Building would be removed and activities and workers would be moved to another facility within LANL, most likely at TA 3.

6.3.1.2 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

Land use would change from professional offices to residential under the residential development scenario. Land use within the current footprint of the tract would be developed to reflect that of adjacent multiple-family residential land uses. There would be some land disturbance associated with the proposed use; however, development at the site is limited by topography. As such, any new development would to a large degree take place in previously disturbed areas.

Land use impacts associated with the development of the DOE LAAO Tract under this scenario would be minor. The transition from administrative to multiple-family residential land use would be consistent with land uses adjacent to the tract.

Commercial Development Land Use Scenario

There also would be little to no anticipated change in land use under the commercial development scenario. This proposal would largely result in the continuation of current land use at the site. As such, no adverse impacts to land use would be expected to occur.

6.3.1.3 Environmental Restoration

No additional restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before that tract would be considered suitable for conveyance or transfer.

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

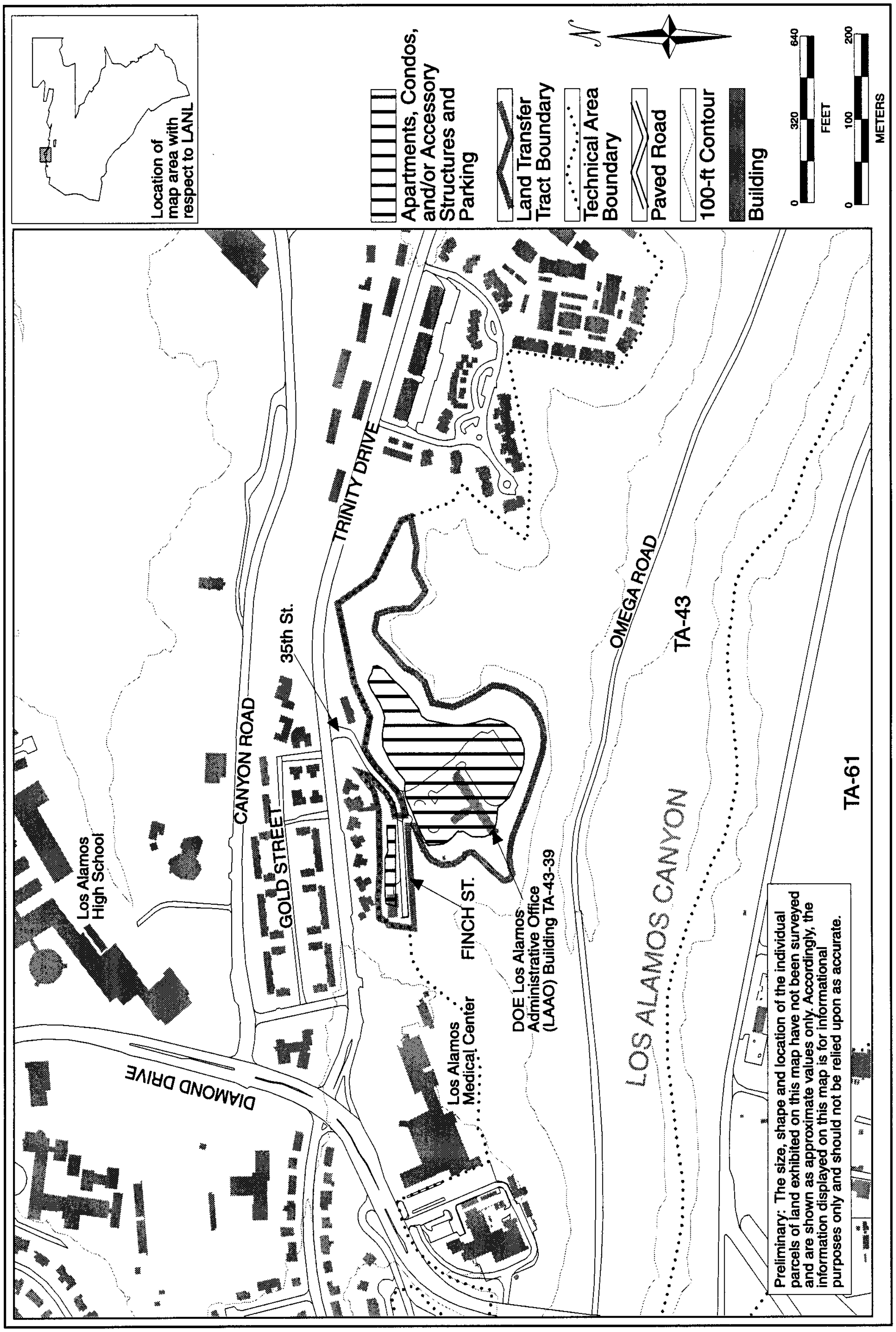

Figure 6.3.1.1-1. DOE Los Alamos Area Office Tract Contemplated Land Uses.

6.3.2 Transportation

Direct consequences of the transfer of this tract would include alteration of the daily commute for DOE and contractor personnel relocated from the DOE LAAO Building. Some DOE and contractor personnel would have a shorter drive to work, for example, those living in White Rock, but most would have farther to travel. Indirect consequences are discussed in the following sections.

6.3.2.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

The residential development land use scenario for this tract anticipates development of residential facilities. The Institute of Transportation Engineers (ITE) land use code 220 was utilized to estimate the trips generated by this proposed high-density residential development. High-density residential development is contemplated for 9 to 10 acres (3 to 4 hectares) of the site at a density of 20 dwelling units per acre. This would result in approximately 200 apartment units. Table 6.3.2.1-1 shows the number of trips the ITE Trip Generation Manual estimates would be generated by this development (ITE 1997).

As shown in Table 6.3.2.1-1, the proposed development could add an additional 86 trips to Trinity Drive in the weekday morning peak hour and add an additional 84 entering trips in the weekday evening peak hour. The residential land use scenario also could add 1,326 two-way trips per day on Trinity Drive. The number of trips anticipated is based on application of the ITE standard trip generation methodology. Local conditions in Los Alamos, such as the number of people employed at LANL, may affect the actual number of trips generated during peak hours.

Adding these new trips to those already existing on the transportation network would result in 27,900 trips per day on Trinity Drive. This would result in the LOS C on Trinity Drive, which is defined as good operating conditions with stable flow, but speeds and maneuverability are more closely controlled by the higher traffic volumes. This would be the same LOS predicted for the No Action Alternative. It is likely that the additional trips generated by this proposed development would not have a substantial impact on the operation of Trinity Drive.

Table 6.3.2.1-1. Estimated Increase in Traffic for the Residential Development Scenario

ITE TRAFFIC VOLUME ESTIMATES FOR DOE LAAO TRACT								
Land Use	ITE Land Use Code	24 Hour Two-Way Volume	Morning Peak Hour Trips		Evening Peak Hour Trips		Saturday Peak Hour Trips	
			Enter	Exit	Enter	Exit	Enter	Exit
Apartments – 200 Dwelling Units	220	1,326	16	86	84	40	0	0

6.0 DOE LOS ALAMOS AREA OFFICE TRACT

Commercial Development Land Use Scenario

If the commercial development land use scenario is implemented, the impacts would be similar to those described for the affected environment (see Section 6.1.2) because the land use would not change substantially.

6.3.3 Infrastructure

As a direct result of conveyance or transfer of this tract, DOE LAAO personnel would be relocated to a different facility and would continue to have the same utility usage. Indirect consequences are discussed in the following sections.

6.3.3.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

The indirect environmental impacts with regard to utilities and infrastructure resulting from this alternative would fall into two categories: (1) increased utility usage and (2) ground disturbance resulting from construction of new facilities or modification of existing facilities. Table 6.3.3.1-1 shows the estimated increase in power, electricity, water and gas usage, and wastewater and solid waste production for the contemplated use as compared to the capacity for the existing utility systems. It is not anticipated that the increases in usage would exceed the existing capacity of any utility.

Development of this nature would require enhancement of existing infrastructure. Water, electricity, gas, and sewage lines would need to be extended to service new structures. New roads, parking areas, and structures would be developed. The construction of roads, parking areas and buildings, and extension of utility lines would cause soil disturbance. Refer to Section 6.3.9 of this chapter for details on impacts resulting from ground disturbance from new construction.

Commercial Development Land Use Scenario

The commercial development land use scenario envisions no further development, as described in Section 6.3.1.1 of this chapter. Commercial businesses would use the existing DOE LAAO Building as office space. The new businesses in the DOE LAAO Building would create additional utility usage, which is shown in Table 6.3.3.1-2. It is not anticipated that these increases would exceed the capacity for any utility in the region.

Table 6.3.3.1-1. Estimated Increase in Utility Usage for the Residential Development Land Use Scenario on the DOE LAAO Tract

	PEAK POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (BAYO) mgy (mly)	MSW tpy (mty)
Estimated annual increase	0.2	1.3	26 (736)	20 (76)	10 (38)	180 (163)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	135 (511)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mgy = million gallons per year, mly = million liters per year, tpy = tons per year, msw = municipal solid waste, mty = metric tons per year

Table 6.3.3.1-2. Estimated Increase in Utility Usage for the Commercial Development Land Use Scenario on the DOE LAAO Tract

	PEAK POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (BAYO) mgy (mly)	MSW tpy (mty)
Estimated annual increase	0.05	0.3	3 (85)	3 (11)	1 (4)	7 (6)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	135 (511)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mgy = million gallons per year, mly = million liters per year, tpy = tons per year, msw = municipal solid waste, mty = metric tons per year

Additionally, because the existing DOE LAAO Building would be used and no construction of new buildings or infrastructure is anticipated, there would be no soil disturbance under this land use scenario.

6.3.4 Noise

6.3.4.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

If the tract were developed residentially, there would be little change in noise levels, although the ambient noise would increase slightly. During the demolition of existing structures and construction of new residences, ambient noise would increase from about 40 to 50 dBA up to about 95 dBA. Residential use would result in ambient levels of about 60 to 70 dBA due to vehicular traffic and residential activities. Noise associated with vehicles likely would occur over longer periods of the day and consistently through the week. However, slow moving vehicles such as required in a dense residential area, are less intrusive than, for example, vehicles moving 40 to 60 miles (80 to 100 kilometers) per hour on a thoroughfare.

Commercial Development Land Use Scenario

If the tract were to remain in commercial use as an office building, then noise levels would remain as described in the No Action Alternative (that is, from 40 to 50 dBA). This noise level would be largely determined by background noises from traffic on nearby Trinity Drive and Los Alamos Canyon Bridge.

6.3.5 Visual Resources

6.3.5.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

No substantial impacts to visual resources would be expected under the residential development scenario. The developed portions of the site fall into Scenic Class IV. Scenic Class IV is considered to be of relatively low public value. The undeveloped portions of the site fall into Scenic Class III and are considered to be of moderate public value as a visual resource. The contemplated land use is residential development, which could be accomplished without substantial change to the visual character of the tract.

Commercial Development Land Use Scenario

There would be no impact to visual resources from this development scenario. The office building would remain, and no roads or other structures would be added.

6.3.6 Socioeconomics

There would be no direct socioeconomic impact from transfer of ownership of the DOE LAAO Tract. Employment of DOE and contractor personnel would continue in a different location. Indirect consequences are discussed in the following sections.

6.3.6.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

In the event of residential development, construction activities would temporarily increase employment in the ROI. This would, in turn, generate increases in ROI income. These changes would be temporary, lasting only the duration of the construction period. Because the majority of the jobs generated would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

Commercial Development Land Use Scenario

If the site were developed for commercial or industrial uses, there would be possible short-term economic gains from minor construction, as well as long-term economic gains from the industries using the land. Based on the development assumptions described in Chapter 4 of this CT EIS, approximately 120 workers would be employed on the tract, and 200 jobs would be generated in the ROI. Because these jobs would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

6.3.7 Ecological Resources

Direct impacts of the conveyance and transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities. Indirect consequences are discussed in the following sections.

6.3.7.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

The development of the DOE LAAO Tract to high-density multiple-family residential use would impact the ecological resources on the tract and adjacent areas. Approximately 6.5 acres (2.6 hectares) of ponderosa pine forest would be lost as the area is converted to housing, roadways, and residential landscaping. Highly mobile wildlife species or wildlife species with large home ranges (such as deer, elk, and birds) would be able to relocate to adjacent undeveloped areas. However, successful relocation, primarily into Los Alamos Canyon (as all sides of the mesa location are surrounded by development), may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development area. Species relocation may result in additional pressure to lands already at or near carrying capacity. The wildlife impacts could include stress and overwintering mortality. For less-mobile species (reptiles, amphibians, and small mammals), direct mortality could occur during the actual construction event or ultimately result from habitat alteration. Acreage used for the development also would be degraded as potential hunting habitat for raptors and other predators. One little-addressed consequence of urban development is the influence of domestic animals upon wildlife populations. For example, free-roaming domestic cats may kill more than 100 animals each year. Studies have shown that approximately 60 percent of the wildlife cats kill are small mammals; 20 percent are birds (predation at bird feeders can be substantial; one Virginia study estimated 28 kills per urban cat per year); and 10 percent are amphibians, reptiles, and insects. Due to the presence of coyotes in the DOE LAAO area, predation by cats would tend to be limited to within developed and closely adjacent natural areas (Goldsmith et al. 1991, Crooks 1997-98, and CSBC 1998). Free-ranging domestic dogs are known to harass and disrupt the activities of many wildlife species and are documented to have caused mortality in animals such as deer and foxes (Goldsmith et al. 1991).

In addition to the area to be disturbed, there would be a slight decrease in quality of the Los Alamos Canyon habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction. Given the limited acreage involved and existing developed nature of the site, impacts are expected to be small.

There are three species that are Federal-listed as threatened or endangered that may potentially use the DOE LAAO Tract: the bald eagle, American peregrine falcon, and the Mexican spotted owl. Loss of the entire tract as foraging habitat would decrease the total available habitat for these species by approximately 6.5 acres (2.6 hectares) or approximately 0.05 percent of the available foraging habitat on DOE property. With respect to the bald eagle, this area has a low level of potential foraging use. The Los Alamos Canyon AEI core habitat for the Mexican spotted owl would be reduced by approximately 6.5 acres (2.6 hectares). Pueblo Canyon AEI buffer habitat for the American peregrine falcon would be reduced by approximately 1.5 acres (0.6 hectares) (PC 1999d). Because direct entry into the adjacent Los Alamos Canyon habitat would require descending a steep cliff face, only limited increases in recreational use would be expected. Therefore, effects to the adjacent Los Alamos Canyon natural habitat would be minor.

Commercial Development Land Use Scenario

Impacts of the commercial development scenario would be similar to those of the No Action Alternative, with one basic exception. The environmental review and protection processes for future activities would not be as rigorous as those which govern the DOE.

6.3.8 Cultural Resources

Direct impacts of the conveyance and transfer itself would result from the transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Potentially eligible cultural resources are present in the DOE LAAO Tract, and thus, could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing them from future consideration under the *National Historic Preservation Act*.

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing them from consideration under the *Religious Freedom Restoration Act*, *American*

Indian Religious Freedom Act, and Executive Order 13007, "Indian Sacred Sites." Finally, the disposition of this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing these items from consideration under the *Native American Graves Protection and Repatriation Act*, or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following.

6.3.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts are anticipated from the land uses contemplated for the DOE LAAO Tract by the receiving parties. The two land uses identified for the tract include residential development and commercial development. This analysis reflects the broad, planning-level impacts anticipated from each contemplated use.

Residential Development Land Use Scenario

Under the residential development scenario, the tract would be extensively altered by construction activities, including demolition of buildings, grading, and trenching. Two buildings considered potentially eligible to the NRHP would be demolished. Activities also could result in primary impacts to other unidentified resources through physical destruction, damage, or alteration. Resources avoided by construction or on adjacent lands may be isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions.

The introduction of additional residents would increase access to cultural resources located within the tract and on adjacent LANL or privately held land. Increased access could cause possible destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies.

Commercial Development Land Use Scenario

Impacts of the commercial development scenario would be similar to those of the No Action Alternative, with the exception that there would be no DOE responsibility for historic properties on the tract. The use of the DOE LAAO Building, a potentially eligible resource, would continue, and the building would not be demolished although modifications would be likely. Other unidentified or undetermined resources would be passively preserved.

6.3.9 Geology and Soils

6.3.9.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

One contemplated use is residential development. This use would require extensive ground disturbance to remove existing structures, install sufficient utilities to support housing, and complete redesign the tract's roadways. The actual area disturbed would be dependent on final configuration of planned housing but is estimated to be approximately 10 acres (4 hectares).

Commercial Development Land Use Scenario

Contemplated commercial development use includes continuation of office use but with different tract ownership. Consequences would be the same as for the No Action Alternative existing uses. The tract is already developed; no additional utilities, roadwork, or buildings would be required. No soil disturbance or change in availability of resources would be anticipated. No impacts from this alternative would be expected.

6.3.10 Water Resources

6.3.10.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

If the residential development land use scenario is pursued, surface water quality outside of the tract boundary in Los Alamos Canyon may be indirectly affected by increased sediment load in stormwater runoff from the tract during and after construction. Residential development would not affect groundwater quality or quantity beneath the tract but may contribute to the overall regional water level decline and possibly result in degradation of water quality within the aquifer.

Commercial Development Land Use Scenario

The impacts from the commercial development of this tract would be the same as those discussed for the affected environment (Section 6.1.10). The office building would remain, and no roads or other structures would be added.

6.3.11 Air Resources

Direct consequences of the transfer of this tract would include alteration of the daily commute for DOE and contractor personnel relocated from the DOE LAAO Building. Some DOE and contractor personnel would have a shorter drive to work, for example, those living in White Rock, but most would have farther to travel. This would result in slightly greater emissions than those discussed in the No Action Alternative. Indirect consequences are discussed in the following sections.

6.3.11.1 Environmental Consequences of the Contemplated Uses

Residential Development Land Use Scenario

If the DOE LAAO Tract were developed residentially, then additional criteria pollutants, primarily trace amounts of carbon monoxide and ozone, would be emitted from residents' motor vehicles. These emissions would be slightly greater than in the No Action Alternative because more people would occupy the tract and because vehicular activity would be present in evenings and on weekends. There would be no noticeable effect, however, on pollutant concentrations, and ambient air standards would continue to be met.

There would be no emissions of hazardous or other chemical air pollutants or radioactive air pollutants in the case of residential development. Concentrations of these pollutants would thus remain as in the No Action Alternative. Specifically, chemical exposures would remain below health-based standards, and maximum dose from the inhalation of radioactive air pollutants would be approximately 2.0 millirem per year.

Commercial Development Land Use Scenario

Consequences to air quality of commercial development of the DOE LAAO Tract would be almost identical to the No Action Alternative. Air quality would remain within standards for criteria pollutants, for hazardous and other chemical air pollutants, and for radioactive air pollutants.

6.3.11.2 Global Climate Change

Residential Development Land Use Scenario

Under the contemplated residential development land use scenario, about 200 housing units, occupied by about 500 new residents would be constructed. Space and water heating requirements, and use of an estimated 420 personal vehicles, would lead to a 25-fold increase in emissions of carbon dioxide, to an estimated 3,300 tons (3,000 metric tons) per year.

Commercial Development Land Use Scenario

Under the commercial development land use scenario, emissions of carbon dioxide would remain at an estimated 130 tons (120 metric tons) per year, the same as in the No Action Alternative.

6.3.12 Human Health

6.3.12.1 Environmental Consequences of the Contemplated Uses

Consequences would be the same for either land use scenario as in the No Action Alternative. Radiation doses received by residents at this tract would be an estimated 2.0 millirem per year (DOE 1999c, Chapter 5).

No changes in cancer risk should be expected. Nonradiological exposures would be expected to be below health-based standards. Residents would face the same hazards to floods and wildfires as workers now do, and should have adequate time to evacuate premises. Seismic events come without warning and would carry risks of physical injury from building collapses.

Residential development would bring 500 new residents into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. Residential development also would introduce more sensitive receptors, such as children and pregnant females, to an area that currently hosts only LANL-related workers. While all doses would be within health-based standards established by other Federal agencies, the closer proximity would increase the radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities. These same human health consequences would result from commercial development of the DOE LAAO Tract, but are lessened by three factors: (1) fewer members of the public would use the tract (an estimated 120 workers); (2) workers would be present less often than residents; (3) and the work force would contain fewer sensitive receptors.

6.3.12.2 Chemical Accidents

Accident assessment estimates greater public consequences than estimated in the No Action Alternative. For 15 of the 16 accident scenarios postulated in the LANL SWEIS, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached the DOE LAAO Tract, even under adverse weather dispersion conditions. ERPG-2 concentrations would reach the tract under the 16th scenario, however, and would affect residents.

The lone scenario in which the chemical plume would reach the DOE LAAO Tract is the hypothetical rupture of a chlorine cylinder during adverse weather dispersion conditions at the chlorinating station along Diamond Drive in the Los Alamos townsite (Building 00-1109). Under this scenario, ERPG-3 concentrations would be estimated to extend a distance of 1,345 feet (410 meters), and ERPG-2 concentrations a distance of 4,789 feet (1,460 meters). The DOE LAAO Tract is 3,280 feet (1,000 meters) from the accident location and occupants would thus experience ERPG-2 concentrations. In the Proposed Action Alternative, the tract is either developed residentially (200 apartments) or retained for commercial use of the office building. If developed residentially, an estimated 360 members of the public would be exposed to ERPG-2 concentrations. If developed commercially, an estimated 50 members of the public would be exposed to ERPG-2 concentrations at the tract. These exposures would be in addition to the 226 public exposures to ERPG-2 concentrations and the 180 public exposures to ERPG-3 concentrations, as estimated in the LANL SWEIS (DOE 1999c).

6.3.12.3 Radiological Accidents

Regardless of land use subsequent to disposition, the MEI dose at this tract would be the same as described in the No Action Alternative. MEI doses would be greater than 300 millirem for 3 of 13 scenarios: 97 rem for RAD-02 (natural gas pipeline failure, explosion, and fire at the CMR Building), 17 rem for RAD-12 (plutonium release from the Dual Axis Radiographic Hydrodynamic Test [DARHT] Facility during an earthquake), and 5 rem for RAD-15B (explosion followed by fire in an entire wing of the CMR Building).

Commercial use of the existing building for offices has been contemplated as a possible land use subsequent to transfer of ownership. Under this scenario, estimated tract collective dose and estimated excess LCFs also would remain the same as in the No Action Alternative, with one difference—the receptors of these doses would be members of the public not DOE employees. If the tract was developed residentially, collective tract dose and excess LCFs would increase from those estimated for the commercial development scenario because the tract would have a higher population density (approximately 500 residents versus 120 workers). A comparison of the estimated additional consequences associated with hypothetical radiological accidents for each land use scenario is presented in Table 6.3.12.3-1.

6.3.12.4 Natural Event Accidents

The postulated wildfire accident scenario would have no estimated chemical consequences at the DOE LAAO Tract. Earthquakes would have consequences, however. If developed residentially, an estimated 360 members of the public would be exposed to ERPG-2 concentrations. If developed commercially, an estimated 50 members of the public would be exposed to ERPG-2 concentrations at the tract. These exposures would be in addition to the 226 public exposures to ERPG-2 concentrations, and the 180 public exposures to ERPG-3 concentrations, as estimated in the LANL SWEIS (DOE 1999c).

MEI doses would be the same as in the No Action Alternative, regardless of land use subsequent to disposition. The maximum dose resulting from the postulated wildfire would be less than 0.1 rem; that from the most severe earthquake, however, would approach 300 rem.

If the tract were developed commercially subsequent to disposition, exposures would remain as in the No Action Alternative (as many as five excess LCFs), with one difference. The difference would lie in the receptors of these doses. In the No Action Alternative, all doses would be to DOE employees. If the tract is transferred, all doses would be to members of the public.

If the tract were developed residentially, however, there would be significant increases in collective tract dose and excess LCFs. The most severe earthquake would result in estimated tract collective doses greater than 100,000 person-rem and in more than 40 excess LCFs. These exposures would be in addition to those estimated in the LANL SWEIS (340,000 person-rem and 230 excess LCFs for SITE-03B).

Table 6.3.12.3-1. Additional Accident Consequences Associated with Contemplated Land Uses on the DOE LAAO Tract

				COMMERCIAL DEVELOPMENT[a]		RESIDENTIAL DEVELOPMENT[a]		SWEIS ESTIMATES[b]	
Accident Scenario	**Accident Location**	**Facility**	**Frequency per Year**	**Collective Dose[c]**	**Excess LCF**	**Collective Dose[c]**	**Excess LCF**	**Collective Dose[c]**	**Excess LCF**
RAD-01	54-38	RANT	1.6×10^{-3}	2	0	14	0.01	72	0.04
RAD-02	03-29	CMR	1.5×10^{-6}	4,300	2.2	31,000	16	120,000	57
RAD-03	18-116	Kiva #3	4.3×10^{-6}	1	0	9	0.01	100	0.06
RAD-05	21-209	TSTA	9.1×10^{-6}	0	0	0	0	24	0.01
RAD-07	50-69	WCRR	3.0×10^{-4}	10	0.01	73	0.04	1,300	0.69
RAD-08	54-230	TWISP	4.3×10^{-6}	2	0	16	0.01	400	0.2
RAD-09A	54-226	TWISP	4.9×10^{-1}	0	0	0	0	4	0
RAD-09B	54-226	TWISP	4.9×10^{-3}	1	0	10	0.01	230	0.12
RAD-12	16-411	--	1.5×10^{-6}	810	0.4	5,800	2.9	35,800	18
RAD-13	18-116	Kiva #3	1.6×10^{-5}	2	0	14	0.01	160	0.08
RAD-15A	03-29	CMR	3.6×10^{-5}	12	0.01	87	0.04	175	0.09
RAD-15B	03-29	CMR	3.2×10^{-5}	240	0.12	1,700	0.85	3,400	1.7
RAD-16	03-29	CMR	3.5×10^{-6}	1	0	5	0	56	0.03

Notes: RANT = Radioactive Assay Nondestructive Test; TSTA = Tritium Science Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

[a] In addition to doses estimated in the SWEIS.

[b] For the entire population within a 50-mile (80-kilometer) radius of LANL.

[c] Person-rem

6.3.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated land uses estimate that air emissions and hazardous chemical and radiological releases associated with LANL operations would be within current regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing any of the proposed alternatives would not lead to environmental justice impacts. Under the Proposed Action Alternative, modest economic benefits would arise from the additional jobs created during construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local governments. Each of these impacts would be positive and would not disproportionately affect low-income or minority populations.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process.

6.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the DOE LAAO Tract would not immediately cause any irreversible or irretrievable commitments of resources. In addition, because this tract is already developed, no significant irreversible commitments of ecological habitat or cultural resources would occur under either the residential or commercial land use scenarios.

Residential development would cause the irretrievable commitment of resources during construction and subsequent use of 200 new apartments. Energy would be expended in the form of natural gas and electricity. Additional water also would be consumed. Construction of these buildings would require the irretrievable commitment of standard building materials such as lumber and roofing materials.

6.3.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the DOE LAAO Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources because new development could result in physical destruction, damage, or alteration of cultural resources. The conveyance or transfer of the tract could also result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

Subsequent commercial development of the tract would have no adverse environmental impacts at the tract itself because its current land use is similar to a commercial use. There would be small impacts within the County. There would be minor transportation impacts, for example, because current DOE and contractor personnel would likely have slightly longer commutes to work.

Subsequent residential development also would cause unavoidable adverse impacts in several resource areas. There would be increased demands for utilities, for example. Increased demand for water, solid waste, and sewage would have adverse effects in the immediate Los Alamos region by lowering the aquifer level more quickly, shortening the remaining lifetime of the County landfill, and increasing both the quantities of sewage that require treatment and the quantities of treated sewage discharged to the environment. The environmental effects of increased demand for electricity and natural gas would be felt elsewhere (in the Four Corners region, for example), in the form of increased emissions of air pollutants in order to generate electricity. Increased consumption of natural gas adds to global climate change through increased emissions of carbon dioxide.

Residential development also would lead to an estimated 3 percent increase in personal vehicles in Los Alamos County, with attendant slight increases in congestion and traffic noises. Noise levels would increase within the DOE LAAO Tract, in frequency of occurrence and duration (into the night). The visual environment would deteriorate within the tract itself, but would not affect other areas.

Finally, residential development would bring 500 new residents into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. While all doses would be within health-based standards established by other Federal agencies, the closer proximity would slightly increase the radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.

6.3.16 Relationship Between Local Short-Term Use of the Environment and Maintenance of Long-Term Productivity

The actual conveyance or transfer of the DOE LAAO Tract would not immediately cause any specific impacts on short-term uses of the environment. The tract is located within the Los Alamos townsite, is relatively small, and is surrounded by already-developed areas. Subsequent development, whether commercial or residential, would therefore be compatible with the long-term uses of the land.

7.0 MISCELLANEOUS SITE 22 TRACT

7.1 Affected Environment

7.1.1 Land Use

The Miscellaneous Site 22 Tract consists of less than 0.5 acre (0.2 hectare) located in the Los Alamos townsite at the southern edge of the mesa above Los Alamos Canyon (see Figure 7.1.1-1) (DOE 1998b).

The northern edge of the tract is located behind an adjacent commercial storage business and a fast-food restaurant. The southern portion of the tract generally conforms to the topography of the mesa's edge.

Historically, when LANL operations were centralized around Ashley Pond located to the north across Trinity Drive, the Miscellaneous Site 22 Tract was the location of the machining shops. At present a LANL air monitoring station is located at the tract. Although it remains part of LANL, the site is not otherwise physically or operationally related to LANL (DOE 1998b). It is informally used by the public as a vehicle parking area. Figure 7.1.1-2 shows the location of the air monitoring station.

A portion of the Los Alamos Bench Trail crosses the tract Los Alamos Canyon to the south of the site and continues to the north (LANL 1998c) (see Figure 3.2.1-2 in Chapter 3). No other recreational related opportunities exist at the site.

7.1.1.1 Environmental Restoration

The Miscellaneous Site 22 Tract contains no potential release sites (PRSs) and one structure within its boundaries. There is a small amount of construction debris, however, that may have to be addressed prior to transfer of ownership. No sampling has yet been conducted to determine whether the debris is simply solid waste or whether it contains asbestos or other regulated materials. For this reason, the entire tract is considered to have potential contamination issues (see Figure 7.1.1.1-1).

7.0 MISCELLANEOUS SITE 22 TRACT

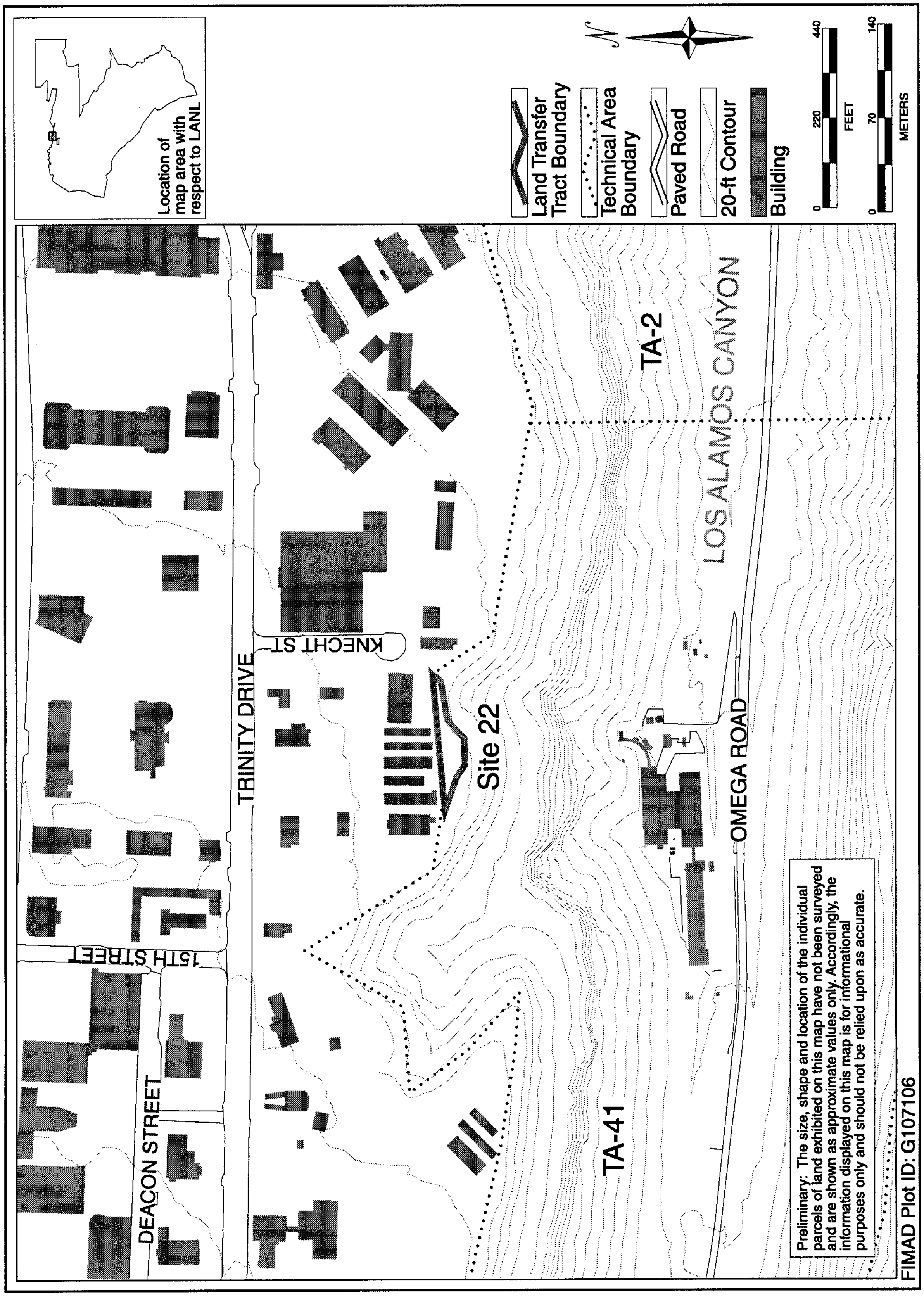

Figure 7.1.1-1. Miscellaneous Site 22 Tract Layout.

7.0 MISCELLANEOUS SITE 22 TRACT

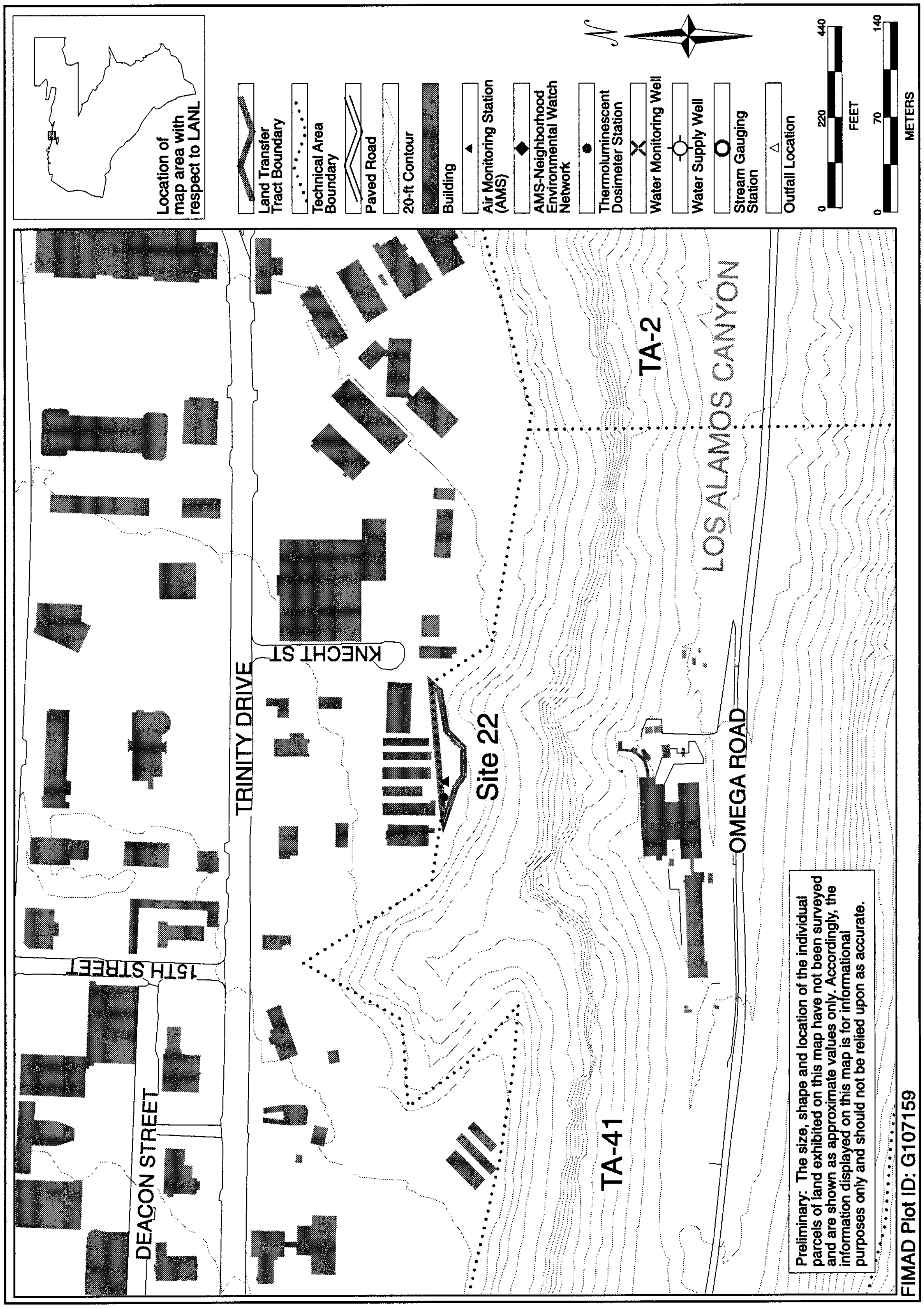

Figure 7.1.1-2. Miscellaneous Site 22 Tract Monitoring Stations and Outfall Locations.

7.0 MISCELLANEOUS SITE 22 TRACT

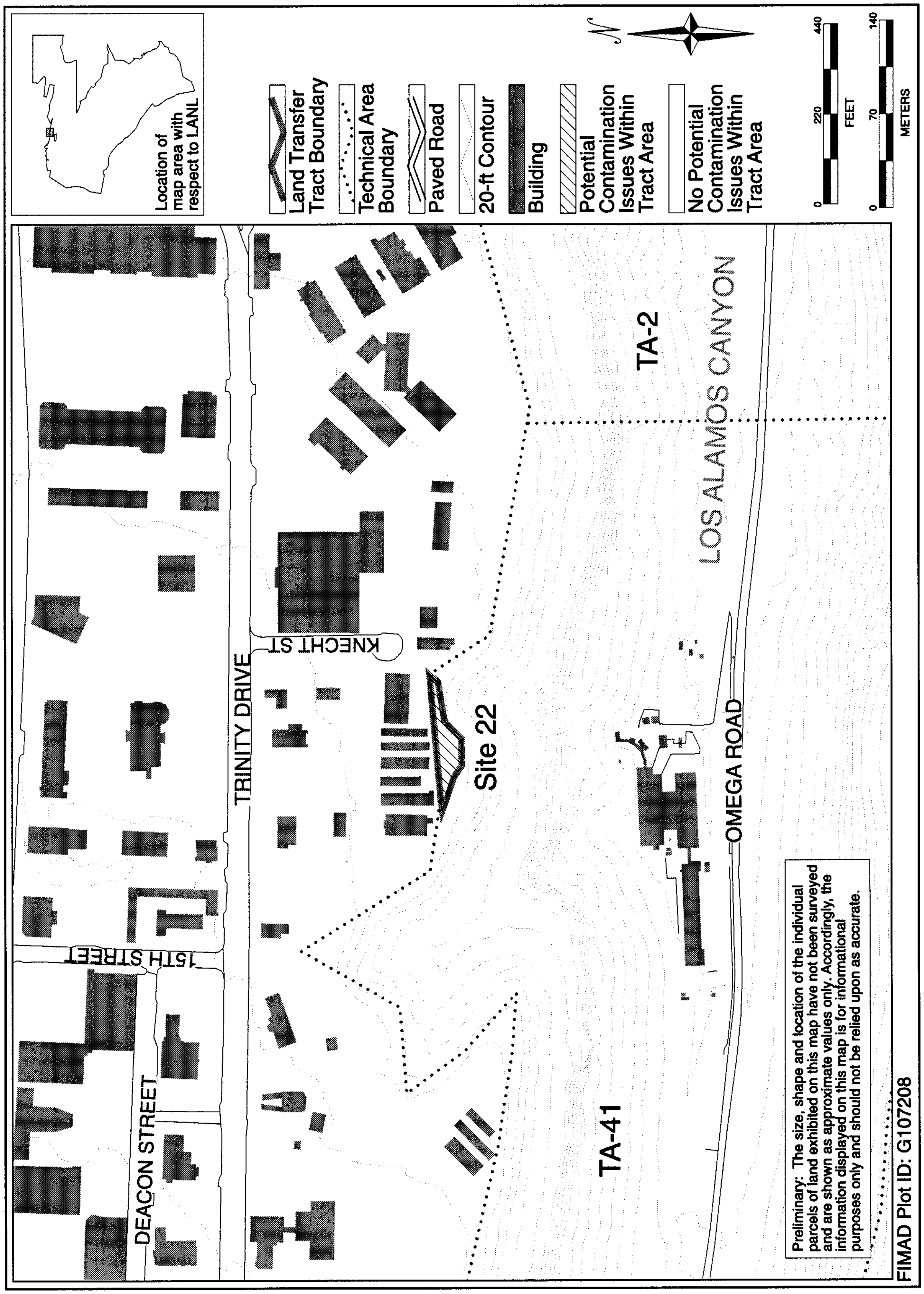

Figure 7.1.1.1-1. Miscellaneous Site 22 Tract Potential Contamination Issue Areas.

7.0 MISCELLANEOUS SITE 22 TRACT

7.1.2 Transportation

This tract is adjacent to Trinity Drive (see Figure 7.1.1-1), which is a four-lane major arterial with an approximate capacity of 7,200 passenger cars per hour (pcph). Data provided by the County of Los Alamos show that Trinity Drive carried approximately 2,630 vehicles in the vicinity of the Miscellaneous Site 22 Tract during the peak hour in January 1998. The average annual daily traffic for Diamond Drive near the site is approximately 19,700 vehicles per day. This results in a current level of service (LOS) C for Trinity Drive, which is defined as good operating conditions with stable flow, but speeds and maneuverability are more closely controlled by the higher traffic volumes. Increasing Trinity Drive traffic by 1.5 percent a year to account for expected growth in the area over the next 20 years maintains the LOS C for Trinity Drive.

7.1.3 Infrastructure

Figure 7.1.3-1 shows the utilities and infrastructure at the Miscellaneous Site 22 Tract. The DOE currently uses this tract as a buffer zone. The tract has an air monitoring station with a small access stairway. The air monitoring station uses a negligible amount of electricity to operate. All utilities are available to the site. This tract is not metered separately for any utilities, and no figures for current utility usage are available.

7.1.4 Noise

The Miscellaneous Site 22 Tract, less than 0.25 acre (0.1 hectare), is currently surrounded by commercial properties. The predominant source of noise, surprisingly, is traffic on East Jemez Road across Los Alamos Canyon. An air sampling station is located on the tract and also contributes to audible noise. Noise levels are estimated to range from 50 to 60 decibels (dB).

7.1.5 Visual Resources

The Miscellaneous Site 22 Tract generally is visually similar to adjacent land areas. There are some manmade modifications within the tract. The primary views to the site are from South Mesa located across Los Alamos Canyon to the south of the tract. The views from the tract to the south, west, and east are primarily of tree and rock covered mesa and side slopes. The view to the north is mainly of commercial storage units. After scenic quality, distance zone, and sensitivity level components were combined using the Inventory Class Matrix, it was determined that the site falls into Scenic Class IV and that the current visual resources are of low public value.

7.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer.

This tract is comparatively small and currently has no development except for an air monitoring station. There is no employment associated with this tract of land.

7.1.7 Ecological Resources

Vegetation in this tract consists primarily of native grasses, herbs, and shrubs. Fauna presence in this small tract would be characteristic of the region but limited to those species able to coexist with extensive human development (for example, rats, mice, songbirds). The site is not in a floodplain nor does it support wetlands. Habitat for the American peregrine falcon, bald eagle, and Mexican spotted owl overlaps this land tract. The habitat is poor due to the small tract area, intensive adjacent development, and human population in the general area. However, the tract contains 0.25 acres (0.1 hectares) of identified area of environmental interest

7.0 MISCELLANEOUS SITE 22 TRACT

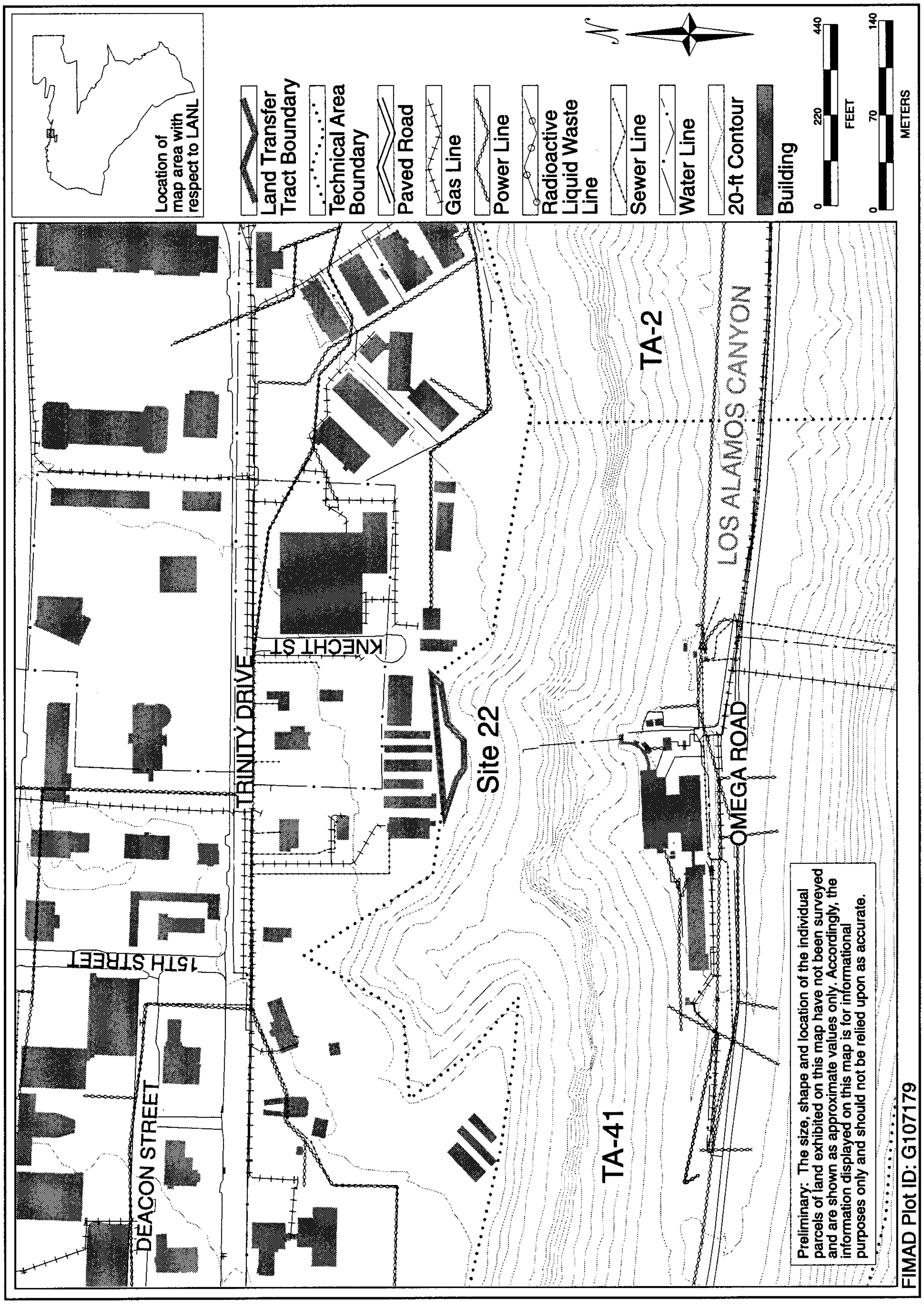

Figure 7.1.3-1. Miscellaneous Site 22 Tract Utilities and Infrastructure.

(AEI) core habitat for the Los Alamos Canyon Mexican spotted owl (PC 1999d). Noise in the vicinity of this tract is from motorized vehicles and business operation in the area. Artificial light sources associated with commercial development and vehicles also are present (LANL 1998b).

7.1.8 Cultural Resources

The Miscellaneous Site 22 Tract is located on a mesa edge just north of Los Alamos Canyon. Prior to DOE use, this tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on privately held land.

One hundred percent of the Miscellaneous Site 22 Tract has been inventoried for historic and prehistoric cultural resources and none were found. There are no historic structures located on the tract. There are no known traditional cultural properties (TCPs) located in the Miscellaneous Site 22 Tract. Consultations to identify TCP resources have not been conducted. Due to the tract's location and size, it has a low potential for unidentified resources.

7.1.9 Geology and Soils

The Miscellaneous Site 22 Tract borders the edge of Los Alamos Canyon. Outcrops along the canyon edge belong to the upper member of the Bandelier Tuff (Tshirege), typical of the Pajarito Plateau. No major surface faulting is evident at the Miscellaneous Site 22 Tract, but fracturing along the canyon edge is common in the area.

7.1.10 Water Resources

The Miscellaneous Site 22 Tract is located on the slope above Los Alamos Canyon, which is an ephemeral drainage in this vicinity. There are no known springs or wetlands within the tract. There are no National Pollutant Discharge Elimination System (NPDES)-permitted outfalls within the tract. There are no regional aquifer groundwater test or supply wells within the tract or within a distance of 0.5 mile (0.8 kilometer).

There are no stream gages or established surface water or groundwater monitoring stations located within the tract. The closest environmental monitoring locations maintained by the LANL Environmental Surveillance and Compliance Program are for surface water and shallow groundwater in Los Alamos Canyon and do not pertain to water quality or quantity associated with this tract.

The Miscellaneous Site 22 Tract does not lie within the 100-year or 500-year floodplains as modeled by LANL for Los Alamos Canyon.

7.1.11 Air Resources

Air quality is good at the Miscellaneous Site 22 Tract, affected mostly by traffic on nearby Trinity Drive. Air quality is also affected, to a lesser extent, by emissions from LANL as a whole.

The Miscellaneous Site 22 Tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Except for small amounts of carbon monoxide and ozone resulting from hydrocarbons emitted from motor vehicles, there are no sources of criteria pollutants within the tract itself.

Analyses performed for the LANL SWEIS estimate that concentrations of chemical air pollutants from LANL do not exceed health-based standards for any point beyond the LANL boundary, including at the Los Alamos Medical Center (DOE 1999c, Chapter 5). The closest LANL facilities are at Technical Area (TA) 41, located nearly directly below Miscellaneous Site 22 Tract, on the floor of Los Alamos Canyon.

However, there are no emissions of chemical air pollutants from TA 41.

Finally, analyses for doses from LANL radioactive air pollutants indicate that air concentrations at the Miscellaneous Site 22 Tract would deliver a dose of approximately 1.6 millirem per year if people resided there year-round, or less than one-fifth of the EPA standard (DOE 1999c, Chapter 5). There are no emissions of radioactive air pollutants from activities at the tract itself.

7.1.11.1 Global Climate Change

Because there are no heated facilities and because motor vehicles cannot operate on this tract, there are no emissions of carbon dioxide or other greenhouse gases from the Miscellaneous Site 22 Tract.

7.1.12 Human Health

7.1.12.1 The Radiological Environment for the Miscellaneous Site 22 Tract

The Miscellaneous Site 22 Tract sits on the edge of the LANL townsite mesa just above TA 41 and is currently within the LANL perimeter. No one resides on the land, and there are few visitors. It would be expected that radiation doses would be much less than that to the LANL offsite maximally exposed individual (MEI) due to the much greater distance from the LANL primary source of radioactive air emissions (the Los Alamos Neutron Science Center [LANSCE]). Similarly, background radiation doses would be the same as for the Los Alamos townsite. No PRSs or other known sources of radioactive contamination exist for this tract.

7.1.12.2 The Nonradiological Environment for the Miscellaneous Site 22 Tract

Exposures to nonradiological contaminants via airborne pathways in the LANL vicinity have already been shown to be below health-based standards for the affected environment (DOE 1999c). No PRSs or other known sources of nonradiological contamination exist for this tract except possibly some building debris.

7.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached the Miscellaneous Site 22 Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the LANL SWEIS, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. Using data from the LANL SWEIS, doses to the MEI at the Miscellaneous Site 22 Tract have been estimated for each of these, as shown in Table 7.1.12.3-1.

Because there are no workers or residents at the tract, estimated tract collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe postulated earthquake (accident SITE-03B) has an estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The earthquake scenario would release chemicals from a number of facilities,

7.0 MISCELLANEOUS SITE 22 TRACT

Table 7.1.12.3-1. MEI Doses for the Miscellaneous Site 22 Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-2}	48	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	32,000	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	35	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	2	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	320	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	60	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	38	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	12,000	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	53	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	110	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	2,100	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	5	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; CMR = Chemistry and Metallurgy Research; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

including formaldehyde from the Health Research Laboratory (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed above for chemical accidents, earthquakes would have no estimated chemical consequences at the Miscellaneous Site 22 Tract. The most severe postulated earthquake, however, would be expected to release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of nearly 100 Roentgen equivalent man (rem) at the Miscellaneous Site 22 Tract.

The site wildfire scenario would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at the Miscellaneous Site 22 Tract is estimated to be less than 0.1 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Because there are no workers or residents at the tract, estimated tract collective dose and estimated excess LCF are both zero for all five natural event accident scenarios.

7.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

7.2 No Action Alternative

7.2.1 Land Use

There would be no anticipated change in land use at the Miscellaneous Site 22 Tract, as currently described under the No Action Alternative.

7.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006, although some LANL sites may take longer. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the Miscellaneous Site 22 Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 7.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report (DOE 1999b).

This information indicates the only cleanup likely for the tract would be the characterization and removal of the construction debris, an action estimated to require 9 months. Waste volumes are expected to total 10 cubic yards (8 cubic meters). The cost estimate for remedial action at this parcel is about $91,000. This estimate is based on information currently available regarding the site contamination, and is subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual "cleanup." Although a cleanup approach has been identified, it is possible that the administrative authority could require additional actions, resulting in greater waste volumes, a longer cleanup duration, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

7.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on Trinity Drive near the Miscellaneous Site 22 Tract. It is expected that the future operational performance of Trinity Drive would remain similar to that of the existing performance.

7.2.3 Infrastructure

The No Action Alternative would result in no changes in the infrastructure or utilities of the Miscellaneous Site 22 Tract. The air monitoring station would remain in operation. No appreciable change in utility usage or infrastructure development is expected.

7.2.4 Noise

In the No Action Alternative, the Miscellaneous Site 22 Tract would remain in its current use, and traffic on Trinity Drive determines ambient noise levels. Noise levels would be expected to remain about the same as they are currently in the range of 50 to 60 A-weighted decibels (dBA).

7.2.5 Visual Resources

Under the No Action Alternative, it is expected that the visual character of the site would remain as it is today.

7.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

7.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at the Miscellaneous Site 22 Tract, as described in Section 7.1.1. Therefore, no impact to ecological resources is projected under the CT EIS No Action Alternative.

7.2.8 Cultural Resources

Under the No Action Alternative, the Miscellaneous Site 22 Tract would remain under the responsibility of the DOE, and the treatment of any unidentified cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords.

7.2.9 Geology and Soils

Consequences are limited to existing uses with regard to geology and soils. The tract is already developed; no additional utilities, roadwork, or buildings would be required. No soil disturbance or change in availability of resources would be expected.

7.2.10 Water Resources

Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

7.2.11 Air Resources

In the No Action Alternative, the Miscellaneous Site 22 Tract would continue to be used as a LANL buffer area. As currently is the case, there would be no emissions of criteria pollutants, hazardous or other chemical pollutants, or radioactive air pollutants from activities at the Miscellaneous Site 22 Tract. Accordingly, air pollutants at this tract would come from external activities and sources.

The dominant source of criteria pollutants would continue to be traffic along Trinity Drive. Analyses show that ambient air quality would remain within standards established by EPA and the State of New Mexico for criteria pollutants (DOE 1999c, Chapter 5).

For hazardous and other chemical pollutants, analyses performed for the LANL SWEIS estimate that concentrations of chemical air pollutants would not exceed health-based standards for any point beyond the LANL boundary except for the Los Alamos Medical Center. Concentrations at the Miscellaneous Site 22 Tract also would comply with health-based standards.

Finally, analyses for doses from radioactive air pollutants indicate that air concentrations at the Miscellaneous Site 22 Tract would deliver a dose of approximately 2.5 millirem per year to people residing there year-round, or about 25 percent of the EPA standard (DOE 1999c, Chapter 5). There would be no emissions of radioactive air pollutants from activities at the tract itself.

7.2.11.1 Global Climate Change

There would be no change from today's type or level of activities at the Miscellaneous Site 22 Tract for the No Action Alternative. Because there are no heated facilities and the tract has no vehicle traffic, there would be no emissions of carbon dioxide or other greenhouse gases from the Miscellaneous Site 22 Tract.

7.2.12 Human Health

There would be no identifiable human health consequences of the No Action Alternative for the Miscellaneous Site 22 Tract. No changes in cancer risk should be expected for implementing this alternative.

7.2.12.1 Chemical Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached Site 22, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

7.2.12.2 Radiological Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. MEI doses would be greater than 500 millirem for 3 of 13 scenarios. The estimated tract collective dose and estimated excess LCF would both be zero.

7.2.12.3 Natural Event Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be less than 0.1 rem; the maximum dose from the most severe earthquake would be nearly 100 rem. Because there would be no workers or residents at the tract, estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

7.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. Human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations that would continue under the No Action Alternative would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents at LANL would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

7.3 Proposed Action Alternative

There are no DOE facilities or activities on this tract that would have to be relocated or otherwise affected by the proposed transfer of this tract except for the need to relocate the tract's environmental media monitoring station onto LANL lands. Therefore, there would be no direct consequences of the transfer of ownership of the tract other than those associated with potential loss of Federal protection of any cultural and ecological resources that may be present and the negligible consequences of relocating the air monitoring station (see Sections 7.3.7 and 7.3.8, respectively).

7.3.1 Land Use

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections.

7.3.1.1 Description of Contemplated Uses

Land use proposed for the Miscellaneous Site 22 Tract would likely result in its use as part of a commercial storage business. Activities at the tract would primarily involve vehicle parking and container storage. The site would not be developed further in the near-term except perhaps by being paved, and the general public would have unrestricted access.

7.3.1.2 Environmental Consequences of the Contemplated Uses

The scenario as currently defined would result in a slight change from existing land use. The site is currently a LANL buffer area that receives unauthorized use for vehicle parking. Under the Proposed Action Alternative, the Miscellaneous Site 22 Tract would change to a sanctioned parking area. The environmental consequences to land use would remain essentially the same as for the No Action Alternative.

7.3.1.3 Environmental Restoration

No additional restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer.

7.3.2 Transportation

7.3.2.1 Environmental Consequences of the Contemplated Uses

The contemplated uses discussed in Section 7.3.1 would result in transportation system impacts essentially the same as for the No Action Alternative. Therefore, it is expected that the future operational performance of Trinity Drive would remain similar to that of the current performance.

7.3.3 Infrastructure

7.3.3.1 Environmental Consequences of the Contemplated Uses

Conveyance or transfer of this tract could result in closure and possible removal of the air monitoring station. However, if the monitoring station were moved to another location, the electric power usage would be approximately the same as it currently is, regardless of location. Otherwise, no changes to the infrastructure at the site are anticipated, and no new impacts would result.

7.3.4 Noise

7.3.4.1 Environmental Consequences of the Contemplated Uses

If developed commercially, the Miscellaneous Site 22 Tract would continue to be used for vehicle parking and storage. Activity levels would remain as today and, accordingly, so would noise levels. Noise from East Jemez Road across Los Alamos Canyon would continue to be the primary intrusion on background noise levels. It is estimated that noise levels would range from 50 to 60 dB.

7.3.5 Visual Resources

7.3.5.1 Environmental Consequences of the Contemplated Uses

No substantial impacts to the visual resources of the tract would be expected under the Proposed Action Alternative. The contemplated land use is commercial, similar to the existing use. The tract is classified as Scenic Class IV, which indicates low public value for the visual resources. The planned use would maintain or improve current visual resources.

7.3.6 Socioeconomics

7.3.6.1 Environmental Consequences of the Contemplated Uses

Little development would be expected on this tract of land due to its size and location. There would be no impact to the regional economy.

7.3.7 Ecological Resources

Direct impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

7.3.7.1 Environmental Consequences of the Contemplated Uses

Vegetation on the Miscellaneous Site 22 Tract consists of primarily grasses, wildflowers, shrubs, and bare ground in a highly developed area. Commercial development of the area would result in the loss of approximately 0.5 acres (0.2 hectares) of very poor habitat. Approximately 0.26 acres (0.11) of area included in the Mexican spotted owl Los Alamos Canyon AEI core habitat would be affected (PC 1999d).

Under most commercial development scenarios the impacts would be similar. Transfer of land out of DOE control would result in a less rigorous environmental review and protection process for future activities.

7.3.8 Cultural Resources

National Register of Historic Places (NRHP)-eligible or potentially eligible resources and TCPs have not been identified, nor are they expected to be present in the Miscellaneous Site 22 Tract. If resources are present in the Miscellaneous Site 22 Tract, direct impacts of the conveyance and transfer itself would result from the transfer of these resources out of the responsibility and protection of the DOE.

7.3.8.1 Environmental Consequences of the Contemplated Uses

No cultural resources have been identified nor are expected to be present in the Miscellaneous Site 22 Tract. Therefore, there would be no impacts associated with the use of this tract.

7.3.9 Geology and Soils

7.3.9.1 Environmental Consequences of the Contemplated Uses

Land use proposed for this tract would likely result in its use as part of a commercial storage business. Because this tract is already developed, no additional utilities, roadwork, or other soil disturbing actions are anticipated.

7.3.10 Water Resources

7.3.10.1 Environmental Consequences of the Contemplated Uses

The contemplated land use for the Miscellaneous Site 22 Tract includes paving for vehicle parking and container storage. No other alternative has been contemplated.

Conveyance or transfer of this tract would not directly affect surface water or groundwater quantity or quality. However, surface water quantity and quality outside of the tract boundary in Los Alamos Canyon may be indirectly affected by a slight increase in storm water runoff from the tract that may wash contaminants from paved areas into the canyon.

7.3.11 Air Resources

7.3.11.1 Environmental Consequences of the Contemplated Uses

Contemplated use for the Miscellaneous Site 22 Tract would be little changed from current unofficial use. Air quality at the tract would remain unchanged, with concentrations of criteria pollutants, hazardous and other chemical pollutants, and radioactive air pollutants all within Federal and State standards.

7.3.11.2 Global Climate Change

Contemplated land use for the Miscellaneous Site 22 Tract would be little changed from its unofficial current use. Because there would be no heated facilities and little possible increase in vehicle use, essentially there would be no emissions of carbon dioxide or other greenhouse gases.

7.3.12 Human Health

7.3.12.1 Environmental Consequences of the Contemplated Uses

The consequences for the Proposed Action Alternative implementation would be the same as for the No Action Alternative. The public could be in closer proximity to LANL but not closer than the offsite MEI with respect to the LANL operations producing the radioactive air emissions. Therefore, nonradiological and radiological doses would be the same as for the No Action Alternative.

7.3.12.2 Chemical Accidents

Accident assessment would be the same as in the No Action Alternative. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached Site 22, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

7.3.12.3 Radiological Accidents

The Miscellaneous Site 22 Tract has only one planned use subsequent to land transfer, namely, continued use as a commercial storage facility. The MEI dose assessment would be the same as in the No Action Alternative; MEI doses would be greater than 500 millirem for 3 of 13 scenarios. The estimated tract collective dose and estimated excess LCF would also remain as in the No Action Alternative (that is, both would remain zero).

7.3.12.4 Natural Event Accidents

Accident assessment would be the same as in the No Action Alternative. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be less than 0.1 rem; the maximum dose from the most severe earthquake would be nearly 100 rem. However, because there is no planned development of this tract, and hence there would be no workers or residents, the estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

7.3.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated land use estimate that air emissions and hazardous chemical and radiological releases from LANL operations would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on the tract.

The analyses also indicate that socioeconomic changes resulting from implementing either of the proposed alternatives would not lead to environmental justice impacts. Under the Proposed Action Alternative, very modest economic benefits could arise from site improvement and use. Any impacts would be positive and would not disproportionately affect any single group.

7.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

Because there would be no change in the use of this land tract, neither the actual conveyance or transfer nor the future use would cause any irreversible or irretrievable commitments of resources.

7.3.15 Unavoidable Adverse Environmental Impacts

Because there would be no change in the use of this land tract, neither the actual conveyance or transfer nor the future use would cause any adverse environmental impacts.

7.3.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

Because there would be no change in the use of this land tract, neither the actual conveyance or transfer nor the future use would cause any specific impacts on short-term uses of the environment. Similarly, because this tract is already developed, there would be no impact to the long-term ecological productivity of the area.

8.0 MISCELLANEOUS MANHATTAN MONUMENT TRACT

Because the Miscellaneous Manhattan Monument Tract is small, solely used for an historic monument, and is not contemplated to change under any of the alternatives, the discussions of transportation, infrastructure, noise, visual resources, socioeconomics, ecological resources, cultural resources, geology and soils, water resources, air resources, human health, and environmental justice were rolled into the overall discussion where relevant, or otherwise, omitted entirely.

8.1 Affected Environment

The Miscellaneous Manhattan Monument Tract contains no potential release sites (PRSs) within its boundaries, and the only structure on the tract is the monument itself.

The Miscellaneous Manhattan Monument Tract is located on less than 0.5 acre (0.2 hectare) adjacent to Ashley Pond in the center of the Los Alamos townsite (see Figure 8.1-1) (DOE 1998b). Access to the site is available from Trinity Drive.

Although no longer associated with any LANL operations, the plaque within the monument structure commemorates the location of the Los Alamos Ranch School ice house where components for the atomic bomb were inspected and assembled. Standard utilities, gas, water, electricity, and sewers are available to the site. The Miscellaneous Manhattan Monument Tract is situated in an urbanized portion of the townsite and contains no sensitive habitat. The Manhattan Monument is, however, a contributing element of the Los Alamos Scientific Laboratory National Historic Landmark, which was created in 1966. Other contributing elements of the landmark in the vicinity include Fuller Lodge, the Historical Museum, private residences on “Bathtub Row,” and a stone powerhouse.

The site is one feature of the surrounding park used by local business people, families, and tourists. Adjacent land uses include County offices, banking, and retail businesses. Although the area is used as open space, no historic trails or other formal recreational opportunities exist at the site (LANL 1998c).

8.2 No Action Alternative

There would be no anticipated change in land use at the Miscellaneous Manhattan Monument Tract, as currently described

8.0 MISCELLANEOUS MANHATTAN MONUMENT TRACT

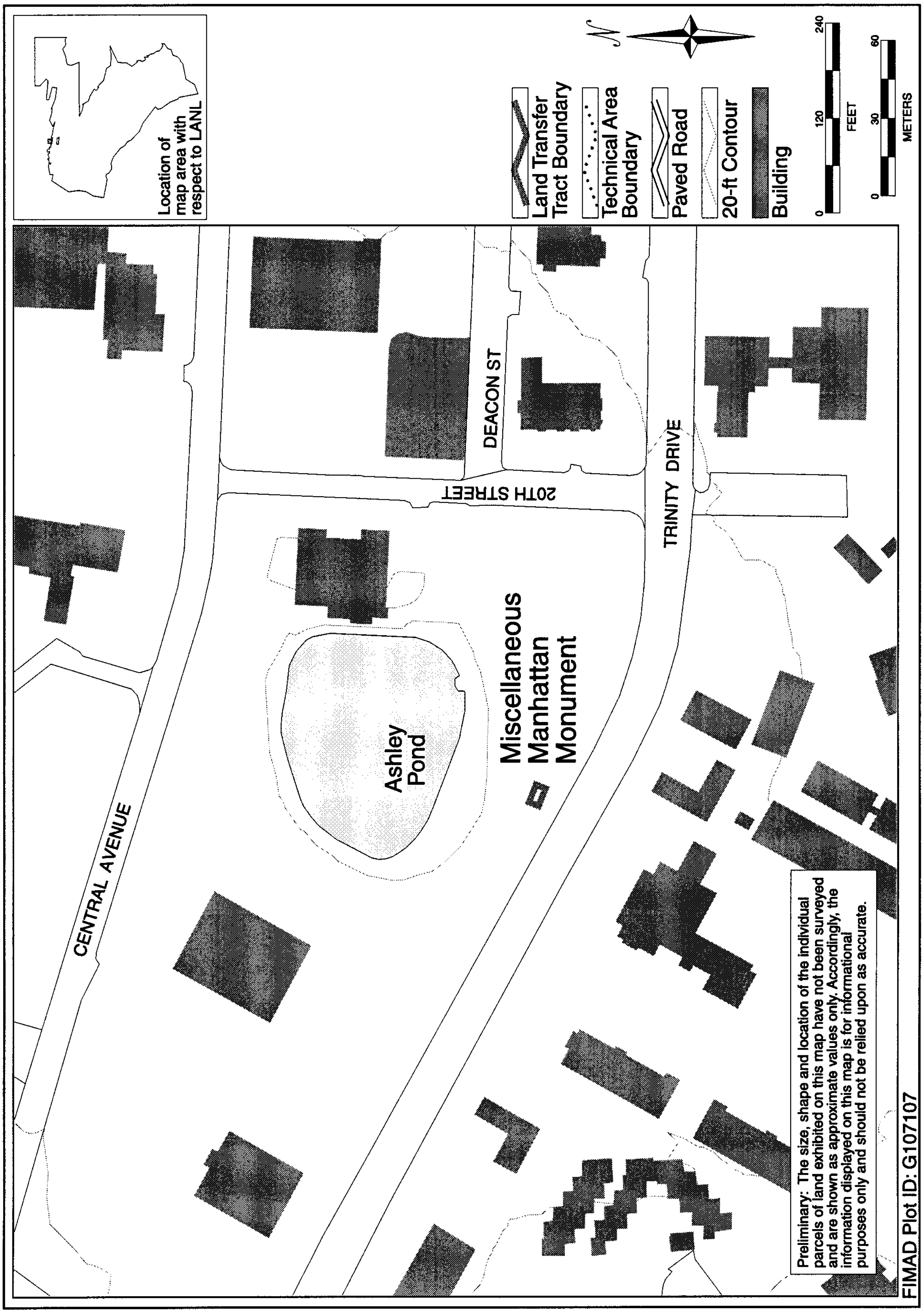

Figure 8.1-1. Miscellaneous Manhattan Monument Tract Layout.

under the No Action Alternative. For historic preservation purposes, the Miscellaneous Manhattan Monument Tract would remain the responsibility of the DOE, and the treatment of this National Register of Historic Places (NRHP)-listed resource would continue to be subject to Federal laws, regulations, guidelines, and executive orders.

8.3 Proposed Action Alternative

Direct impacts of the conveyance or transfer itself would be limited to the transfer of a contributing element of an NRHP-listed resource out of the responsibility and protection of the DOE. Under the Criteria of Adverse Effect (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible resources is an adverse effect. Because the Manhattan Monument is a contributing element of a NRHP-listed resource, it would be directly impacted by the Federal action. In addition, Section 110f of the *National Historic Preservation Act* requires that Federal agencies exercise a higher standard of care when considering undertakings that may affect National Historic Landmarks.

Land use proposed for this site would result in the continued historic preservation of the tract (PC 1998e and PC 1998f). Stewardship of the site would require that landscaping and other routine maintenance activities be performed on an as-needed basis. The Miscellaneous Manhattan Monument Tract would not be further developed, and the general public would have unrestricted access to the site and its surrounding area.

No change in land use is contemplated for the Miscellaneous Manhattan Monument Tract, and no indirect impacts would be anticipated. Neither environmental restoration nor decommissioning is anticipated.

8.3.1 Irreversible And Irretrievable Commitment of Resources

Because there would be no change in the use of this land tract, neither the actual conveyance nor transfer nor the future use would cause any irreversible or irretrievable commitments of resources.

8.3.2 Unavoidable Adverse Environmental Impacts

Because there would be no change in the use of this land tract, neither the actual conveyance nor transfer nor the future use would cause any adverse environmental impacts.

8.3.3 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

Because there would be no change in the use of this land tract, neither the actual conveyance nor transfer nor the future use would cause any specific impacts on short-term uses of the environment. Similarly, because this tract is already developed, there would be no impact to the long-term ecological productivity of the area.

9.0 DP ROAD TRACT

9.1 Affected Environment

9.1.1 Land Use

The DP Road Tract is located between the western boundary of Technical Area (TA) 21 and the major commercial districts of the Los Alamos townsite and is near the currently active operations of LANL (see Figure 9.1.1-1, DP Road Tract Layout). The tract is approximately 50 acres (20 hectares). The western section of the tract contains two structures on approximately 2 acres (0.8 hectare), one of which houses a major portion of the LANL archives. Approximately 26 acres (10.5 hectares) of relatively level land is covered with native vegetation. Portions of DP Canyon and BV Canyon (which flows into Los Alamos Canyon) are within the tract boundaries and include areas generally too steep for development (slopes greater than 20 degrees). Access into the site is from Trinity Drive onto DP Road.

Vegetation at the site includes ponderosa pine forest and pinyon-juniper woodlands, both with open shrub, grasslands, and wildflower areas. The DP Road Tract also contains potentially sensitive wildlife habitat.

With the exception of the buildings already mentioned, there are no other permanent buildings within the boundaries of the DP Road Tract (DOE 1998b). However, adjacent land use includes various businesses along DP Road. The Knights of Columbus building stands just off the intersection of DP Road and Trinity Drive on the north side of DP Road. Several hundred yards (approximately 365 meters) of vacant land lie between this building and the Los Alamos Fire Department training facility. The north leg of the DP Road Tract continues east into DP Canyon, between businesses along DP Road and residences along East Road.

In the past, portions of the DP Road Tract were used for LANL fueling facilities (north) and for a trailer park and playground area (south). Currently, there is no LANL activity within the tract with the exception of archive storage. A short trail crosses the southeast "thumb-shaped" part of the tract and provides access from DP Road to the old Los Alamos Ranch Trail, which crosses along the north side of Los Alamos Canyon (see Figure 3.2.1-2 in Chapter 3). The trail is sometimes used for hiking. There are no other recreational opportunities at the site.

9.0 DP ROAD TRACT

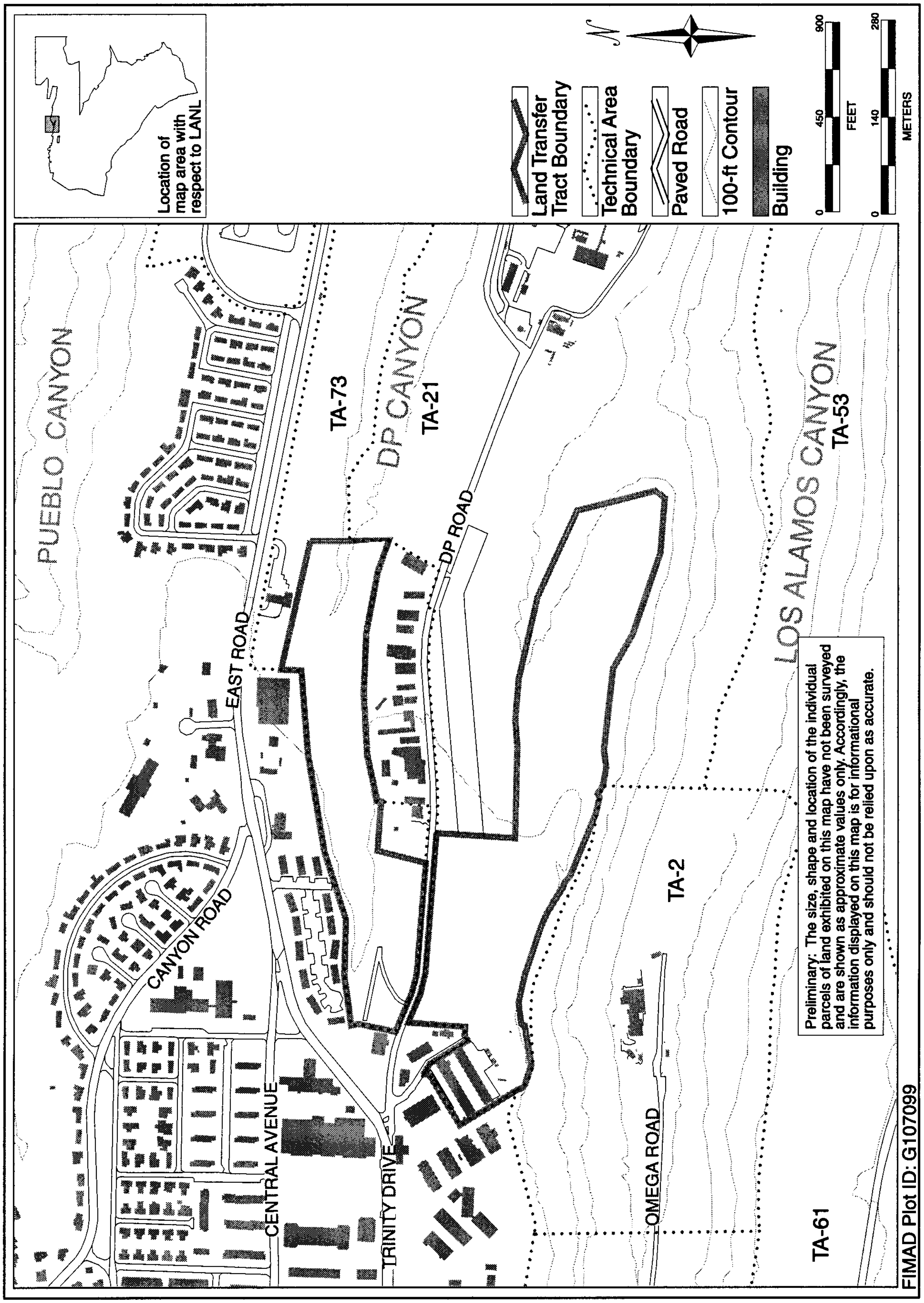

Figure 9.1.1-1. DP Road Tract Layout.

9.0 DP ROAD TRACT

Structures or facilities that are associated with Federal, State, or local permits are located on or near the DP Road Tract. Examples of such facilities or structures are air monitoring stations and wastewater discharge outfalls. Radiation stations are located on or near the tract. Figure 9.1.1-2 shows the location of these facilities relative to the DP Road Tract.

9.1.1.1 Environmental Restoration

There are 10 potential release sites (PRSs), 10 DOE-owned structures, and 2 canyon systems on this tract. Eight of the PRSs have been categorized as surface units, and two as subsurface units. Nine PRSs have had some sampling and characterization, with the detection of metals, organic chemicals, and radioactive isotopes. Structures include two large archive buildings, six simple storage sheds, one transportainer, and a backflow preventer, which is part of the water supply system. A portion of DP Canyon is included in this tract.

Figure 9.1.1.1-1 shows areas with potential contamination issues (PCIs) within this tract, as well as areas with no known contamination. PCI acreage is estimated to total 18 acres (7 hectares). The north and south legs of the tract appear to have no PCIs.

9.1.2 Transportation

An existing collector road, DP Road serves this tract (see Figure 9.1.1-1). This collector road has the capability to service approximately 2,000 passenger cars per hour (pcph) in both directions. DP Road can be accessed from Trinity Drive, a four-lane major road west of DP Road, and from the east by a two-lane street, East Road.

Trinity Drive currently has an approximate capacity of 7,200 pcph, and East Road has a capacity of approximately 2,400 pcph. Data provided by the County of Los Alamos show that Trinity Drive at East Road carried approximately 1,100 vehicles in the peak hour near the vicinity of DP Road in January 1998. The average annual traffic on Trinity Road at East Road near the site is approximately 10,350 vehicles per day. This results in a level of service (LOS) D for the two-lane street, which is defined as below average operating conditions approaching “stop and go” traffic flow. The two-lane section of these roads was evaluated because it is the constraint for roadway operation.

Increasing Trinity Drive at East Road traffic to account for expected growth in the area over the next 20 years degrades the operation to LOS E in the year 2018. This LOS represents the maximum capacity of the road and is the operating condition just prior to traffic jam conditions.

The existing intersection of DP Road and Trinity Drive is a blind curve. Westbound Trinity Drive traffic, transitioning to a one-lane section at this location, does not have a clear view of eastbound traffic. The allowable room for turning onto DP Road and from DP Road onto Trinity Drive is currently insufficient, and the turn lane configuration can be confusing.

9.1.3 Infrastructure

Figure 9.1.3-1 shows the location of structures, roads, and utility lines for the DP Road Tract. Industrial and security fence lines are shown on Figure 9.1.3-2. The tract is largely undeveloped, containing only two major structures, located at the west end of the tract. One structure houses the LANL archives, while a LANL subcontractor, Johnson Controls Northern New Mexico (JCINNM), uses the other. DP Road bisects the tract, but most of the area has no paved roads.

All utilities are available to this site. A natural gas supply line passes close to the boundary of the site near the southwest corner. Electrical power is available to the site. A water supply line enters the tract at the southwest boundary. A radioactive liquid

9.0 DP ROAD TRACT

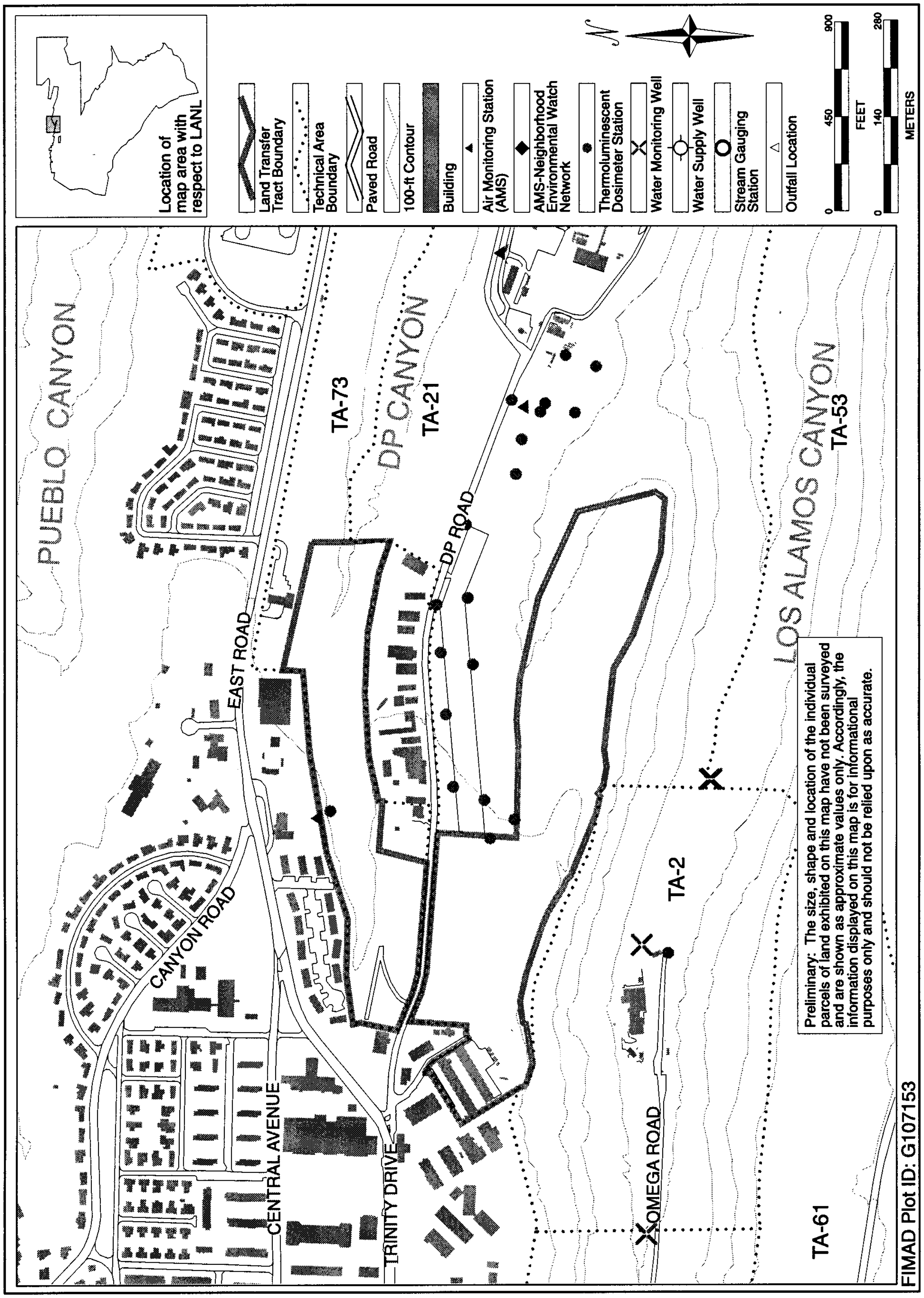

Figure 9.1.1-2. DP Road Tract Monitoring Stations and Outfall Locations.

9.0 DP ROAD TRACT

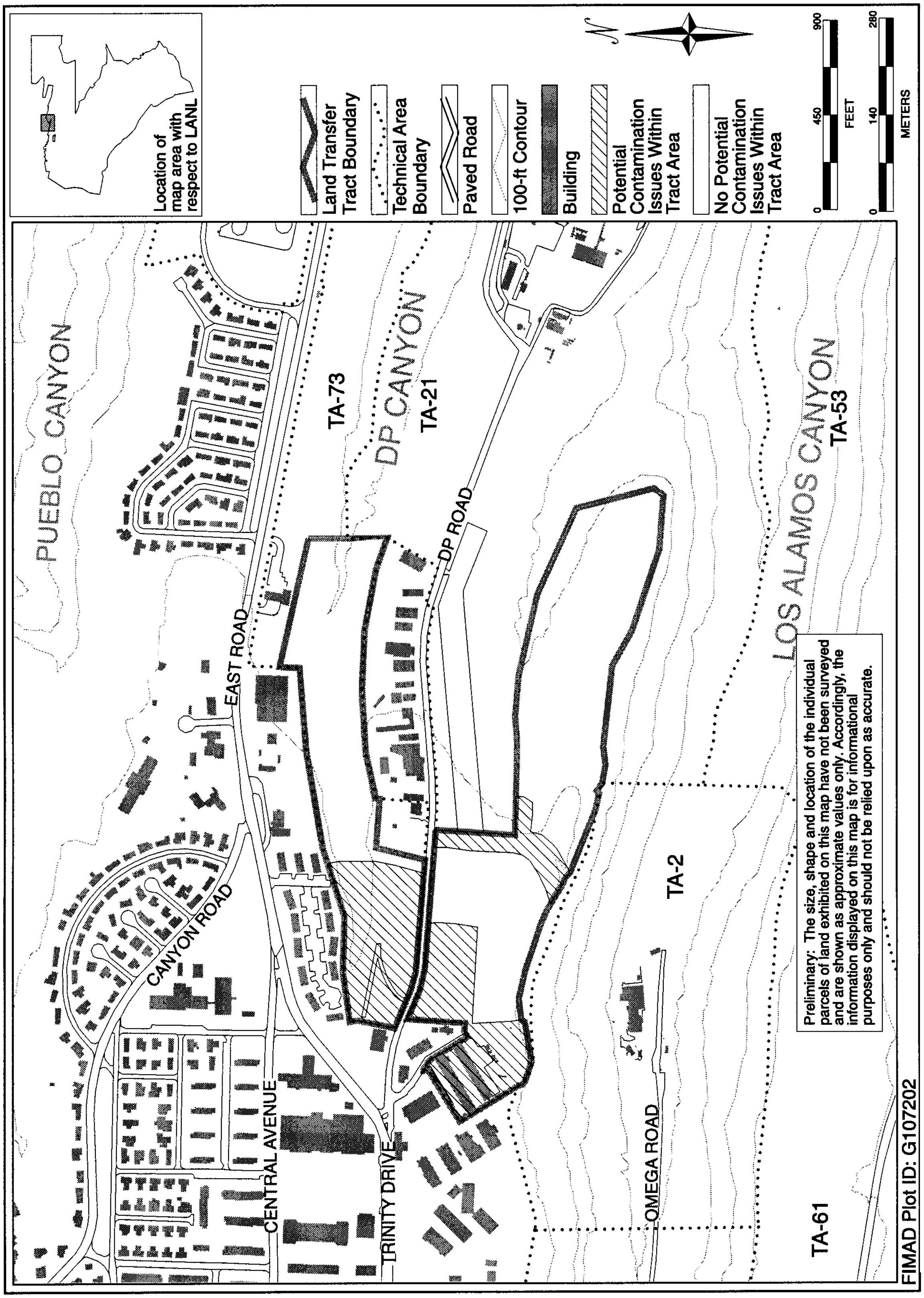

Figure 9.1.1.1-1. DP Road Tract Potential Contamination Issue Areas.

9.0 DP ROAD TRACT

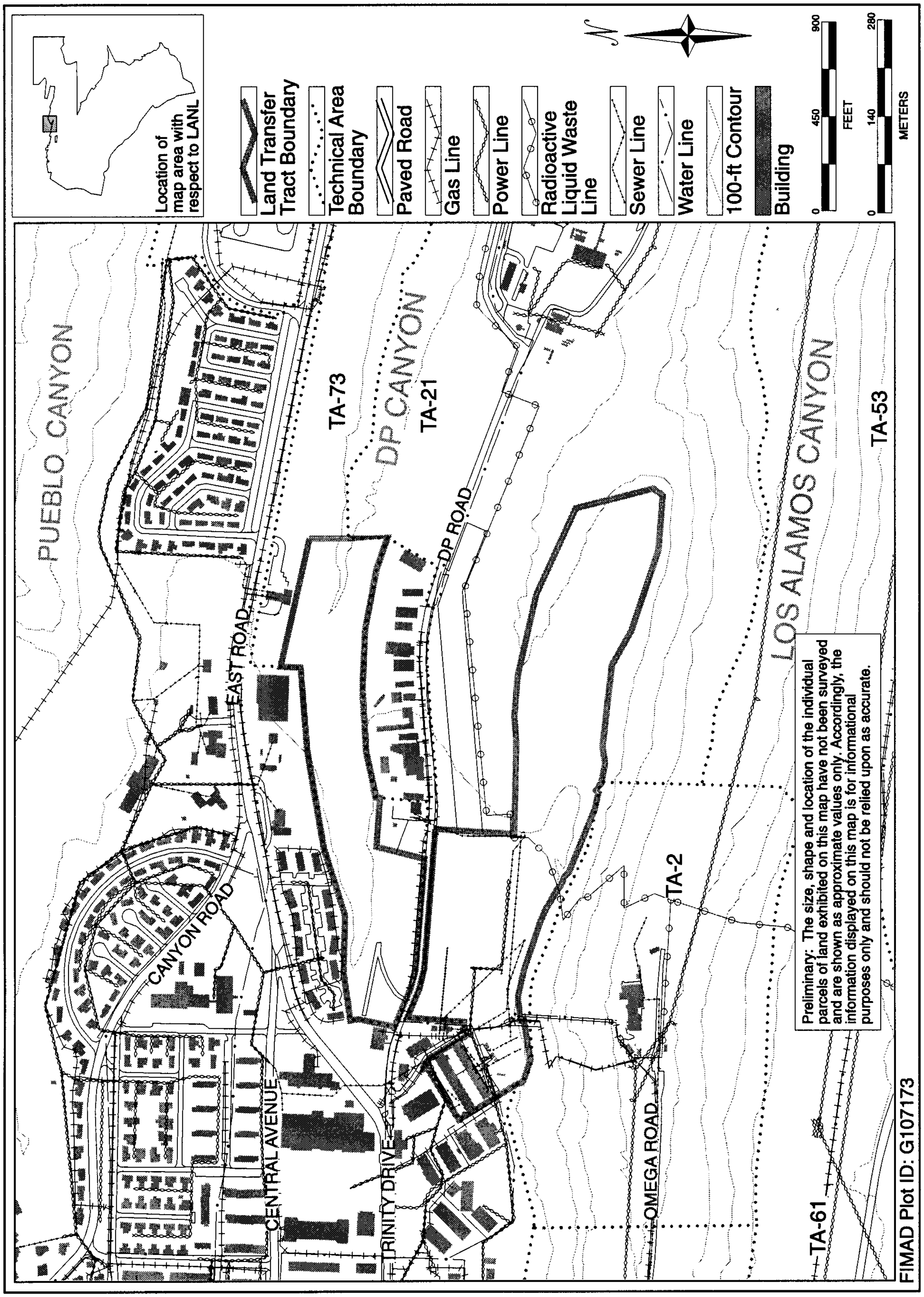

Figure 9.1.3-1. DP Road Tract Utilities and Infrastructures.

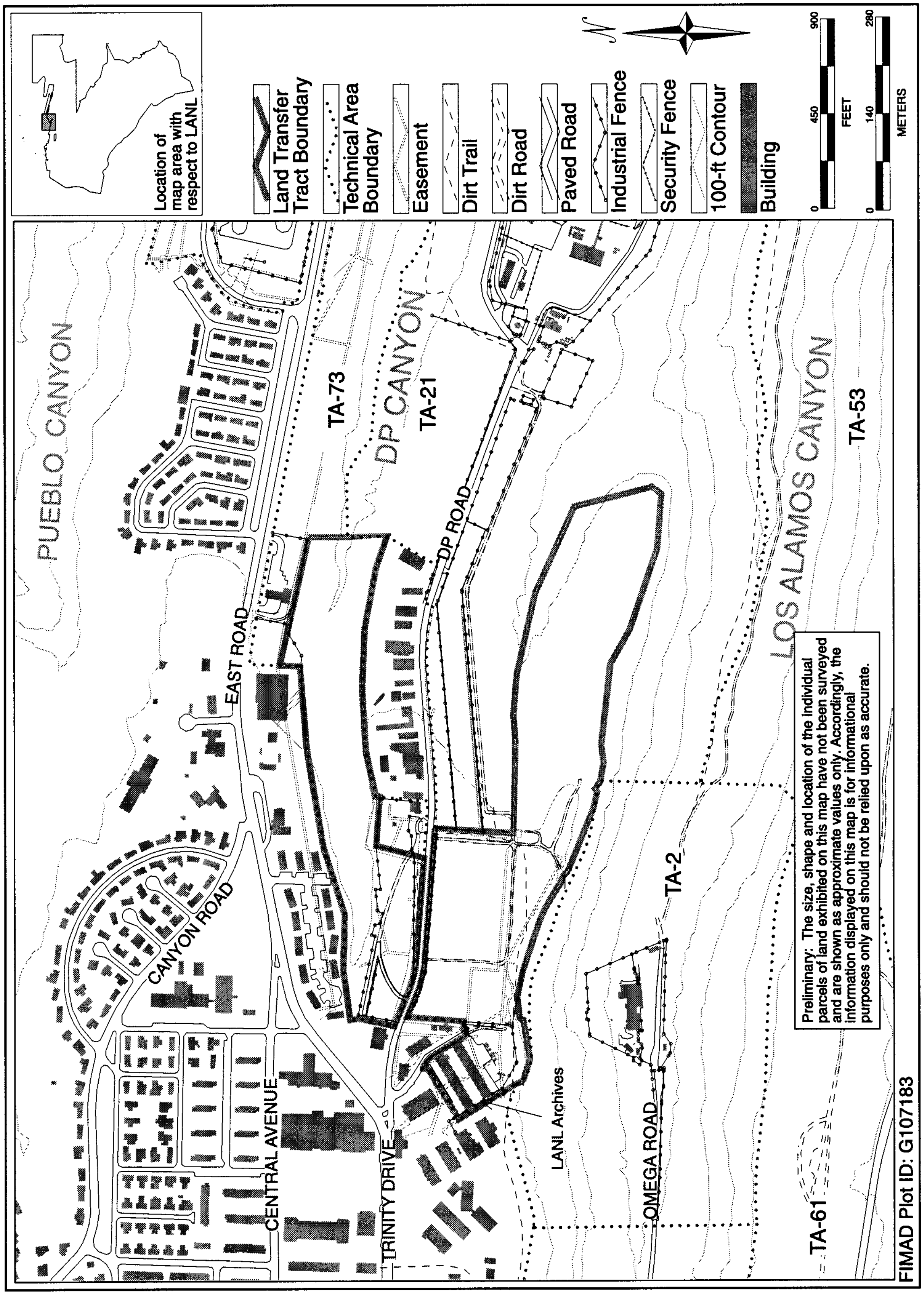

Figure 9.1.3-2. DP Road Tract Industrial and Security Fence Lines.

waste (RLW) line traverses the southern leg of the tract. The RLW line currently is scheduled to be cleaned and plugged. This tract is not metered separately for any utilities, and no figures for current utility usage are available.

9.1.4 Noise

Ambient noise levels for the DP Road Tract are affected primarily by vehicles using DP Road and Trinity Drive. The intersection of these two roads is congested at times, as an estimated 10,000 to 11,000 vehicles per day travel along Trinity Drive at this point. There are light industrial and commercial activities along the road, but the contribution of these activities is minor compared to noise from traffic.

Noise measurements have been taken for the DP Road Tract as part of a biological assessment of the impacts of land disposal and use upon threatened and endangered species (the Mexican spotted owl). All measurements were done in the C-weighted decibel (dBC) scale, because this scale better represents sounds heard by animals than the A-weighted decibel (dBA) scale does. Background noise was determined to average 66 dBC (48 dBA) (DOE 1997a, page 24).

9.1.5 Visual Resources

The DP Road Tract includes areas that are covered with vegetation as well as some areas with development (primarily along DP Road). The land is forested but fairly common in terms of visual character. Views to the site are primarily from DP Road, TA 2, and developed areas south of East Road located to the north of the tract. There are views of mountains looking east and west on DP Road. There are some views from the edge of the mesas into adjacent canyons, although these views often are obstructed by vegetation. This tract was analyzed by assigning two rating units to the tract based roughly on the areas with manmade modifications or lack of modifications within the tract. Rating Unit 1 includes the area adjacent to the DP Road and the area referred to as “West” where the archives are located. Rating Unit 2 includes the areas referred to as “North” and “South” but is exclusive of the area directly adjacent to the road.

After scenic quality, distance zone, and sensitivity components were combined using the Inventory Class Matrix, it was determined that the areas in Rating Unit 1 of the tract fall into Scenic Class III, and the areas in Rating Unit 2 fall into Scenic Class IV. These classes represent moderate and low public value for the visual resources, respectively.

9.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer. This tract is primarily used to house the LANL archives. There is little other ongoing development on the land and little or no employment associated with activities on this tract.

9.1.7 Ecological Resources

Vegetation present on the DP Road Tract is primarily ponderosa pine forest and pinyon-juniper woodland, both containing open shrub, grassland, and wildflower areas. Most of the tract has been disturbed by previous industrial activities, and at one time it contained a trailer park and a playground. Flora and fauna are characteristic of the region. At least 30 mammal species, including 15 bat species, 80 bird species, 7 reptile and amphibian species, and 154 plant species are present in the vicinity of the tract. Several large game animals, including elk, mule deer, and black bear, use the area. There is no identified floodplain within the DP Road Tract. Adjacent Los Alamos Canyon is a perennial water source, flowing a few cubic feet per second during most of the year, that supports stretches of riverine and palustrine wetlands. The tract contains suitable habitat for the American peregrine falcon, bald eagle, and Mexican spotted owl. Mexican spotted owl and American peregrine falcon areas of environmental interest (AEIs) are present within the land tract. Noise in the vicinity of the DP Road Tract results from road traffic on East Road, Trinity Drive, and DP Road and from business operations conducted in the area. DP Road is lit at night by security lighting and by commercial lighting from adjacent developed areas.

Biological assessments have been prepared for four other projects within or adjacent to the tract area. Determinations for these projects were a “may affect, but not likely to adversely affect species of Federal protection or concern.” Additionally, a biological assessment was prepared for a land lease in upper Los Alamos Canyon. The determination for that project also was “may affect, but not likely to adversely affect federally protected species.” The U.S. Fish and Wildlife Service (USFWS) concurred with each determination of effect based upon the specific proposals for site uses and mitigations considered for implementation.

9.1.8 Cultural Resources

The DP Road Tract was used from the Coalition period through the Nuclear Energy period. Prior to DOE use, this tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on LANL and privately held lands.

One hundred percent of the DP Road Tract has been inventoried for historic and prehistoric cultural resources. One National Register of Historic Places (NRHP)-eligible prehistoric site has been recorded within the tract. Historic resources include two Cold War era structures that have been evaluated as potentially NRHP eligible. There is a potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials.

There are no known traditional cultural properties (TCPs) located within the DP Road Tract. Consultations to identify TCP resources have not been conducted. TCPs would not be anticipated on developed portions of the tract.

Additional information on the cultural resources of the DP Road Tract is presented in Appendix E of this CT EIS.

9.1.9 Geology and Soils

The boundaries of the DP Road Tract include areas too steep for development, and the majority of the developable portions of the tract have been disturbed previously by various surface activities (DOE 1999c). Although the tract is heavily developed, it is typified by the Pogna fine sandy loam soil type and steep rock outcrops along the canyon rim. Outcrops are the upper member of the Bandelier Tuff (Tshirege), typical of the Pajarito Plateau. No major surface faulting is evident at the tract, but fracturing along the canyon edge is common in the area. Existing structures are vulnerable to greater than magnitude 7 seismic events (as registered on the Richter scale), and given the sparse vegetation and heavy development, wildfire episodes may have little impact on any increased soil erosion.

9.1.10 Water Resources

The tract is located on the mesa top above Los Alamos Canyon, which is ephemeral drainage in this vicinity. One arm of the tract is in the head of DP Canyon, another ephemeral drainage. DP Canyon receives stormwater runoff from the Los Alamos townsite via a storm drain at the head of the canyon. There are no known springs or wetlands within the tract. There are no

National Pollutant Discharge Elimination System (NPDES)-permitted outfalls within the tract. There are no regional aquifer groundwater test or supply wells within the tract or within a distance of 0.5 mile (0.8 kilometer).

There are no stream gages or established surface water or groundwater monitoring stations located within the DP Road Tract. The closest environmental monitoring locations maintained by the LANL Environmental Surveillance and Compliance Program are for surface water and shallow groundwater in Los Alamos Canyon and for intermediate perched groundwater downstream in DP Canyon and do not pertain to water quality or quantity associated with this tract.

The DP Road Tract does not lie within the 100-year or 500-year floodplains as modeled by LANL for Los Alamos and DP Canyons.

9.1.11 Air Resources

Air quality at the DP Road Tract is primarily affected by LANL operations at TA 21 east of the tract and at the Los Alamos Neutron Science Center (LANSCE) facility on the mesa immediately to the south. Pollutant contributions also arise from vehicles using DP Road and Trinity Drive, commercial activities along DP Road, and the commercial and residential activities of the Los Alamos townsite.

The DP Road Tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Except for small amounts of carbon monoxide and ozone resulting from hydrocarbons emitted from motor vehicles, there are no sources of criteria pollutants within the tract itself.

Concentrations of chemicals at the tract are the result of other nearby activities. Commercial activities at the DP Road Tract result in minor emissions of hazardous and other chemical pollutants. Analysis shows that about 130 different chemicals have been or are being used at TA 21, and about 90 at LANSCE. (The tract also abuts the TA 2 Omega West reactor, on the floor of Los Alamos Canyon; but there are no emissions of chemical air pollutants from this "mothballed" facility.) For chemical emissions from activities at both of these technical areas, however, short-term exposures resulting from inhalation of chemical air pollutants at points along the current boundaries of the technical areas were all estimated to be less than health-based standards, and there are no anticipated adverse health effects. Likewise, long-term exposures (for sensitive receptors in Los Alamos and nearby areas) also were estimated to be less than health-based standards (DOE 1999c, Chapter 5).

Analyses for doses from radioactive air pollutants indicate that air concentrations at the DP Road Tract would deliver a dose of approximately 1.5 millirem per year to people residing there year-round, or about 15 percent of the EPA standard (DOE 1999c, Chapter 5). There are no emissions of radioactive air pollutants from activities at the tract itself.

9.1.11.1 Global Climate Change

With the exception of two buildings (where LANL archives are stored and JCINNM employees work), there are no structures or operations within the boundaries of the DP Road Tract. Thus, water and space heating and use of government vehicles comprise the only sources of greenhouse gas emissions on the tract. Carbon dioxide emissions are estimated to be less than 400 tons (363 metric tons) per year.

9.1.12 Human Health

9.1.12.1 The Radiological Environment for the DP Road Tract

This tract is farther than the LANL offsite maximally exposed individual (MEI) is from

LANSCE and is in a more westerly direction from it. As a result, radiological doses are lower at this tract than for the MEI. The LANL SWEIS projects doses to the MEI of 3.1 millirem at the Small Business Center Annex (on East Gate Drive), and approximately 1.5 millirem at the DP Road Tract (DOE 1999c, Chapter 5). The DP Road Tract lies near one of LANL's one-half mile radiation site evaluation circles (See Figure 9.1.12.1-1) due to activities at TA 21's neighboring Tritium Systems Test Assembly (TSTA) and Tritium Science and Fabrication Facility. The radiation site evaluation circles were included in LANL's 1990 Site Development Plan (LANL 1990). These circles were intended to be used as planning tools for site developers and other project managers responsible for siting new facilities or operations to inform them of the presence of existing radiation sources and the need to evaluate their proposed action(s) against this information. The circles are not representative of a particular dose of radiation to the DP Road Tract under either normal or accident conditions, and are noted herein for the purposes of disclosure with regard to the nearest radiation source location relative to the tract. The quantities of radioactive material and other sources of radiation identified by these radiation evaluation circles were evaluated in the 1999 LANL SWEIS, as previously discussed.

Background radiation doses would remain the same as for the Los Alamos townsite. There are no radiological sources present on this tract. Not all of the potential contamination areas have been fully characterized.

9.1.12.2 The Nonradiological Environment for the DP Road Tract

Exposures to nonradiological contaminants via the airborne pathway in the LANL vicinity have already been shown not to be significant for the affected environment (DOE 1999c). No nonradiological emission sources exist on this tract other than those associated with building infrastructure and mobile sources due to vehicular traffic. Nonradiological PRSs present on this tract have been cleaned up, and no further action (NFA) reports have been submitted to the New Mexico Environment Department (NMED) for approval with the intent to remove the PRSs from the *Resource Conservation and Recovery Act* (RCRA) permit.

Two of the three types of natural disasters postulated in the LANL SWEIS could occur on this land (seismic event and wildfire). However, no known hazardous materials are present on this tract that could pose a risk during a natural disaster.

9.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached the DP Road Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the SWEIS, as discussed in Chapter 4, Section 4.1.12. Using data from the LANL SWEIS, doses to the MEI at the DP Road Tract have been estimated for each of these, as shown in Table 9.1.12.3-1.

Because there are no residents and no public workers at the tract, the estimated tract

9.0 DP ROAD TRACT

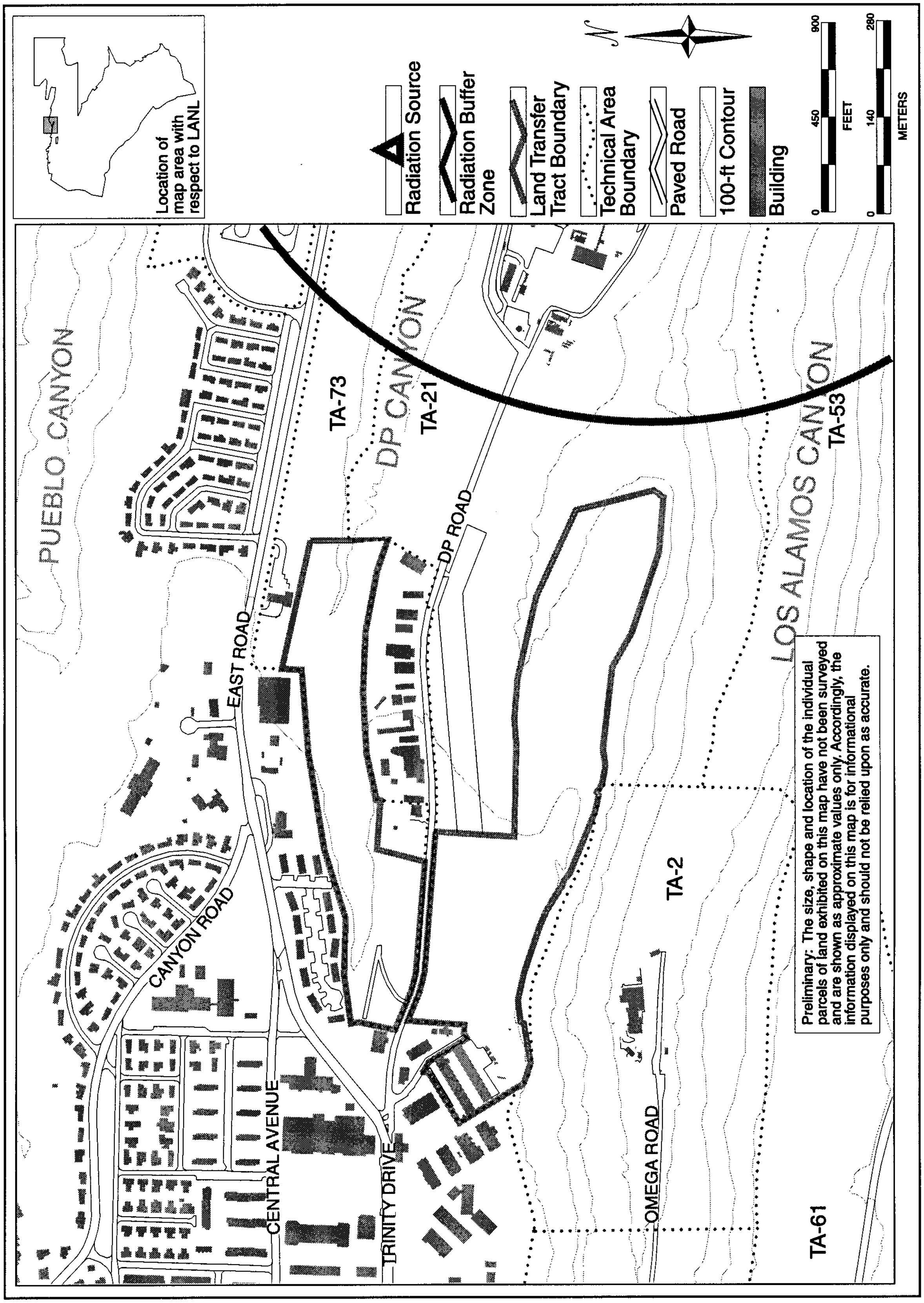

Figure 9.1.12.1-1. DP Road Tract Radiation Site Evaluation Circle.

Table 9.1.12.3-1. MEI Doses at the DP Road Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-2}	55	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	21,000	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	42	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	5	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	260	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	70	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	44	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	10,000	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	62	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	80	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	1,400	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	4	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; CMR = Chemistry and Metallurgy Research; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe earthquake (accident SITE-03B) has an estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The postulated earthquake would release chemicals from a number of facilities, including formaldehyde from the Health Research Laboratory (Building 43-01)and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed above, earthquakes would have no estimated chemical consequences at the DP Road Tract. The most severe postulated earthquake would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of approximately 60 Roentgen equivalent man (rem) at the tract.

The postulated site wildfire would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the postulated earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at DP Road Tract is estimated to be less than 0.1 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Because there are no residents and no public workers at the tract, the estimated tract collective dose and estimated excess LCF are both zero for all five natural event accident scenarios.

9.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

9.2 No Action Alternative

9.2.1 Land Use

Under the No Action Alternative, there would be no changes in land use within the DP Road Tract. No additional construction or abandonment of roads or utilities are planned within the tract; the undeveloped portions of the tract would remain so. Similarly, there would no anticipated change to access to or within the site.

9.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the DP Road Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 9.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report (DOE 1999b).

This information indicates that PRS cleanup is likely to include four removal actions and in situ containment for two former disposal areas. An undetermined number of structures could be razed, and contaminated sediments would likely need to be removed from both canyon systems. Cleanup of PRSs may require about 7 years for the longest cleanup segment. (Multiple sites can be restored simultaneously, so cleanup duration is determined by the site that requires the most time.) The 10 DOE structures (including the two buildings) are assumed to remain intact. Waste volumes are projected to range up to about 2,970 cubic yards (2,260 cubic meters). Cost estimates for remedial action at this parcel range from about $26,986,000 to $29,070,000. These estimates are based on the information currently available for each PRS or structure, and are subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual "cleanup." Although different cleanup approaches have been identified, it is possible that the administrative authority could require additional actions, resulting in greater waste volumes, a longer cleanup duration, and greater costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

9.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on DP Road near the tract. It is expected that the future operational performance of DP Road and Trinity Drive would remain similar to that of the existing performance.

9.2.3 Infrastructure

The No Action Alternative would not result in any substantial changes in the infrastructure or utilities of this tract. The LANL archives would continue to occupy the building in which it is currently located, and JCINNM would continue to use the other building. No appreciable change in utility usage is expected.

9.2.4 Noise

In the No Action Alternative, the DP Road Tract would continue in an undeveloped state. Ambient noises remain the same as today, determined by the amount of traffic on DP Road. Background noise levels would be expected to continue at about 50 dBA.

9.2.5 Visual Resources

It is expected that the visual resources of the tract would remain unchanged under the No Action Alternative.

9.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

9.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at the DP Road Tract, as described in Section 9.1.1. Therefore, no impact to ecological resources are projected under the No Action Alternative.

9.2.8 Cultural Resources

Under the No Action Alternative, the DP Road Tract would remain the responsibility of the DOE, and the treatment of any cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. The use of potentially eligible buildings would continue, and these structures would not be demolished. Planned assessment of these structures would continue, and information would be available to the DOE to ensure stewardship of these resources. Other positive impacts of the No Action Alternative would be the passive preservation of resources due to lack of development. Ongoing negative impacts from natural processes (such as erosion, fire, seismic events, and aging of buildings) on the physical integrity of cultural resources would continue.

9.2.9 Geology and Soils

Under the No Action Alternative, there would be no changes in land use within the DP Road Tract as currently described. No additional construction or abandonment of roads or utilities are planned within the tract; the undeveloped portions of the tract would remain so.

9.2.10 Water Resources

Continuation of the current use of this tract by the DOE would be anticipated under this alternative. Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

9.2.11 Air Resources

As currently is the case, there would be no emissions of hazardous or other chemical pollutants or radioactive air pollutants from activities at the tract. Accordingly, air quality at the DP Road Tract would be affected primarily by LANL operations at TA 21 to the east and at the LANSCE on the mesa immediately to the south. Pollutant contributions also would arise from vehicles using DP Road and Trinity Drive, commercial activities along DP Road, and commercial and residential activities of the Los Alamos townsite.

The dominant source of criteria pollutants would continue to be traffic along Trinity Drive and DP Road. Analyses show that ambient air quality would remain within standards established by EPA and the State of New Mexico for criteria pollutants (DOE 1999c, Chapter 5).

Commercial activities at the DP Road Tract would result in no emissions of hazardous and other chemical pollutants, so concentrations of these chemicals at the tract would be the result of other activities. Data show that about 130 different chemicals have been or are being used at TA 21, and about 90 at the LANSCE. (The tract also abuts the TA 2 Omega West reactor, on the floor of Los Alamos Canyon, but there would be no emissions of chemical air pollutants from this idle facility.) For chemical emissions from activities at both of these technical areas, however, short-term exposures resulting from inhalation of chemical air pollutants at points along the current boundaries of the technical areas would be estimated to be less than health-based standards. Likewise, long-term exposures (for sensitive receptors in Los Alamos and nearby areas) also would be estimated to be less than health-based standards (DOE 1999c, Chapter 5).

Analyses for doses from radioactive air pollutants indicate that air concentrations at the DP Road Tract would deliver a dose of approximately 2.5 millirem per year to people residing there year-round, or about one-fourth of the EPA standard (DOE 1999c, Chapter 5). There would be no emissions of radioactive air pollutants from activities at the tract itself.

9.2.11.1 Global Climate Change

There would be no changes in land use under the No Action Alternative, and the two facilities and associated use of government vehicles would remain the only sources of greenhouse gases. Emissions estimates would remain at today's levels of less than 400 tons (363 metric tons) of carbon dioxide annually.

9.2.12 Human Health

There would be no identifiable human health consequences of the No Action Alternative for the DP Road Tract. No changes in cancer risk should be expected for this alternative. Radiation doses received at this tract would be estimated to increase from approximately 1.5 millirem (today's levels) to approximately 2.5 millirem per year (DOE 1999c, Chapter 5). No significant nonradiological increases in exposures would be expected. It is presumed that visitors would have adequate time to evacuate the premises for wildfires. Because warnings are usually not given for seismic events, the human health impacts due to seismic events would likely be greater than the other two natural disasters. The primary type of human health risk for natural disasters would be physical injury from building debris. No changes in cancer risk should be expected for this alternative.

9.2.12.1 Chemical Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time the air plume reached the DP Road Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

9.2.12.2 Radiological Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. The MEI doses would be greater than 500 millirem for 3 of 13 scenarios postulated in the LANL SWEIS. The estimated tract collective dose and estimated excess LCF would both be zero.

9.2.12.3 Natural Event Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be less than 0.1 rem; the maximum dose from the most severe earthquake would be approximately 60 rem. Because there would be no residents and no public workers at the tract, the estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

9.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations that would continue under the No Action Alternative would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents at LANL would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

9.3 Proposed Action Alternative

9.3.1 Land Use

Direct consequences of the disposition of this tract would include the potential relocation of LANL archives and records currently being stored in one structure and the relocation of the site's environmental media monitoring stations to LANL land. It is likely that the record center buildings would remain on this tract (for example, through a lease-back arrangement). However, if the archives have to be relocated, they could be moved to existing buildings on other parts of LANL property, to other buildings leased from the County or private landowners, or a new storage building could be constructed. Any decision regarding construction of new facilities would be preceded by appropriate NEPA review. The direct consequences of the potential relocation of the archives, associated employees, and the monitoring station are minor and bounded by the indirect consequences. Therefore, the potential direct consequences of the transfer of ownership of the tract will not be discussed for each resource area other than those associated with potential loss of Federal protection of cultural and ecological resources (see Sections 9.3.7 and 9.3.8, respectively).

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections.

9.3.1.1 Description of Contemplated Uses

The following paragraphs provide a description of the contemplated land uses. Land uses identified for the DP Road Tract include industrial and commercial development (see Figure 9.3.1.1-1) or commercial and residential development (see Figure 9.3.1.1-2).

Industrial and Commercial Development Land Use Scenario

Under the industrial and commercial development land use scenario, approximately 21 acres (9 hectares) of level acreage would be developed for heavy commercial and industrial land use. The remaining approximately 5 acres (2 hectares) of level area would be developed for commercial office space.

Commercial and Residential Development Land Use Scenario

Another possible scenario would include some of the above uses and the development of area at the tract as a trailer park for residential use. No specific proposal for reuse of the existing LANL archive buildings is identified. The area could be used for commercial and industrial warehouses, offices, and administrative purposes, or the buildings could be razed (Figure 9.3.1.1-2). Table 9.3.1.1-1 and Table 9.3.1.1-2 summarize the attributes of the contemplated land uses for the DP Road Tract.

Table 9.3.1.1-1. Attributes of Future Land Use for the DP Road Tract Under the Industrial and Commercial Land Use Scenario

INDUSTRIAL AND COMMERCIAL DEVELOPMENT
• Approximately 21 acres (9 hectares) would be developed for heavy commercial and industrial land use. • Approximately 5 acres (2 hectares) would be developed for office space. • Remaining 24 acres (10 hectares) are too steep to be developed. • When fully developed, land would be occupied by 40 new businesses with 900 total employees and 24 vehicles.

Table 9.3.1.1-2. Attributes of Future Land Use for the DP Road Tract Under the Commercial and Residential Land Use Scenario

COMMERCIAL AND RESIDENTIAL DEVELOPMENT
• Approximately 20 acres (8 hectares) would be developed as a trailer park (mobile homes). • Approximately 6 acres (2 hectares) would be developed for office space. • Remaining 24 acres (10 hectares) are too steep to be developed. • When fully developed, the trailer park would be home to 160 mobile homes, 400 new residents, and 330 personal vehicles. • When fully developed, the tract would be occupied by 10 new businesses with 225 total employees.

9.0 DP ROAD TRACT

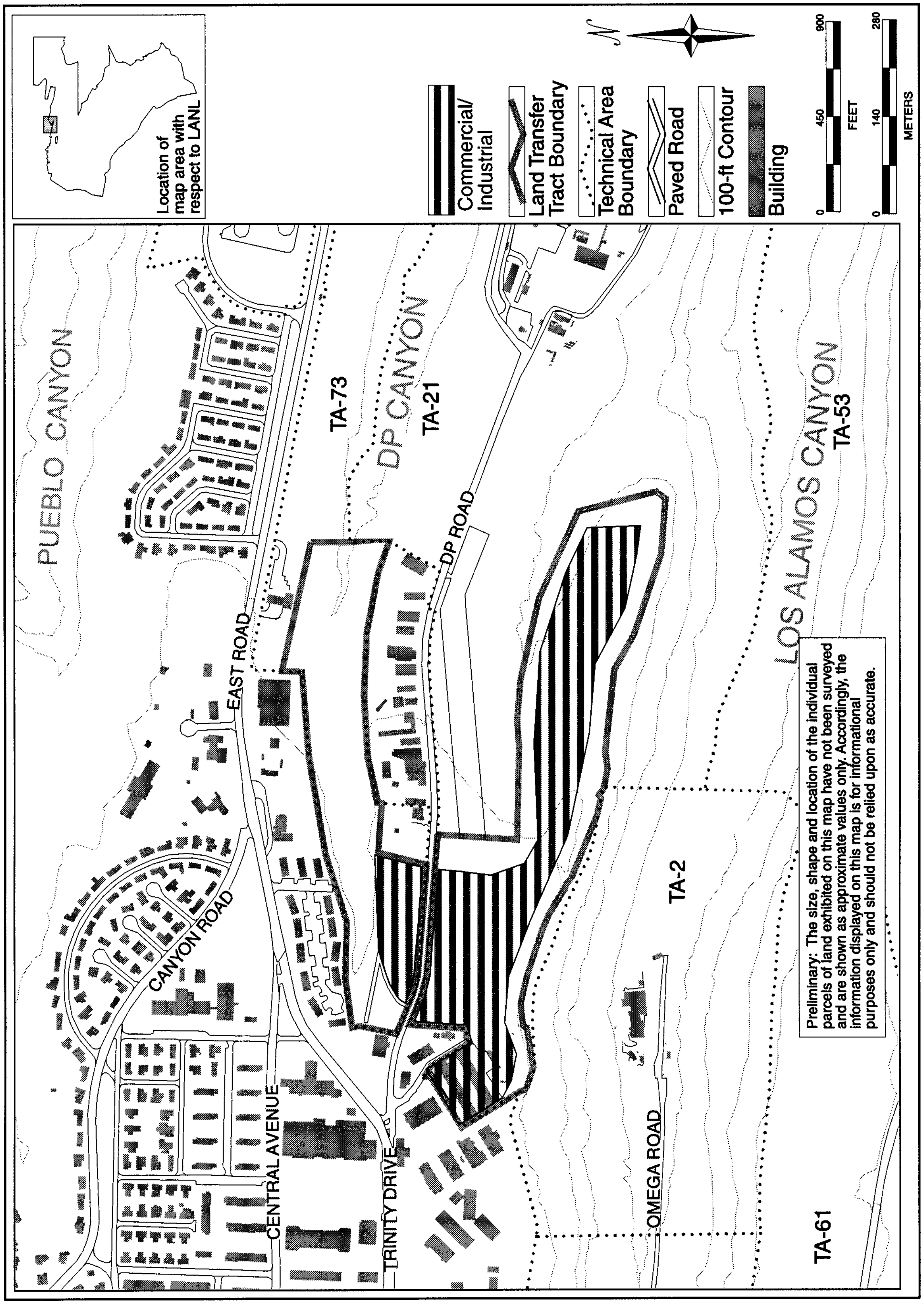

Figure 9.3.1.1-1. DP Road Tract Industrial and Commercial Land Use.

9.0 DP ROAD TRACT

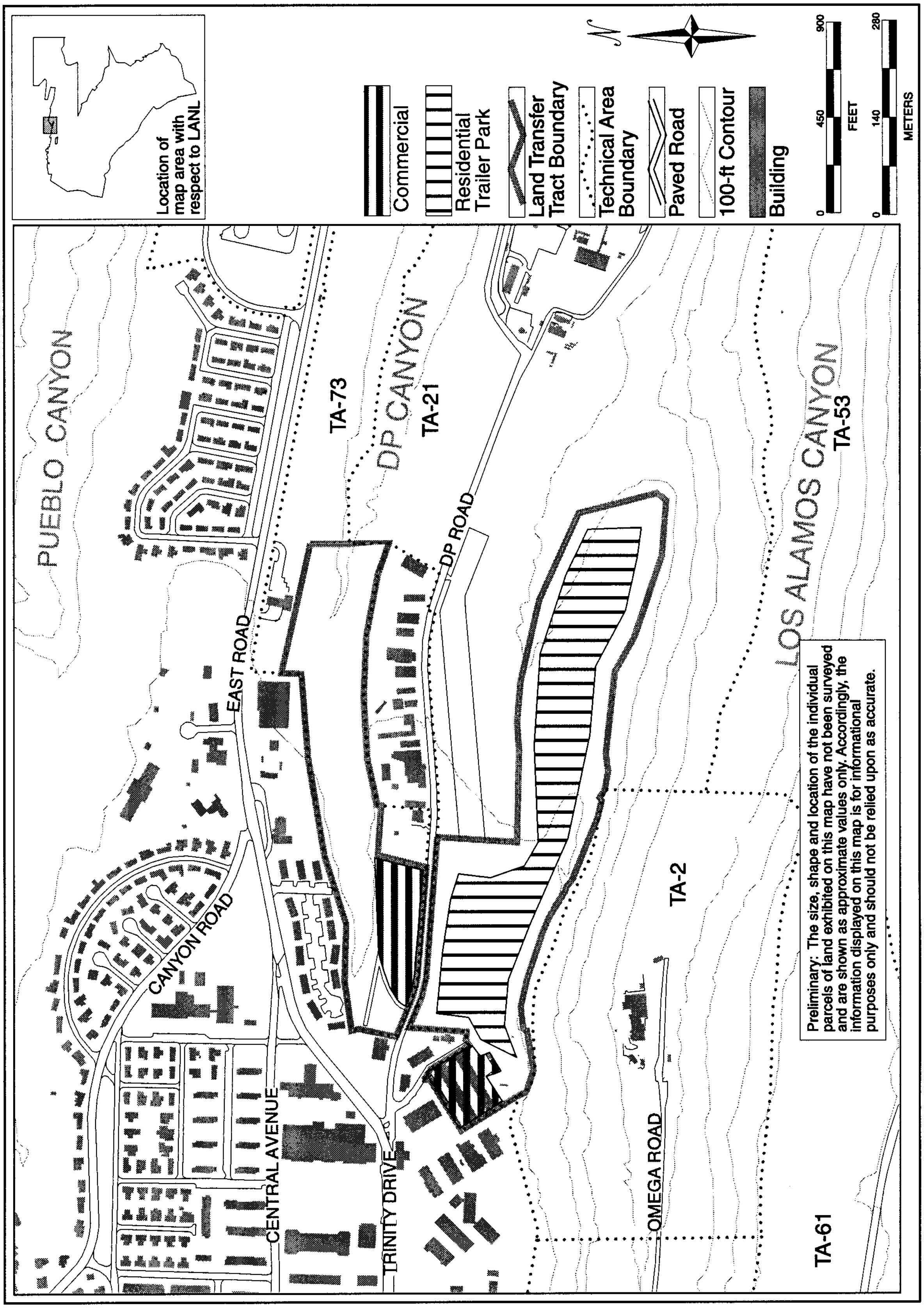

Figure 9.3.1.1-2. DP Road Tract Commercial and Residential Land Use.

9.3.1.2 Environmental Consequences of the Contemplated Uses

Development locations at the tract are limited by topography. Land use on the relatively level portions of the tract would change from previously disturbed, but mostly undeveloped, buffer land. The anticipated change in land use, as described for the industrial and commercial or the commercial and residential development scenarios, would be compatible with both existing and adjacent land use.

9.3.1.3 Environmental Restoration

No additional restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer. Restoration may occur under an accelerated schedule.

9.3.2 Transportation

9.3.2.1 Environmental Consequences of the Contemplated Uses

Industrial and Commercial Development Land Use Scenario

The industrial and commercial development land use scenario anticipates development of additional office and industrial facilities along DP Road. The Institute of Transportation Engineers (ITE) land use codes used to estimate the trips generated by these proposed developments were 130, industrial park and 750, office park. These ITE land use codes allow estimation of the trips generated by these facilities based on the number of acres proposed for each land use type.

Table 9.3.2.1-1 shows the number of trips the ITE Trip Generation Manual (ITE 1997) estimates would be generated by this development.

As shown in Table 9.3.2.1-1, the proposed industrial and commercial development could add an additional 296 entering trips to DP Road and Trinity Drive in the weekday morning peak hour and add an additional 295 exiting trips in the weekday evening peak hour. This combination of land uses may also add 2,312 trips on Trinity Drive and East Road.

Commercial and Residential Development Land Use Scenario

The commercial and residential development land use scenario anticipates establishment of a trailer park similar to the one that previously occupied a portion of the DP Road Tract. A trailer density of 8 per acre with a total of 160 units is assumed. The commercial development use is anticipated to be an office park of 5 acres (2 hectares). The ITE land use codes used to estimate the trips generated by these proposed developments were 240 and 750, respectively.

As shown in the table, the commercial and residential development could add 155 entering trips to DP Road and Trinity Drive in the weekday morning peak hour and an additional 178 exiting trips in the weekday evening peak hour. This combination of land uses also may result in an additional 1,941 trips on Trinity Drive and East Road.

Adding these trips to those already on the transportation network would result in approximately 12,700 and 12,300 trips on Trinity Drive and East Road for the industrial and commercial, and the commercial and residential land use scenarios, respectively. The LOS for the two-lane section of Trinity Drive and East Road is LOS E in the year 2018 for both of these combinations of land uses. This LOS represents the maximum capacity of the road and is the operating condition just prior to traffic jam conditions. It is likely that the DP Road-Trinity Drive intersection would not be adequate in its current configuration, and reconstruction of

Table 9.3.2.1-1. Estimated Increase in Traffic for the Contemplated Land Use for the DP Road Tract

Land Use	ITE Land Use Code	24 Hour Two-Way Volume	Morning Peak Hour Trips		Evening Peak Hour Trips		Saturday Peak Hour Trips	
			Enter	Exit	Enter	Exit	Enter	Exit
ITE ESTIMATED TRAFFIC VOLUMES FOR INDUSTRIAL AND COMMERCIAL DEVELOPMENT SCENARIO								
Industrial – 21 acres (9 hectares)	130	1,311	175	36	46	172	31	66
Office – 5 acres (2 hectares)	750	1,001	121	11	22	123	9	3
Total		2,312	296	47	68	295	40	69
ITE ESTIMATED TRAFFIC VOLUMES FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENT SCENARIO								
Residential – 20 acres (8 hectares)	240	770	13	51	56	34	46	40
Office – 6 acres (2 hectares)	750	1,171	142	12	25	144	11	3
Total		1,941	155	63	81	178	57	43

this intersection would be necessary, possibly including the addition of a traffic signal.

9.3.3 Infrastructure

9.3.3.1 Environmental Consequences of the Contemplated Uses

Industrial and Commercial Development Land Use Scenario

The indirect environmental impacts with regard to utilities and infrastructure resulting from this alternative would fall into two categories: (1) increased utility usage and (2) ground disturbance resulting from construction of new facilities. The utility usage would increase as shown in Table 9.3.3.1-1. It is not anticipated that these increases would exceed the capacity of any utility in the region. Installation of new utility facilities and upgrades to existing ones would require creation of trenches and access and maintenance roads. The construction of roads, parking areas, and buildings, and extension of utility lines would cause soil disturbance. Refer to Section 9.3.9 of this chapter for detail on impacts resulting from ground disturbance from new construction.

Commercial and Residential Development Land Use Scenario

The indirect environmental impacts with regard to utilities and infrastructure resulting from this alternative would fall into two

Table 9.3.3.1-1. Estimated Increase in Utility Usage for the Industrial and Commercial Land Use Scenario on the DP Road Tract

	PEAK POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (BAYO) mgy (mly)	MSW tpy (mty)
Estimated annual increase	0.4	2.3	22 (623)	20 (76)	9 (34)	44 (40)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	135 (511)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, tpy = tons per year, msw = municipal solid waste, mty = metric tons per year

categories: (1) increased utility usage and (2) ground disturbance resulting from construction of new facilities. The utility usage would increase as shown in Table 9.3.3.1-2. It is not anticipated that these increases would exceed the capacity of any utility in the region.

Installation of new utility facilities and upgrades to existing ones would require creation of trenches and access/maintenance roads. The construction of roads, parking areas and buildings, and extension of utility lines would cause soil disturbance. Refer to Section 9.3.9 for detail on impacts resulting from ground disturbance from new construction.

9.3.4 Noise

9.3.4.1 Environmental Consequences of the Contemplated Uses

Industrial and Commercial Development Land Use Scenario

This development is estimated to result in an increase of as many as 900 new direct jobs (DOE 1997a, page 1), which would increase traffic flow. Maximum noise from traffic would not be expected to increase significantly, but traffic noises would likely be present for a greater portion of the day as the new employees arrive at work, exit and return from lunch, perform daily errands, and return home in the afternoon.

Construction of the new commercial and industrial facilities would, however, increase ambient noise levels along DP Road. Construction of new facilities would entail ground clearing, excavation, laying of foundations, erection, and finishing work. The use of heavy equipment such as front-end loaders, concrete mixers, and jackhammers would produce noise levels ranging from 74 to 95 dBA at a distance of 50 feet (15 meters) from the construction site. (DOE 1997a, page 36).

Commercial and Residential Development Land Use Scenario

Commercial and residential development would represent no appreciable difference in ambient noise levels. As a temporary activity, construction would be expected to increase noise levels from 74 to 95 dBA at a distance of 50 feet (15 meters) from the construction site. This noise would be present for longer times during the day because more vehicles would be using DP Road. Once development construction activities have been completed, however, ambient noise levels should return to about 50 dBA.

Table 9.3.3.1-2. Estimated Increase in Utility Usage for the Commercial and Residential Land Use Scenario on the DP Road Tract

	PEAK POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (BAYO) mgy (mly)	MSW tpy (mty)
Estimated annual increase	0.3	1.6	26 (736)	21 (79)	10 (38)	155 (140)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	135 (511)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, tpy = tons per year, msw = municipal solid waste, mty = metric tons per year

9.3.5 Visual Resources

9.3.5.1 Environmental Consequences of the Contemplated Uses

Contemplated uses include industrial and commercial uses or commercial and residential uses. These uses would result in similar impacts. The current moderate public value for the Scenic Class III visual resources and low public value for the Scenic Class IV visual resources would be maintained or improved through planned development. No major impacts to the current visual resources would be anticipated.

9.3.6 Socioeconomics

9.3.6.1 Environmental Consequences of the Contemplated Uses

Industrial and Commercial Development Land Use Scenario

The use of this tract for industrial and commercial uses would generate additional employment in the ROI, which would increase ROI income. There would be minor temporary increases in employment resulting from construction of new facilities. This would, in turn, generate increases in regional income. These changes would be temporary, lasting only the duration of the construction period. Because the majority of the jobs would be filled by the existing ROI labor force, there would be no increase in ROI population or impact on housing demand or public services.

Once the new facilities were operational, there would be additional increases in ROI employment and income. Approximately 900 workers would be employed on the tract, and a total of 1,200 jobs would be generated in the ROI, which in turn would increase ROI income. Because these jobs would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

Commercial and Residential Development Land Use Scenario

Under this scenario, the impacts from construction would be similar to the industrial and commercial development scenario. However, fewer long-term jobs would be generated because there would be fewer businesses on the land. Approximately 225 workers would be employed on the tract, and a total of 370 jobs would be generated in the ROI, which in turn would increase ROI income. Because these jobs would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

9.3.7 Ecological Resources

Direct impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

9.3.7.1 Environmental Consequences of the Contemplated Uses

Industrial and Commercial Development Land Use Scenario

Approximately 26 acres (11 hectares) of ponderosa pine forest and pinyon-juniper woodland (both containing open shrub, grassland, and wildflower areas) would be lost under full buildout of commercial and residential or and industrial and commercial development. Highly mobile wildlife species or wildlife species with large home ranges (such as deer, elk, and birds) would be able to relocate to adjacent undeveloped areas. However, successful relocation may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development area. Species relocation may result in additional pressure to lands already at or near carrying capacity. The impacts could include overgrazing, stress, and overwintering mortality. For less-mobile species (reptiles, amphibians, and small mammals), direct mortality could occur during the actual construction event or ultimately result from habitat alteration. Acreage used for the development also would be lost as potential hunting habitat for raptors and other predators. In addition to the area to be disturbed, there would be a decrease in quality of the habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction. One little-addressed consequence of urban development is the influence of domestic animals upon wildlife populations. For example, free-roaming domestic cats may kill more than 100 animals each year. Studies have shown that approximately 60 percent of the wildlife cats kill are small mammals; 20 percent are birds (predation at bird feeders can be substantial; one Virginia study estimated 28 kills per urban cat per year); and 10 percent are amphibians, reptiles, and insects. Due to the presence of coyotes in the Los Alamos Canyon area, predation by cats would tend to be limited to within developed and closely adjacent natural areas (Goldsmith et al. 1991; Crooks 1997-98; and CSBC 1998). Free-ranging domestic dogs are known to harass and disrupt the activities of many wildlife species and are documented to have caused mortality in animals such as deer and foxes (Goldsmith et al. 1991). The loss of acreage due to development would result in a reduction of breeding and foraging habitat for wildlife currently utilizing the property.

There are three species that are Federal-listed as threatened or endangered that may potentially use the DP Road Tract: the bald eagle, American peregrine falcon, and Mexican spotted owl. With respect to the bald eagle, this area has a very low level of potential use for foraging. Development of this tract, which is within the AEI for both the American peregrine falcon and Mexican spotted owl, could alter foraging behavior of these species. Loss of the entire tract as foraging habitat would decrease the total available Mexican spotted owl, American peregrine falcon, and bald eagle foraging habitat by approximately 24 acres (10 hectares), or 0.9 percent of the available foraging habitat on DOE-LANL property. Mexican spotted owl habitat in the Los Alamos Canyon and Pueblo Canyon AEI and American peregrine falcon AEI habitat in Pueblo Canyon would be affected. For the

Mexican spotted owl, approximately 28 acres (11 hectares) of core habitat and 25 acres (10 hectares) of buffer habitat in the Los Alamos Canyon AEI and approximately 23 acres (9 hectares) of Pueblo Canyon AEI buffer habitat that overlaps the Los Alamos Canyon AEI could be affected. American peregrine falcon AEI core and buffer habitat, 7.5 and 17.0 acres (3 and 7 hectares), respectively, would be affected by the Proposed Action Alternative (PC 1999d). Because direct entry into the adjacent Los Alamos Canyon habitat is possible by descending a steep cliff face along an established trail, increased recreational use is expected to be occur. Recreational effects to the adjacent Los Alamos Canyon natural habitat are projected to occur especially if the residential use is pursued.

Recreational activities in or near Los Alamos Canyon wildlife habitat may cause some animals to alter their activity and feeding patterns, potentially resulting, for some species, in increased stress, decreased reproduction, or the temporary or permanent abandonment of the affected area.

The watershed management approach to natural resource management requires the integration of natural resource management plans across several land management agencies. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- and long-term natural resource management strategies for the Los Alamos Canyon watershed.

The LANL Threatened and Endangered Species Habitat Management Plan would no longer be in effect for this area—thereby potentially reducing the protection afforded threatened and endangered species and their potential habitat in this area.

Commercial and Residential Development Land Use Scenario

The commercial and residential development scenario would be similar in impacts to that of the industrial and commercial development use.

9.3.8 Cultural Resources

Direct impacts of the conveyance and transfer would result from the transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Eligible cultural resources are present in the DP Road Tract, and thus could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing them from future consideration under the *National Historic Preservation Act.*

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing them from consideration under the *Religious Freedom Restoration Act, American Indian Religious Freedom Act,* and Executive Order 13007, “Indian Sacred Sites.” Finally, the disposition of this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing these items from consideration under the *Native American Graves Protection and Repatriation Act*, or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following sections.

9.3.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts would be anticipated from the land uses contemplated for the DP Road Tract by the receiving parties. The two land uses identified for the DP Road Tract include (1) mixed industrial and commercial development and (2) commercial and residential development. This analysis reflects the broad, planning-level impacts anticipated from each contemplated use.

Industrial and Commercial Development Land Use Scenario

Cultural resources are present in the tract and adjacent areas that would be impacted by the contemplated land use scenario.

Industrial and commercial development would disturb any cultural resources present due to construction, grading, and trenching. These impacts would include the potential destruction of buildings, archaeological sites, and TCP locations. Resources avoided by construction may become isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. The development of land may cause changes to the presence or integrity of, or access to natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

Commercial and Residential Development Land Use Scenario

The commercial and residential development scenario is similar to the industrial and commercial development scenario in impacts but includes the development of a residential trailer park and additional impacts of access to cultural resources.

The introduction of additional full-time residents of the trailer park would increase access to cultural resources present nearby. Increased access could cause possible destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies.

9.3.9 Geology and Soils

9.3.9.1 Environmental Consequences of the Contemplated Uses

Impacts to geology and soils would consist of disturbing the soil to upgrade utilities and roadways for the new development and any removal of existing structures or constructing of new structures. Any existing or newly constructed structures would be vulnerable to greater than magnitude 7 seismic events and the stability of the canyon rim must be considered. As with the No Action Alternative, the sparse vegetation and heavy development of the tract would limit any impact on increased soil erosion due to wildfire.

9.3.10 Water Resources

9.3.10.1 Environmental Consequences of the Contemplated Uses

Both of the contemplated land uses for the DP Road Tract, a combination of industrial and commercial uses, or a combination of commercial and residential uses, would result in the same indirect consequences.

The contemplated land uses would not affect groundwater quality or quantity beneath the tract, but any associated increased water usage may contribute to the overall regional water level decline and possibly result in the degradation of water quality within the aquifer.

Development and construction may potentially affect surface water quality within and downstream of the tract. Surface water quality may be impacted if motor oil, gasoline, or other such contaminants wash from paved areas into the drainage during storm events. Also, runoff may have more erosive power if it is flowing across areas that have been denuded, thereby transporting more sediment into the drainage.

9.3.11 Air Resources

9.3.11.1 Environmental Consequences of the Contemplated Uses

Industrial and Commercial Development Land Use Scenario

One possibility is for the DP Road Tract to be developed both commercially (such as office buildings) and industrially. It is assumed, however, that there would be no substantial emissions of hazardous or other chemical pollutants or radioactive air pollutants from new activities at the tract. Accordingly, air quality at the DP Road Tract would continue to be primarily affected by offsite activities such as vehicle emissions and by LANL operations at TA 21 to the east of the tract and at the LANSCE facility on the mesa immediately to the south.

The dominant source of criteria pollutants would continue to be traffic along Trinity Drive and DP Road, which would increase under this development scenario. However, it is unlikely that these additions to regional activity would cause significant increases in ambient air concentrations of criteria pollutants. Ambient air quality should remain within standards established by EPA and the State of New Mexico for criteria pollutants.

Assuming that commercial and industrial activities at the DP Road Tract would result in no substantial emissions of hazardous and other chemical pollutants, then concentrations of these chemicals at the tract would be the result of other offsite activities. Data demonstrate that about 130 different chemicals have been or are being used at TA 21, and about 90 at the LANSCE. (The tract also abuts the TA 2 Omega West reactor, on the floor of Los Alamos Canyon, but there would be no emissions of chemical air pollutants from this idled facility.) Chemical emissions from activities at both of these technical areas, however, would result in short-term exposures from inhalation of chemical air pollutants at points along the current boundaries of the technical areas estimated to be less than health-based standards. Likewise, long-term exposures (for example, sensitive receptors in Los Alamos and nearby areas) also would be estimated to be less than health-based standards (DOE 1999c, Chapter 5).

With no emissions of radioactive air pollutants from activities at the tract itself, doses from radioactive air pollutants would remain the same as in the No Action Alternative. Specifically, air concentrations at the DP Road Tract would deliver a dose of approximately 2.5 millirem per year to people residing there year-round, or about one-fourth of the EPA standard (DOE 1999c, Chapter 5).

Commercial and Residential Development Land Use Scenario

One contemplated land use for the DP Road Tract is primarily residential development, with only 5 acres (2 hectares) developed commercially. For criteria pollutants, ambient air concentrations would continue to comply with Federal and/or State standards. Chemical air concentrations would continue to be below health-based standards. Inhalation doses from radioactive air pollutants would continue to be an estimated 2.5 millirems per year. However, the residential use (160 mobile homes and 400 residents) would have less of an impact on air quality than industrial activities. In short, air quality would be slightly better than in the case of all industrial and commercial development.

9.1.1.2 Global Climate Change

Industrial and Commercial Development Land Use Scenario

New businesses would require some commercial vehicles (pick-up trucks and vans), and would have heating requirements.

The LANL archive center also would continue operations. As a result of development, tract emissions of greenhouse gases would increase appreciably from 400 tons (363 metric tons) per year in the No Action Alternative to 1,800 tons (1,633 metric tons) per year of carbon dioxide.

Commercial and Residential Development Land Use Scenario

An alternative land use is to develop part of the tract primarily for residential use. Approximately 20 acres (8 hectares) would be developed as a trailer court, hosting an estimated 160 trailers, 400 new residents, and 330 personal vehicles. Office buildings would be developed on the remaining 6 acres (2 hectares). The LANL archive center also would continue operations. Carbon dioxide sources would include natural gas used for residential and office heating, and personal and commercial vehicles. As a result of this development, tract emissions of greenhouse gases would increase further from levels in the No Action Alternative, and would be estimated at 3,350 tons (3,038 metric tons) per year of carbon dioxide.

9.1.12 Human Health

9.1.12.1 Environmental Consequences of the Contemplated Uses

Consequences would be the same as in the No Action Alternative. Radiation doses received by new residents at this tract would be an estimated 2.5 millirem per year (DOE 1999c, Chapter 5). However, because this tract lies within the radiation site evaluation circle for TA 21, and potential radiological impacts of the disposition and subsequent development must first be evaluated along with possible mitigation techniques, doses may be greater in the case of an accident at TA 21.

No changes in cancer risk would be expected under normal operational conditions at LANL. Nonradiological exposures would be expected to be below health-based standards. Residents would face the same hazards to floods and wildfires as workers now do, and should have adequate time to evacuate the premises. Seismic events come without warning, and would carry risks of physical injury from building collapses.

Residential development would bring 400 new residents into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. Residential development also would introduce more sensitive receptors, such as children and pregnant females, to an area that currently hosts only LANL-related workers. While all doses would be within health-based standards established by other Federal agencies, the closer proximity would increase radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities. These same human health consequences result from commercial development of the DP Road Tract, but are lessened by two factors. Workers would be present less often than residents, and the work force would contain fewer sensitive receptors.

9.1.12.2 Chemical Accidents

Accident assessment would be the same as described in the No Action Alternative. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached the DP Road Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

9.1.12.3 Radiological Accidents

Regardless of land use subsequent to transfer of ownership, the MEI dose at this tract would be the same as described in the No Action Alternative. MEI doses would be greater than 100 millirem for 4 of 13 scenarios: 24 rem for RAD-02 (natural gas pipeline failure, explosion, and fire at the CMR Building), 320 millirem for RAD-07 (fuel leak and fire at the Waste Characterization, Reduction, and Repackaging [WCRR] Facility), 10 rem for RAD-12 (plutonium release from the Dual Axis Radiographic Hydrodynamic Test [DARHT] Facility during an earthquake), and 1.6 rem for RAD-15B (explosion followed by fire in an entire wing of the CMR Building). In the No Action Alternative, the MEI doses would be received by LANL employees; however, if the tract is transferred and developed, the likely receptor would be a member of the public.

Under both contemplated land use scenarios for the DP Road Tract, average occupancy (370 people) would be approximately the same, and the tract collective dose and excess LCFs would be approximately the same regardless of the type of development that actually occurs. Consequences, however, would be appreciably higher than those estimated for the No Action Alternative (for which collective tract dose and excess LCFs would both be zero). For example, the LANL SWEIS estimated a collective population dose of 120,000 person-rem for all people living within a 50-mile (80-kilometer) radius of LANL, resulting in an estimated 57 excess LCFs for hypothetical accident RAD-02. This would increase by another 7,700 person-rem and four LCFs if DP Road were developed. Table 9.3.12.3-1 compares the estimated additional consequences of all hypothetical radiological accidents.

9.1.12.4 Natural Event Accidents

Natural event accidents would have no estimated chemical consequences at the DP Road Tract.

For the postulated accidents (wildfire and four earthquake scenarios), chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time the air plume reached the tract, even under adverse weather dispersion conditions.

The MEI doses would be the same as in the No Action Alternative, regardless of land use subsequent to transfer of ownership. The maximum dose resulting from the postulated wildfire would be less than 0.1 rem; that from the most severe earthquake, however, would be approximately 60 rem.

There are two possible land uses for the DP Road Tract. Average occupancy (370 people) would be approximately the same under both scenarios, so the tract collective dose and excess LCF would be the same regardless of the development that actually occurs. Consequences, however, would be appreciably higher than those estimated for the No Action Alternative (for which collective tract dose and excess LCF would both be zero). If the DP Road Tract were developed, then the most severe earthquake would result in an estimated tract collective dose greater than 20,000 person-rem, and approximately 20 excess LCFs. These exposures would be in addition to those estimated in the LANL SWEIS (DOE 1999c) (340,000 person-rem and 230 excess LCFs for RAD-03B).

9.1.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated uses estimate

Table 9.3.12.3-1. Additional Accident Consequences Associated with Contemplated Land Use on the DP Road Tract

				BOTH DEVELOPMENT SCENARIOS[a]		SWEIS ESTIMATES[b]	
Accident Scenario	**Accident Location**	**Facility**	**Frequency per Year**	**Collective Dose[c]**	**Excess LCF**	**Collective Dose[c]**	**Excess LCF**
RAD-01	54-38	RANT	1.6×10^{-3}	20	0.01	72	0.04
RAD-02	03-29	CMR	1.5×10^{-6}	7,700	3.8	120,000	57
RAD-03	18-116	Kiva #3	4.3×10^{-6}	15	0.01	100	0.06
RAD-05	21-209	TSTA	9.1×10^{-6}	2	0	24	0.01
RAD-07	50-69	WCRR	3.0×10^{-4}	96	0.05	1,300	0.69
RAD-08	54-230	TWISP	4.3×10^{-6}	26	0.01	400	0.2
RAD-09A	54-226	TWISP	4.9×10^{-1}	0	0	4	0
RAD-09B	54-226	TWISP	4.9×10^{-3}	16	0.01	230	0.12
RAD-12	16-411	--	1.5×10^{-6}	3,700	1.9	35,800	18
RAD-13	18-116	Kiva #3	1.6×10^{-5}	23	0.01	160	0.08
RAD-15A	03-29	CMR	3.6×10^{-5}	29	0.01	175	0.09
RAD-15B	03-29	CMR	3.2×10^{-5}	520	0.26	3,400	1.7
RAD-16	03-29	CMR	3.5×10^{-6}	1	0	56	0.03

Notes: mrem = millirem, RANT = Radioactive Assay and Nondestructive Test, CMR = Chemistry and Metallurgy Research, TSTA = Tritium Systems Test Assembly, TWISP = Transuranic Waste Inspectable Storage Project

[a] In addition to doses estimated in the LANL SWEIS.

[b] For the entire population within a 50-mile (80-kilometer) radius of LANL.

[c] Person-rem.

that air emissions and hazardous chemical and radiological releases associated with LANL operations would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on the tract.

The analyses also indicate that socioeconomic changes resulting from implementing any of the proposed alternatives would not lead to environmental justice impacts. Under the Proposed Action Alternative, modest economic benefits would arise from the additional jobs created during construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local governments. Each of these impacts would be positive and would not disproportionately affect any single group.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process.

9.1.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the DP Road Tract would not immediately cause any irreversible or irretrievable commitments of resources. Subsequent development, under either contemplated land use, would, however, cause irreversible commitments of ecological habitat and cultural resources.

New development also would cause the irretrievable commitment of resources during construction and operation of the new businesses and during installation of infrastructure needed for the residential trailer court. Energy would be expended in the form of natural gas and electricity. Additional water also would be consumed. Construction of these buildings and related infrastructure would require the irretrievable commitment of standard building materials such as lumber and roofing materials.

9.1.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the DP Road Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources because development of previously undisturbed areas could result in physical destruction, damage, or alteration of cultural resources on the tract. The conveyance or transfer of the tract also could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

Subsequent development of the tract, either commercially or residentially, would have unavoidable adverse impacts in several resource areas. One such impact would be loss of ecological habitat within the tract itself.

Development also would cause adverse impact through increased need for and use of utilities. Increased demand for water, solid waste, and sewage treatment services would have adverse effects in the immediate Los Alamos region by lowering the aquifer level more quickly, shortening the remaining lifetime of the County landfill, and increasing both the quantities of sewage that require treatment and the quantities of treated sewage discharged to the environment. The environmental effects of increased demand for electricity and natural gas would be felt elsewhere (in the Four Corners region, for example), in the form of increased emissions of air pollutants in order to generate electricity. Increased consumption of natural gas adds to global climate change through increased emissions of carbon dioxide.

Development also would lead to increased traffic, either via an increase in personal vehicles in Los Alamos County (from residential development) or by increasing the labor force within the County (through commercial development). Both land uses would result in slight increases in congestion and traffic noises. Noise levels would increase within the DP Road Tract, in frequency of occurrence and duration (into the night). The visual environment would deteriorate, especially on the undeveloped south leg of the tract.

Finally, residential development would bring 400 new residents into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. The location is not far from the Small Business Center Annex (on East Gate Drive), the location of LANL's MEI due to radiological air emissions from LANSCE on the adjacent mesa. While all doses would be within health-based standards established by other Federal agencies, the closer proximity also would increase the radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.

9.1.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

The actual conveyance or transfer of the DP Road Tract would not immediately cause any specific impacts on short-term uses of the environment. The tract is located within the Los Alamos townsite, and is surrounded by already developed areas. Subsequent development, whether commercial or primarily residential, would therefore be compatible with long-term uses of the land.

10.0 TECHNICAL AREA 21 TRACT

10.1 Affected Environment

10.1.1 Land Use

Technical Area 21 (TA 21) consists of about 260 acres (105 hectares) at the eastern end of DP Mesa, near the central business district of the Los Alamos townsite. The tract is located between Los Alamos Canyon to the south, and DP Canyon to the north (see Figure 10.1.1-1, Technical Area 21 Tract Layout). The southern and northern boundaries of the tract extend to the bottom of the two canyons that define the mesa. The west-central portion of the tract contains the majority of the development at the tract in terms of buildings and structures. The remaining portions of the tract consist of sloped areas, some of which would likely not accommodate development (slopes greater than 20 percent). Access to the site is via DP Road, which splits the mesa north and south (DOE 1998b). The mesa top, while previously disturbed, remains moderately vegetated with native grasses, shrubs, and small trees (DOE 1997a).

TA 21 is among the oldest technical areas at LANL and is the site of the former plutonium processing facility (DOE 1998b). The tract contains roads, water towers, and other structures that support the 10 primary buildings on the east end of the mesa (LANL 1990). Each of the 10 primary buildings is 10,000 square feet (1,000 square meters) or more in size.

Existing land use is dominated by activities at TA 21's two primary research areas: DP East and DP West. DP East is an area of ongoing tritium research and includes the Tritium Systems Test Assembly (TSTA), and the Tritium Science and Fabrication Facility (TSFF). These two facilities are scheduled to operate beyond the year 2007. DP West has been in decontamination and decommissioning (D&D) since 1992. Nearly half of the site has been demolished, and the remainder is scheduled for D&D in the coming years (DOE 1998b). Access is restricted in LANL operational and buffer areas. An office building with light biological laboratories with unrestricted access is located on the west end of the tract.

10.0 TECHNICAL AREA 21 TRACT

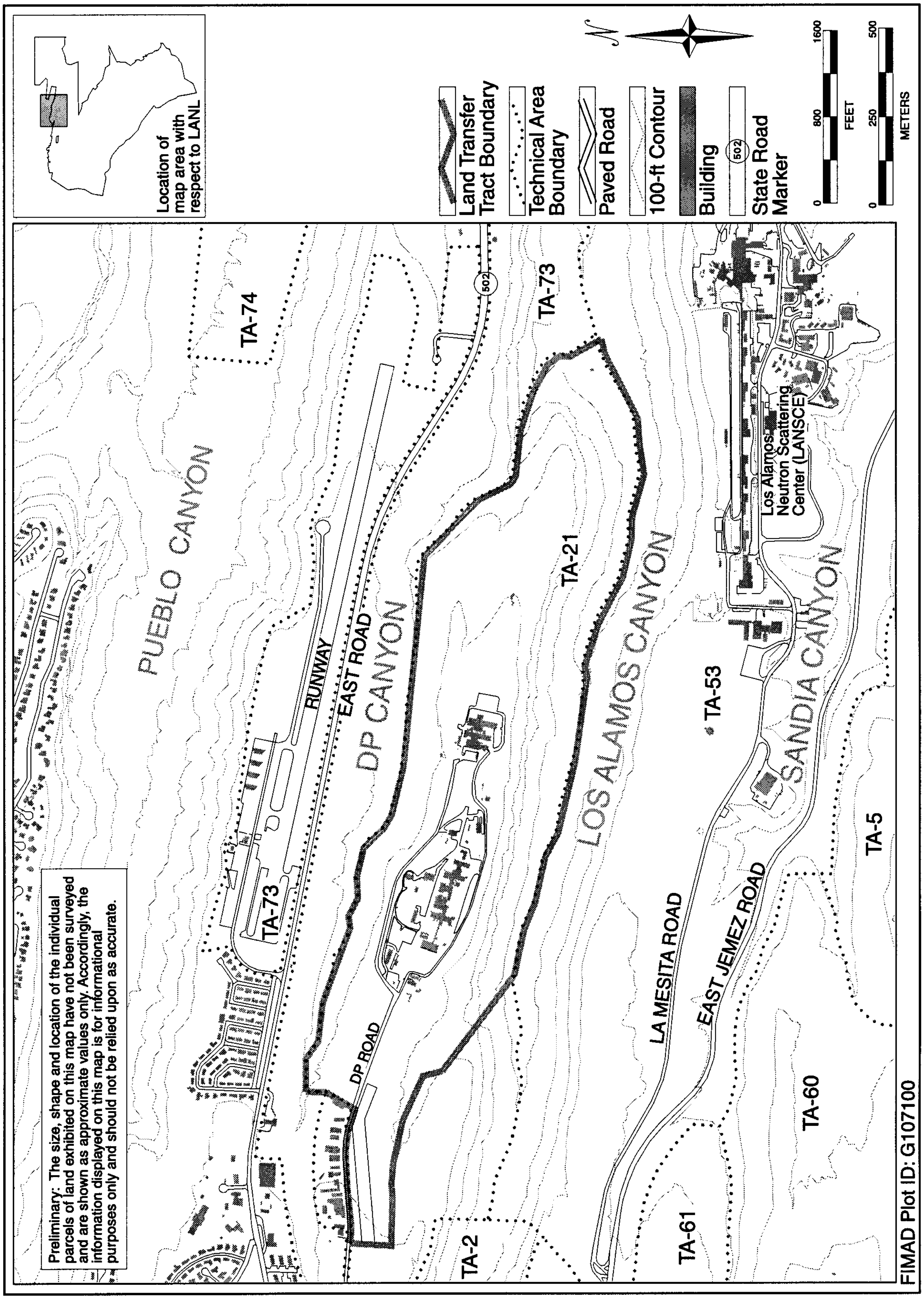

Figure 10.1.1-1. Technical Area 21 Tract Layout.

10.0 TECHNICAL AREA 21 TRACT

Adjacent land use includes the businesses located to the west along DP Road, which are based on a mixture of heavy commercial uses, including automotive repair shops, machine shops, and the Los Alamos County Fire Department training facility. Commercial and light industrial uses such as those associated with the *Los Alamos Monitor* newspaper and a local hardware store also are present (LAC 1998). To the south of DP Road, development is limited to vehicle and equipment storage areas. The Los Alamos Airport is located immediately to the north of the TA 21 Tract, across DP Canyon and State Road 502 (DOE 1998b).

The Mattie Brook Trail bisects the tract east and west, and the Los Alamos Canyon Trail skirts the southern perimeter (see Figure 3.2.1-2 in Chapter 3). The two trails connect at the southeast edge of the tract (LANL 1998c). Access to the trails is currently restricted from TA 21. No other recreational opportunities currently exist within the boundary of the site.
Figure 10.1.1-2 shows the various LANL media monitoring stations located in or at the TA 21 Tract.

10.1.1.1 Environmental Restoration

TA 21 is one of the oldest technical areas at LANL, and its uses have included plutonium processing, tritium research, and the treatment of radioactive liquids. As a result, the tract has substantial environmental contamination. There are a total of 154 potential release sites (PRSs) within 50 feet (15 meters) of the boundaries of the tract. The PRSs fall within five categories: 88 surface units, 34 subsurface units, 21 outfalls, 9 material disposal areas (MDAs), and 2 stack emissions. The latter include incinerators and filter houses and will require the assessment of the entire tract for elevated contamination levels. A total of 95 of the 154 PRSs have been partially sampled, the beginning of the process of characterizing the nature and extent of contamination from historical activities.

There also are 125 structures identified (to date) for decommissioning. These include electrical substation sheds, wastewater treatment facilities, research facilities, and processing facilities. The structures at TA 21 fall within four categories (Types II through VI) based on the estimated cost per unit area anticipated for their decommissioning.

In addition to PRSs and structures, portions of Los Alamos and DP Canyons lie within the boundaries of the TA 21 Tract. Although these canyon areas are not suitable for development, they also may contain contamination that must be characterized and/or remediated.

Figure 10.1.1.1-1 shows areas with the potential contamination issues (PCIs) within this tract. The TA 21 Tract has numerous PRSs, many of which have not yet been characterized. Much of the land around the sites also may be contaminated from prior LANL operations. The MDAs within the tract boundaries may be involved in future remediation activities and prove very costly as well. As a result, PCI acreage is estimated to total almost the entire tract.

10.1.2 Transportation

The existing collector road (DP Road) that serves this tract (see Figure 10.1.1-1) has the capability to service approximately 2,000 passenger cars per hour (pcph) in both directions. DP Road can be accessed from Trinity Drive (see Figure 9.1.1-1 in Chapter 9), a four-lane major road west of DP Road, and from the east by a two-lane highway (State Road 502) and East Road.

Trinity Drive currently has an approximate capacity of 7,200 pcph, and East Road has a capacity of approximately 2,400 pcph. Data provided by the County of Los Alamos show that Trinity Drive and

10.0 TECHNICAL AREA 21 TRACT

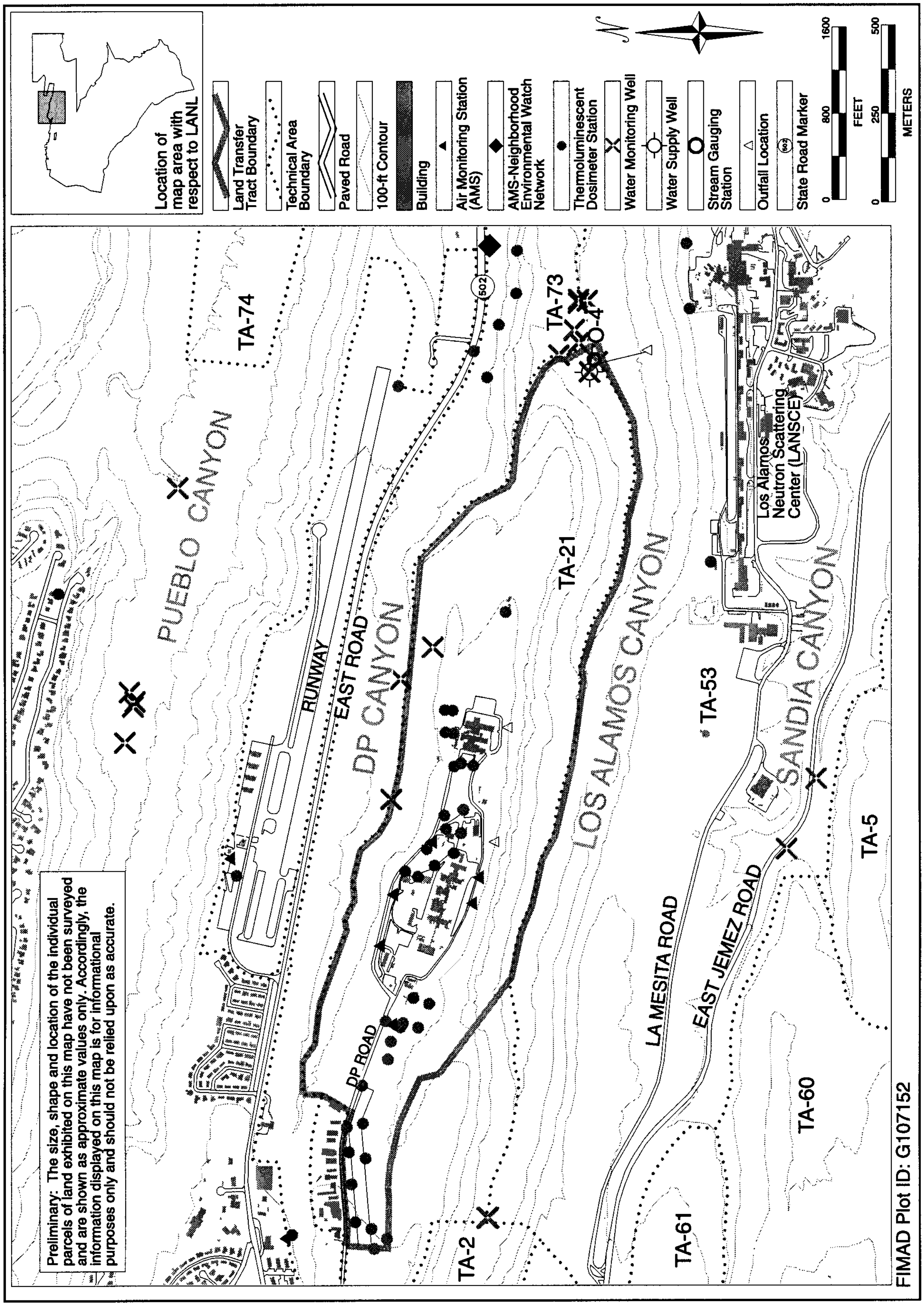

Figure 10.1.1-2. Technical Area 21 Tract Monitoring Stations and Outfall Locations.

10.0 TECHNICAL AREA 21 TRACT

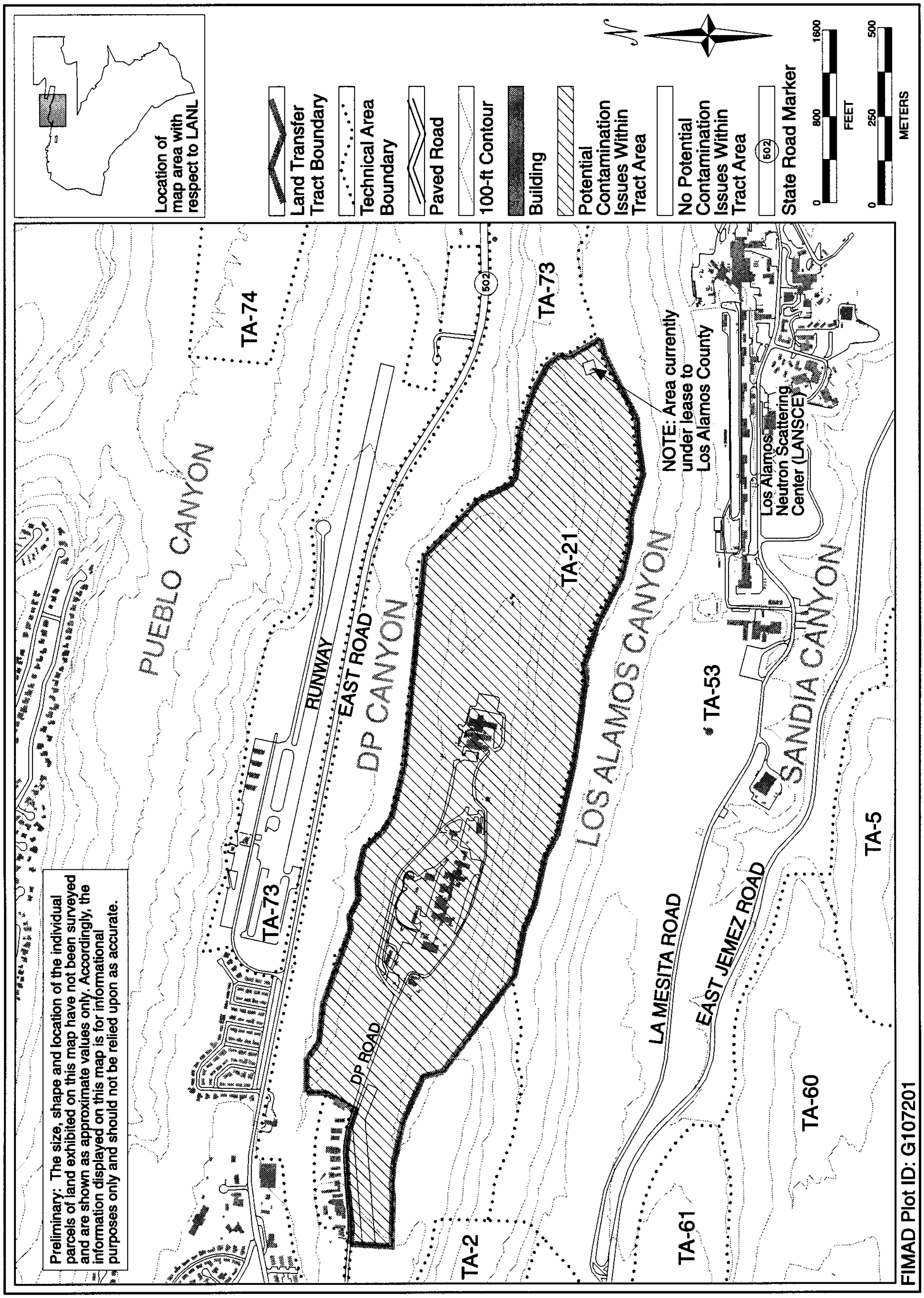

Figure 10.1.1.1-1. Technical Area 21 Tract Potential Contamination Issue Areas.

East Road carried approximately 1,100 vehicles in the peak hour near the vicinity of DP Road in January 1998. The average annual traffic on Trinity Road and East Road near the site is approximately 10,350 vehicles per day. This results in a level of service (LOS) D for the two-lane highway, which is defined as below average operating conditions approaching "stop and go" traffic flow. The two-lane section of these roads was evaluated because it is the constraint for roadway operation.

Increasing Trinity Drive and East Road traffic to account for expected growth in the area over the next 20 years degrades operation to LOS E in the year 2018. This LOS represents the maximum capacity of the road and is the operating condition just prior to traffic jam conditions.

The intersection of DP Road and Trinity Drive is a blind curve. Westbound Trinity Drive traffic, a one-lane section at this location, does not have a clear view of eastbound traffic. The room for turning onto DP Road and from DP Road onto Trinity Drive is currently insufficient, and the turn lane configuration can be confusing.

10.1.3 Infrastructure

Figure 10.1.3-1 shows the location of structures, roads, and utility lines for the TA 21 Tract. Industrial and security fence lines are shown on Figure 10.1.3-2. TA 21 contains all the major utilities, including water, sewer, steam, electrical, gas, and a radioactive liquid waste (RLW) line. Power lines enter the developed area at the midpoint from the south, then run along DP Road and distribute power to the rest of the buildings on the site. A natural gas line enters the TA 21 Tract from the north at the tract's midpoint. A steam plant at TA 21 uses natural gas to produce steam for heating buildings. TA 21 receives water from a supply line entering at the midpoint of the site from the north. This tract is not metered separately for any utilities, and no figures for current utility usage are available.

An RLW line originates from near the middle of the developed area, runs west along DP Road, and exits the site at the western-most boundary. RLW is transported via this line to the RLW Treatment Facility (TA 50). A replacement for the RLW line is currently under development, and the current line is expected to be cleaned and plugged.

10.1.4 Noise

The Los Alamos County Airport is to the north of TA 21 but is separated from TA 21 by DP Canyon, a small tributary of Los Alamos Canyon. TA 53 is to the south but is separated from TA 21 by Los Alamos Canyon. As a result, ambient noise reaching TA 21 comes largely from workers and light trucks traveling to and from LANL facilities. There is slight contribution from traffic along State Road 502, which can be heard when there is no traffic entering TA 21 from DP Road. The takeoff and landing of small airplanes contribute intermittently to noise levels. However, because this tract is further removed from traffic than the neighboring DP Road Tract, ambient noise levels are estimated to be somewhat lower than 50 decibels, A-weighted (dBA).

10.1.5 Visual Resources

The TA 21 Tract consists of a variety of buildings, roads, parking lots, and other associated facilities located on top of the mesa. The side slopes of the mesa are mostly undeveloped and forested. The site, particularly the water tower, can be seen from locations along State Road 502. Somewhat distant views from the site toward the west include the Jemez Mountains. This tract was analyzed by assigning two rating units to the tract based on the visual characteristics of the undeveloped and developed portions of the

10.0 TECHNICAL AREA 21 TRACT

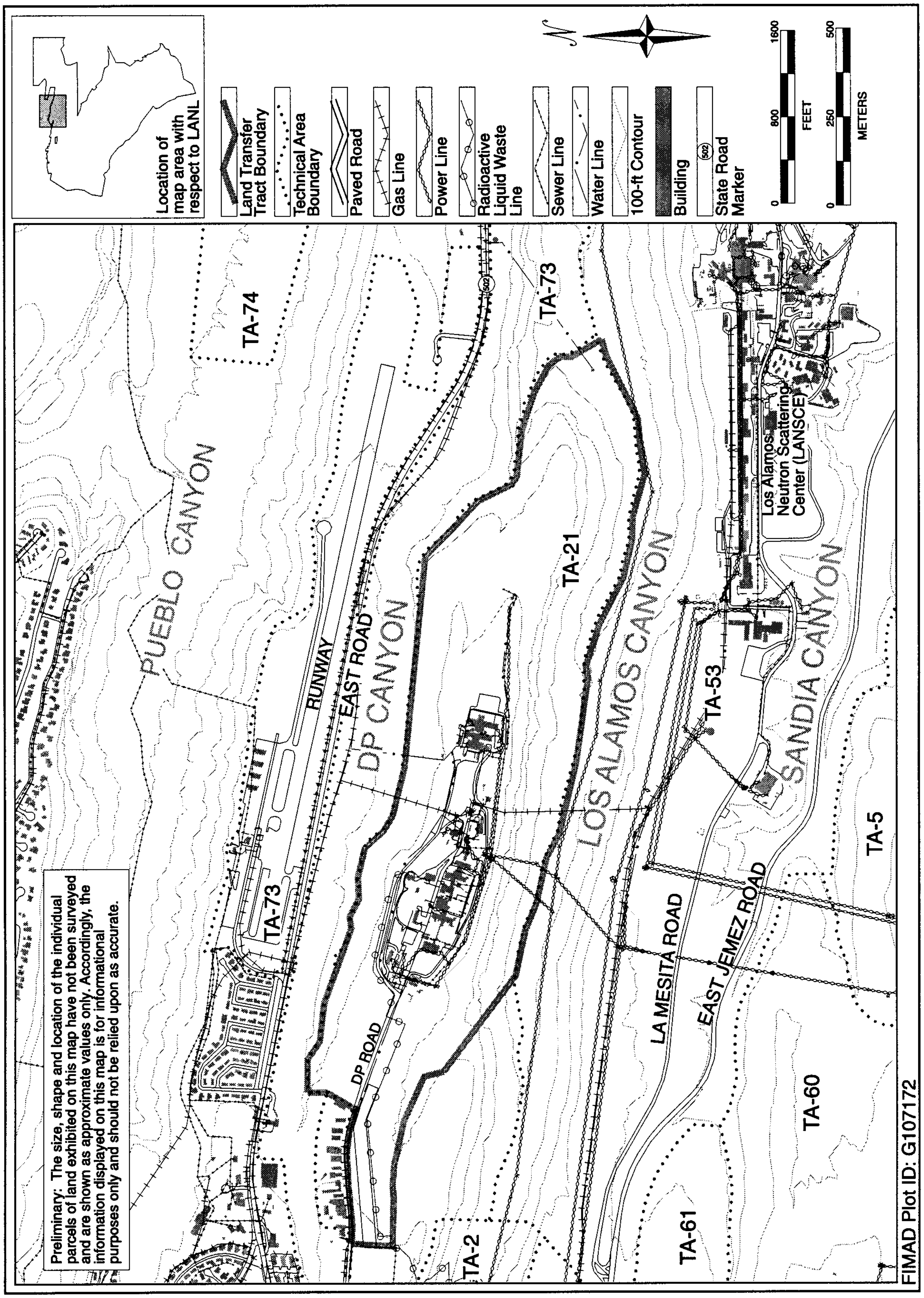

Figure 10.1.3-1. Technical Area Utilities and Infrastructure.

10.0 TECHNICAL AREA 21 TRACT

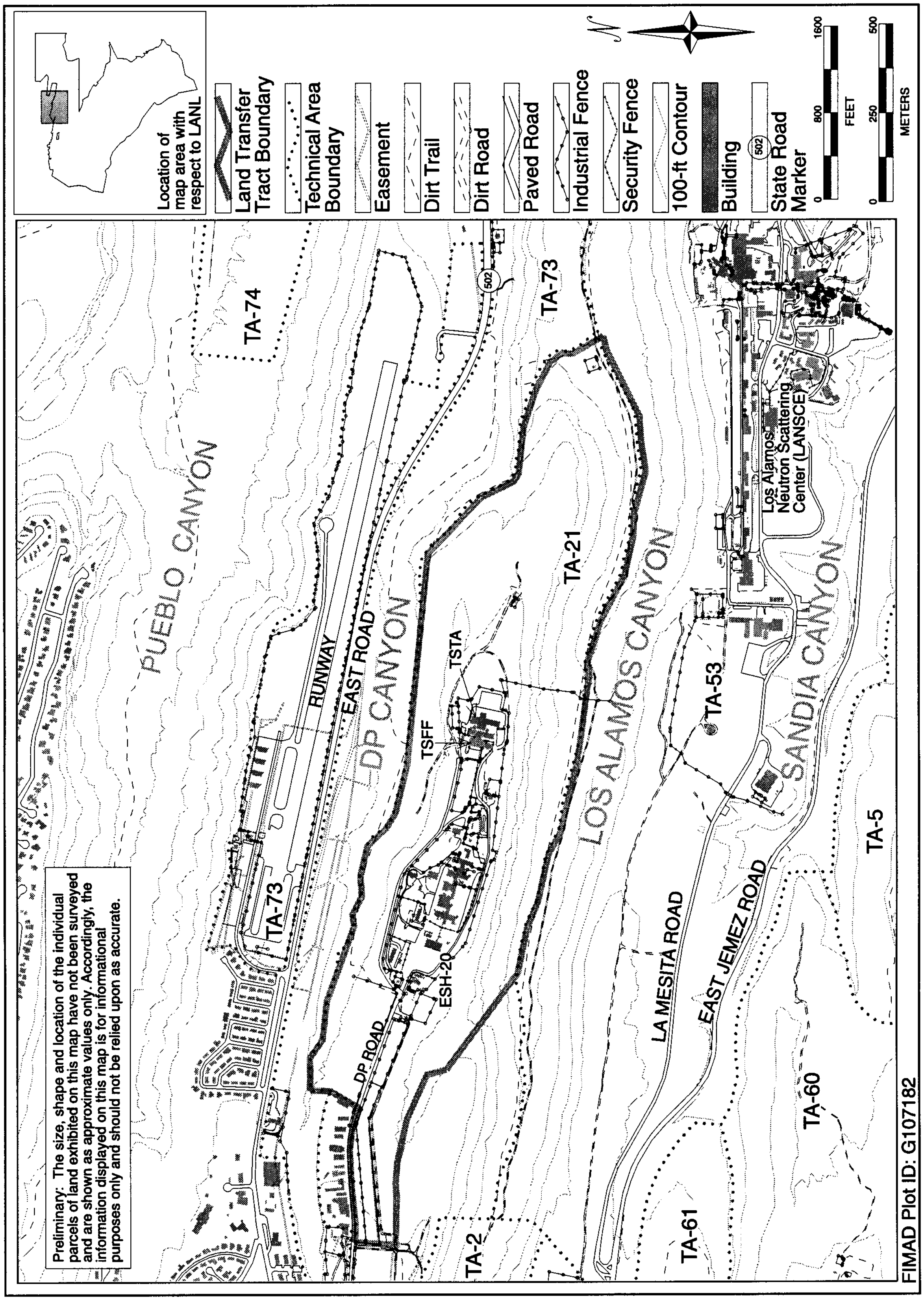

Figure 10.1.3-2. Technical Area 21 Industrial and Security Fence Lines.

site. These areas generally correspond to the side slopes of the mesa, Rating Unit 1, and the top of the mesa, Rating Unit 2.

After scenic quality, distance zone, and sensitivity level components were combined using the Inventory Class Matrix, it was determined that both the developed and undeveloped portions of the site fall into Scenic Class IV, low public value for the visual resources.

10.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer.

This tract consists of two primary research areas: DP West and DP East. The DP West area has been in the decontamination, decommissioning, and demolition process, and programs located there have been largely been relocated to other areas at LANL. An office building with light laboratories remains. The DP East area is a tritium research site. The tritium activities have not been relocated, and are considered critical to national security and fusion energy research. These activities are anticipated to be required beyond the year 2007.

10.1.7 Ecological Resources

Similar to the DP Road Tract and contiguous with it, the TA 21 Tract supports ponderosa pine forest; pinyon-juniper woodland; and open shrub, grassland, and wildflower areas. Approximately 20 percent of the area is developed as roadways, parking lots, and facilities with associated landscaping. Most of the tract has been disturbed by previous industrial activities. Flora and fauna are characteristic of the region. At least 30 mammal species, including 15 bat species, 80 bird species, 7 reptile and amphibian species, and 154 plant species are present in the vicinity of the tract. Several large game animals, including elk, mule deer, and black bear use the area. There are no identified floodplains within the tract. TA 21 has wetlands within its current boundaries. A review of the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) and wetland mapping data of the LANL indicated the presence of wetlands in TA 21. At some time in the past, industrial outfalls have since been decommissioned and closed. Eventually, these associated wetlands will transition to dry land vegetation. A small (less than 1 acre or 1 hectare) willow-dominated wetland exists in the bottom of DP Canyon near the top of the drainage. With currently designated conveyance and transfer tract boundaries, portions of this wetland exist in both the Airport Tract and the TA 21 Tract. See Appendix D of this CT EIS for further description of wetlands and floodplains. Adjacent Los Alamos Canyon contains a perennial water source flowing a few cubic feet per second during most of the year that support stretches of riverine and palustrine wetlands. The TA 21 Tract contains suitable habitat for the American peregrine falcon, bald eagle, and Mexican spotted owl. Three Mexican spotted owl areas of environmental interest (AEIs) overlap this land tract, and two American peregrine falcon AEIs are also present and overlapping.

Noise in the vicinity of the DP Tract results from traffic on East Road, Trinity Drive, and DP Road, as well as TA 21 activities conducted in the area. DP Road and TA 21 are lighted at night by security lighting and by commercial lighting from adjacent developed areas.

10.1.8 Cultural Resources

TA 21 was used from the Coalition period through the Nuclear Energy period. Prior to DOE use, this tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on LANL and privately held lands.

One hundred percent of the TA 21 Tract has been inventoried for historic and prehistoric resources. Survey results indicate that there are 44 cultural resources within the tract. Two of these sites are prehistoric and 42 are historic. One prehistoric site has been evaluated as eligible for the National Register of Historic Places (NRHP), and the other has been excavated and does not retain sufficient data potential currently to be considered eligible. One of the historic sites is NRHP-eligible and another is considered potentially eligible. The remaining 40 historic sites are LANL buildings associated with the historic developments during the Nuclear Energy period. These buildings have been preliminarily evaluated as potentially eligible for the NRHP. It is unlikely that all of the TA 21 buildings will be determined as NRHP-eligible resources. There also is a potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials in TA 21.

There are no known traditional cultural properties (TCPs) located within the TA 21 Tract. Consultations to identify TCP resources have not been conducted. TCPs may be identified during further consultations with Native American and Hispanic groups regarding the traditional uses of this tract. TCPs would not be anticipated in developed parts of the tract.

Additional information on the cultural resources of the TA 21 Tract is presented in Appendix E of this CT EIS.

10.1.9 Geology and Soils

The southern and northern boundaries of the TA 21 Tract extend to the bottom of the two canyons that consist of exposed Bandelier Tuff and Totavi gravelly loamy soil. The west-central portion of the tract contains the majority of the development at the tract in terms of buildings and structures. The remaining portions of the tract consist of sloped areas, some of which would not likely accommodate development (slopes greater than 20 percent). The mesa top, while previously disturbed, is typified by the Pogna fine sandy loam soil type and steep rock outcrops along the canyon rim. Outcrops are the upper member of the Bandelier Tuff (Tshirege), typical of the Pajarito Plateau. No major surface faulting is evident in TA 21, but fracturing along the canyon edge is common in the area. Existing structures are vulnerable to greater than magnitude 7 seismic events (as measured on the Richter scale) and wildfire episodes.

10.1.10 Water Resources

Figure 10.1.1-1 shows the location of the TA 21 Tract, which includes the mesa top and adjacent canyons. Both canyons are ephemeral drainages in the vicinity of the tract and receive stormwater runoff and snowmelt from the mesa top and surrounding areas. There are no known springs within the tract. DP Spring flows from the DP Canyon wall adjacent to the tract but does not maintain flow into the canyon bottom.

The USFWS NWI and LANL identify wetlands within the TA 21 Tract. Wetlands assessments are provided in Appendix D. There are two active National Pollutant Discharge Elimination System (NPDES)-permitted outfalls within the tract associated with the TSFF and the steam plant. These outfalls will be deleted when the source of discharge has been eliminated. There is one regional aquifer supply well within the tract and one regional aquifer test well several hundred feet northeast of the tract (see Figure 10.1.1-2). There is an NPDES-permitted outfall associated with the supply well.

There are no stream gages within the TA 21 Tract. There are two surface water monitoring stations located within the tract, DPS-1 and DPS-4. There are groundwater monitoring stations within the tract in Los Alamos and DP Canyon, but these are for shallow and intermediate perched groundwater zones and do not pertain to the regional aquifer water supply associated with this tract. Portions of the TA 21 Tract that lie within the canyon bottoms are in the 100-year floodplain. Assessment of floodplains is included in Appendix D.

10.1.11 Air Resources

Air quality at the TA 21 Tract is primarily affected by LANL operations at TA 21 and at the Los Alamos Neutron Science Center (LANSCE) on the mesa immediately to the south. Slight pollution contributions also arise from automobiles using DP Road and Trinity Drive and commercial activities along DP Road.

The TA 21 Tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Five criteria pollutants are emitted from the steam plant within TA 21. The only other emissions of criteria pollutants are small amounts of carbon monoxide and ozone resulting from hydrocarbons emitted from motor vehicles.

The steam plant burns fuel oil and has a peak rating of 140,000 British thermal units (BTUs) per hour. Plant emissions at peak load have been estimated as shown in Table 10.1.11-1. It has been estimated, however, that these emissions are within air quality standards (DOE 1999c, Appendix B).

All emissions of hazardous and other chemical air pollutants at the TA 21 Tract are from LANL activities. Emissions from the LANSCE at TA 53 on the neighboring mesa, also could affect air pollution concentrations at TA 21. Analysis shows that about 130 different chemicals have been or are being used at TA 21, and about 90 at the LANSCE. For chemical emissions from activities at both

Table 10.1.11-1. Steam Plant Emissions

CRITERIA POLLUTANT	PEAK EMISSIONS
Carbon monoxide	0.4 lb/hr (0.05 g/sec)
Nitrogen dioxide	1.7 lb/hr (0.22 g/sec)
Sulfur dioxide	4.1 lb/hr (0.52 g/sec)
Total suspended particulates	0.2 lb/hr (0.02 g/sec)
PM-10	0.1 lb/hr (0.01 g/sec)

Notes: lb/hr = pounds per hour, g/sec = grams per second, PM-10 = particulate matter less than 10 microns in size

of these technical areas, however, short-term exposures resulting from inhalation of chemical air pollutants at points along the current boundaries of the technical areas were all estimated to be less than health-based standards, and there are no anticipated adverse health effects. Likewise, long-term exposures (such as for sensitive receptors in Los Alamos and nearby areas) also were estimated to be less than health-based standards (DOE 1999c, Chapter 5).

Analyses for doses from radioactive air pollutants indicate that air concentrations at the TA 21 Tract would deliver a dose of approximately 1.5 to 3.0 millirem per year to people residing there year-round, or up to 30 percent of the EPA standard (DOE 1999c, Chapter 5).

10.1.11.1 Global Climate Change

About 240,000 square feet (22,296 square meters) of TA 21 structures are heated. In addition to space and water heating needs, research conducted at some of these facilities requires process steam. Maintenance and research activities also require the use of several government vehicles. These activities result in estimated emissions of 7,400 tons (6,712 metric tons) of carbon dioxide annually. Other greenhouse gases are emitted in very small quantities or not at all.

10.1.12 Human Health

10.1.12.1 The Radiological Environment for the TA 21 Tract

TA 21 is the land tract closest to LANSCE, which is the primary source of radioactive emissions as measured by the LANL offsite maximally exposed individual (MEI). The eastern tip of this land tract is about the same distance from the LANSCE as the MEI. This tract also has operational tritium facilities that have airborne radioactive emissions (TSTA and TSFF) and maintain some radioactive materials inventory (tritium) that could be at risk during a natural disaster or other accident.

This is an industrial complex, so there are no residents. Therefore, the dose to visitors (including joggers and hikers) from the LANSCE are much less than the MEI effective dose equivalent (EDE) annual dose. Other potential radiological exposures include direct radiation from the TA 21 MDAs. Visitors also are assumed to be Los Alamos residents who would receive the area background dose. Radiological PRSs and other sources of contamination exist on this site, but these have not been completely characterized. This tract has the highest potential radiation dose of all the land tracts considered for conveyance or transfer because of the existing operations, MDAs, and proximity to the LANSCE.

The LANL SWEIS projects radiological doses to the MEI of 3.1 millirem per year at the Small Business Center Annex (on East Gate Drive) and from 1.4 millirem (at its western edge) to 3.0 millirem (at its eastern edge) per year at the TA 21 Tract (DOE 1999c, Chapter 5). Doses are thus within the EPA standard of 10 millirem per year. The TA 21 Tract lies within two of LANL's one-half mile radiation site evaluation circles (see Figure 10.1.12.1-1) due to activities at the LANSCE on the neighboring mesa and at TA 21 itself. The radiation site evaluation circles were included in LANL's 1990 Site Development Plan (LANL 1990). These circles were intended to be used as planning tools for site developers and other project managers responsible for siting new facilities or operations to inform them of the presence of existing radiation sources and the need to evaluate their proposed action(s) against this information. The circles are not representative of a particular dose of radiation to the TA 21 Tract under either normal or accident conditions and are noted herein for the purposes of disclosure with regard to the nearest radiation source location relative to the tract. The quantities of radioactive material and other sources of radiation identified by these radiation evaluation circles were evaluated in the 1999 LANL SWEIS, as previously discussed.

10.1.12.2 The Nonradiological Environment for the TA 21 Tract

Exposures to nonradiological contaminants via the airborne pathway in the LANL vicinity have already been shown not to be significant for the affected environment (DOE 1999c). PRSs and other contamination on this tract may include nonradiological constituents; the site has not been completely characterized.

It is postulated that two of the three types of natural disasters postulated in the SWEIS could occur on this land (seismic events and wildfire). This site has hazardous materials present in the buildings that could be at risk during a natural disaster.

10.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all

10.0 TECHNICAL AREA 21 TRACT

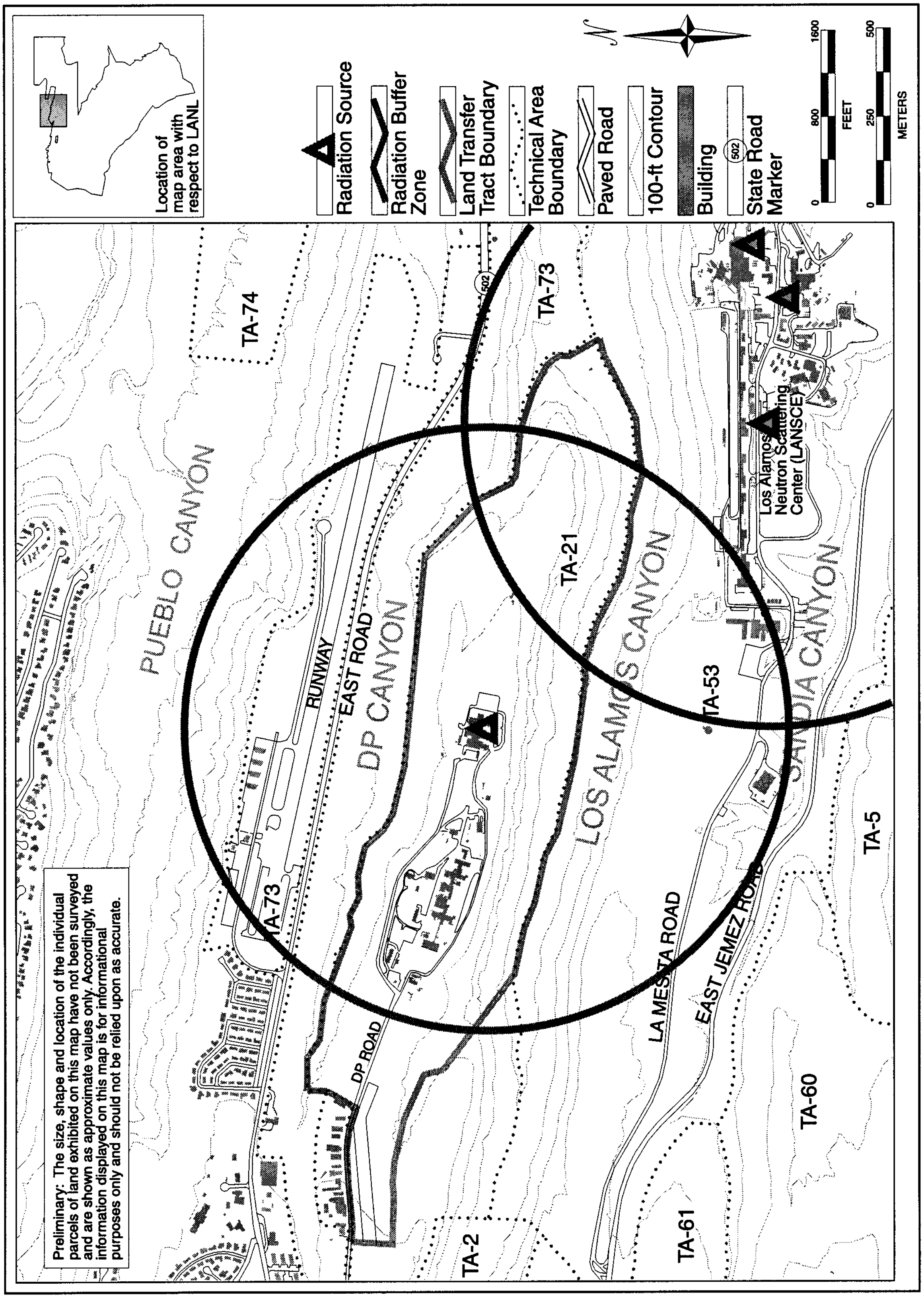

Figure 10.1.12.1-1. Technical Area 21 Radiation Site Evaluation Circles.

postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached TA 21, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the LANL SWEIS, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. Using data from the LANL SWEIS, doses to the MEI at TA 21 have been estimated for each of these, as shown in Table 10.1.12.3-1.

Table 10.1.12.3-1. MEI Doses for the TA 21 Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-3}	98	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	17,000	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	84	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	NA[a]	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	220	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	120	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	75	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	8,000	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	120	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	67	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	1,200	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	4	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; CMR = Chemistry and Metallurgy Research; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project
[a] Not Applicable. Accident could not occur at TA 21 if the land were transferred.

Because there are no residents and no public workers at the tract, the estimated tract collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe postulated earthquake (accident SITE-03B) has been estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The postulated earthquake scenario would release chemicals from a number of facilities, including formaldehyde from the Health Research Laboratory (HRL) (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed for chemical accidents, earthquakes would have no estimated chemical consequences at TA 21. The most severe earthquake, however, would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of approximately 30 Roentgen equivalent man (rem) at the tract.

The postulated site wildfire scenario would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the postulated earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at TA 21 is estimated to be about 0.1 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Because there are no residents and no public workers at the tract, the estimated tract collective dose and estimated excess LCF are both zero for all five natural event accident scenarios.

10.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

10.2 No Action Alternative

10.2.1 Land Use

There would be no anticipated changes to land use at the TA 21 Tract under the No Action Alternative. TSTA and TSFF operations occurring in the DP East area of the tract would continue consistent with future LANL projections (DOE 1999c). Tritium research activities would occur within the existing facilities or in adjacent areas of previously disturbed lands associated with those operations. There would be no anticipated change in access to the site, and the office building would continue to be used.

10.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in the DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the TA 21 Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 10.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report (DOE 1999b).

This information indicates PRS cleanup is likely to include removal actions, in situ treatment, and in situ containment. It is likely that all structures would be razed, and contaminated sediments are likely to be removed from both canyon systems. Although schedule estimates have not yet been prepared for cleanup of the canyon systems, cleanup of PRSs is estimated to require 7 years, while demolition of structures is estimated to require 12 months. Waste volumes are projected to range up to approximately 9,290 cubic yards (7,090 cubic meters) from cleanup of PRSs to approximately 56,560 cubic yards (43,220 cubic meters) from decommissioning and razing of structures. The cost estimate for remedial action at this parcel is about $400,184,000. This estimate is based on the information currently available for each PRS or structure, and is subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual “cleanup.” Although different cleanup approaches have been identified, it is possible that the administrative authority could require additional actions, resulting in greater waste volumes, a longer cleanup duration, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

10.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on DP Road near the site. It is expected that the future operational performance of DP Road and Trinity Drive would remain similar to that of current performance.

10.2.3 Infrastructure

The impacts of the No Action Alternative for the TA 21 Tract are the same as the impacts described in the Expanded Operations Alternative of the LANL SWEIS (DOE 1999c). Operations at the TSTA and TSFF would continue for at least 10 years. No new environmental impacts are anticipated as a result of the No Action Alternative.

10.2.4 Noise

In the No Action Alternative, TA 21 current uses would continue. There would be some increase in operations from current levels, but daytime noises are expected to be largely unchanged (that is, somewhat less than 50 dBA).

10.2.5 Visual Resources

Under the No Action Alternative, it is expected that the visual resources of this tract would remain the same. The class designation for this tract is Scenic Class IV, which indicates visual resources of low public value.

10.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

10.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at the TA 21 Tract, as described in Section 10.1.1. Therefore, no impact to ecological resources are projected under the CT EIS No Action Alternative.

10.2.8 Cultural Resources

Under the No Action Alternative, the TA 21 Tract would remain under the responsibility of the DOE, and the treatment of any cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. The use of the TA 21 facilities, which may include potentially eligible resources, would continue. Planned evaluation of these structures would continue, and information would be available to the DOE to ensure stewardship of these resources. Other positive impacts of the No Action Alternative would be the passive preservation of resources due to lack of development. Ongoing negative impacts from natural processes (such as erosion, fire, seismic events, and aging of buildings) on the physical integrity of cultural resources would continue.

10.2.9 Geology and Soils

Consequences are limited to existing uses. The tract is already developed; no additional utilities, roadwork, or buildings are required. No soil disturbance or change in availability of resources are anticipated.

10.2.10 Water Resources

Continuation of the current use of this tract by the DOE is anticipated under this alternative. Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

10.2.11 Air Resources

In the No Action Alternative, LANL operations would continue at TA 21. Emissions of criteria pollutants would continue; but the highest estimated concentration of each pollutant would be below Federal and State standards established to protect human health, with an ample margin of safety. Both short-term and long-term exposures to emissions of hazardous and other chemical air pollutants would be within levels established by health-based standards (DOE 1999c, Chapter 5). Doses from radioactive air pollutants would increase to approximately 2.5 to 4.0 millirem per year.

The same land use would exist in the No Action Alternative (tritium research), but the level of activity is expected to be slightly greater. As a result, carbon dioxide emissions also should increase somewhat from current levels of 7,400 tons (6,712 metric tons) per year to an estimated 7,800 tons (7,075 metric tons) per year.

10.2.12 Human Health

There would be no identifiable human health consequences to the public from implementation of the No Action Alternative for the TA 21 Tract. No changes in cancer risk should be expected for this alternative. Estimated radiation doses received at this tract would be approximately double from today's levels, ranging from 2.5 millirem (at the western edge) to 4.0 millirem (at the eastern edge) per year at the TA 21 Tract (DOE 1999c, Chapter 5). Doses would remain, however, within the EPA standard of 10 millirem per year (DOE 1999c, Chapter 5). No significant nonradiological increases in exposures would be expected. It is presumed that visitors would have adequate time to evacuate the premises for wildfires. Because warnings are usually not given for seismic events, the human health impacts due to seismic events likely would be greater than the other two natural disasters. The primary type of human health risk for natural disasters would be physical injury from falling debris and fires. No changes in cancer risk should be expected for this alternative.

10.2.12.1 Chemical Accidents

Accident assessment would be the same as discussed in the Affected Environment section in this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time the air plume reaches TA 21, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

10.2.12.2 Radiological Accidents

Accident assessment would be the same as discussed in the Affected Environment section in this chapter. MEI doses would be greater than 500 millirem for 3 of 13 scenarios postulated in the LANL SWEIS. Doses would be received by LANL employees. The estimated tract collective dose and estimated excess LCF would both be zero for nonemployees.

10.2.12.3 Natural Event Accidents

Accident assessment would be the same as discussed in the Affected Environment section in this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be about 0.1 rem; the maximum dose from the most severe earthquake would be approximately 30 rem. Because there are no residents and no public workers at the tract, the estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

10.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations, which would continue under the No Action Alternative, would be expected to be within regulatory limits, and no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents at LANL would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

10.3 Proposed Action Alternative

10.3.1 Land Use

Direct land use consequences of the transfer of this tract would include the relocation of LANL personnel who currently work at TA 21. Relocated personnel who currently work in office buildings would likely be moved to existing buildings on other parts of LANL property, possibly to new mobile manufactured buildings on an existing parking lot at TA 16. Due to recently identified mission support requirements for the TSTA and TSFF facilities at TA 21 beyond the 10-year timeframe established by the Act (Public Law 105-119), the tritium facilities and inventory would not be expected to move from TA 21. Planning for any removal actions needed later has not begun, and possible alternative locations are unknown. Environmental media monitoring stations would require relocation to other locations within LANL boundaries. The direct impacts would be minor and would be bounded by the indirect impacts. Construction of new facilities necessarily would be preceded by appropriate NEPA reviews that may result in the preparation of an environmental assessment or an environmental impact statement.

10.3.1.1 Description of Contemplated Uses

The commercial and industrial development land use scenario proposed for this tract could include the development of at least 55 acres (22 hectares) of the mesa, primarily in areas that have been previously disturbed (see Figure 10.3.1.1-1). Immediately off the mesa top, slopes are generally too steep (greater than 20 percent) to accommodate development. The attributes of future land use for the TA 21 Tract under the commercial and industrial land use scenario include:

- A minimum of 55 acres (22 hectares) would be developed for commercial and industrial uses.
- Commercial uses could include both light and heavy commercial businesses such as office buildings and business parks, warehouses, parking areas, service stations, repair garages, tire shops, motels and hotels, large stores, and drive-in or take-out facilities, and/or other similar businesses.
- Industrial uses could include light fabrication and manufacturing facilities compatible with other uses currently located at and adjacent to the site.
- When fully developed, land would be occupied by 70 businesses, 1,900 employees, and 56 commercial vehicles.

10.3.1.2 Environmental Consequences of the Contemplated Uses

There would be little or no indirect environmental consequences from the contemplated land uses because land uses would remain commercial and industrial. The location and type of future enterprises would need to be consistent with existing and adjacent land use. Access to and within the eastern portions of the site would be expected to improve.

10.3.1.3 Environmental Restoration

No additional environmental restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer.

10.3.2 Transportation

There would be few direct transportation impacts resulting from implementation of this development scenario. Relocation of TA 21 functions would alter the daily commute of LANL and contractor personnel currently employed at TA 21. Depending upon their new work location and their place of residence, personnel would have either a shorter or longer drive to work. Indirect consequences are discussed in the following sections.

10.3.2.1 Environmental Consequences of the Contemplated Uses

The commercial and industrial land use scenario anticipates development of additional commercial and industrial facilities at the TA 21 site. The Institute of Transportation Engineers (ITE) land use code utilized to estimate the trips generated by this proposed development was 130, Industrial Park. This ITE land use code allows estimation of the trips generated by these facilities based on the number of acres proposed for the land use type.

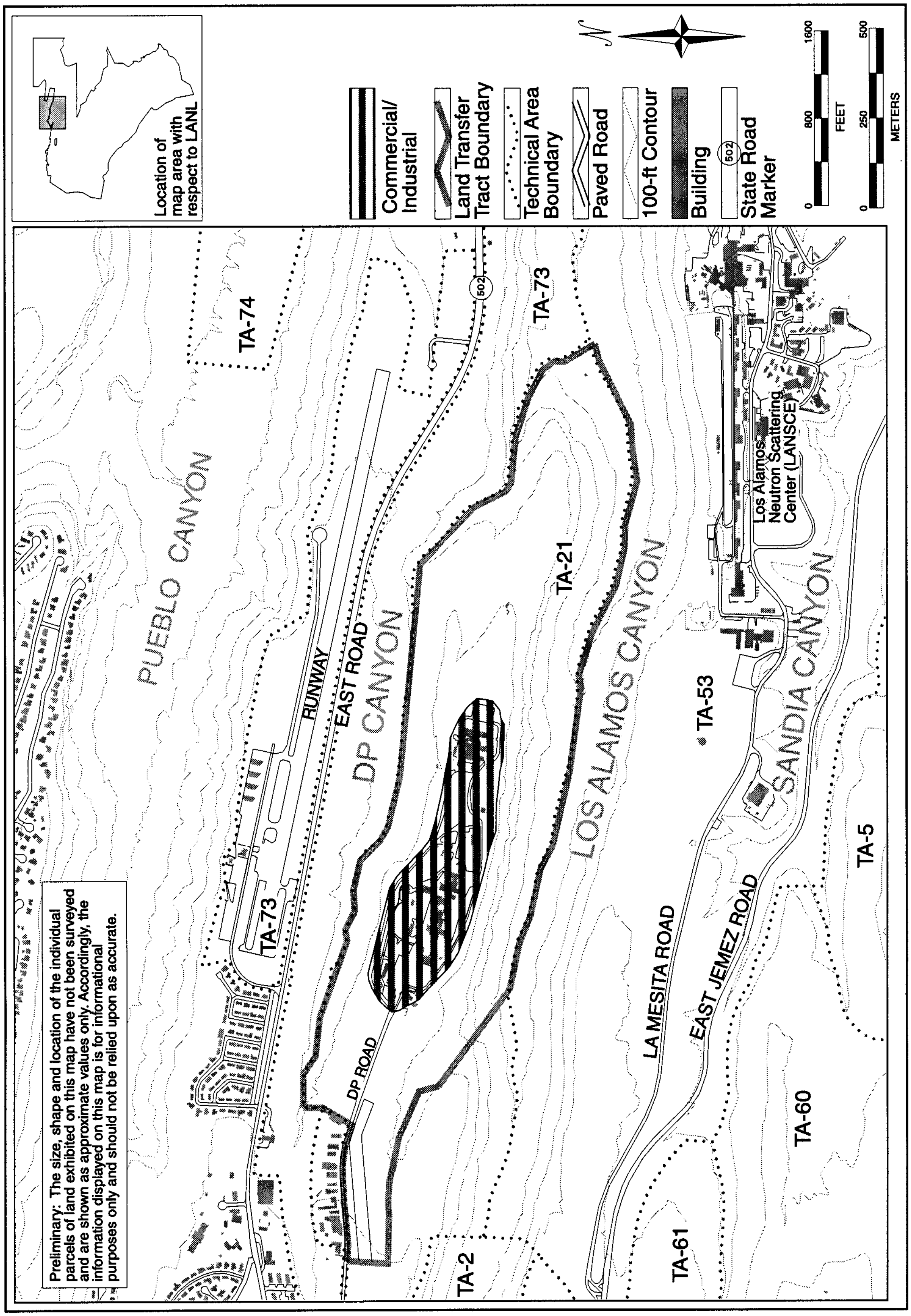

Figure 10.3.1.1-1. Technical Area 21 Contemplated Land Uses.

Table 10.3.2.1-1 shows the number of trips the ITE Trip Generation Manual (ITE 1997) estimates would be generated by this development. As shown in the table, the proposed development would add an additional 464 entering trips to DP Road and State Road 502 in the weekday morning peak hour and add an additional 455 exiting trips in the weekday evening peak hour. This land use scenario also may add an additional 3,471 trips to the local transportation system.

Adding these trips to those already on the transportation network would result in approximately 17,500 trips on State Road 502. The LOS for the two-lane section of Trinity Drive and East Road would be LOS E with the commercial and industrial development land use scenario around the year 2018. This LOS represents the maximum capacity of the road and is the operating condition just prior to traffic jam conditions. It is likely that the DP Road-Trinity Drive intersection would not be adequate in its current configuration, and reconstruction of this intersection would be necessary, possibly including the addition of a traffic signal.

The construction of a bridge connecting the eastern edge of the TA 21 Tract with the Airport Tract would be possible. This connection would improve the ingress and egress to the proposed DP Road commercial area, including this site. This also would alleviate the traffic problems that currently exist where DP Road intersects with Trinity Drive. However, it would increase the number of trips at the Airport Road and East Road intersection. This scenario would likely require the installation of a traffic signal at the Airport Road-East Road intersection.

Transportation effects within LANL from the relocation of personnel from TA 21 to their new facilities would be increases in traffic congestion during peak morning and evening hours in the immediate area of the new facilities. Because of the relatively small number of personnel relocated (in relation to the total number of LANL employees), no noticeable changes would be expected on a site-wide scale.

10.3.3 Infrastructure

There would be minimal direct consequences to infrastructure from the Proposed Action Alternative because utility needs would be relocated, not terminated. For example, it would be likely that the TA 21 steam plant would be reproduced elsewhere, with the same consumption of natural gas as the existing steam plant.

Table 10.3.2.1-1. Estimated Increase in Traffic for the Commercial and Industrial Development Land Use Scenario

ITE ESTIMATED TRAFFIC VOLUMES FOR TA 21 TRACT								
Land Use	**ITE Land Use Code**	**24 Hour Two-Way Volume**	**Morning Peak Hour Trips**		**Evening Peak Hour Trips**		**Saturday Peak Hour Trips**	
			Enter	**Exit**	**Enter**	**Exit**	**Enter**	**Exit**
Industrial – 55 acres (23 hectares)	130	3,471	464	95	121	455	83	176

10.3.3.1 Environmental Consequences of the Contemplated Uses

Indirect environmental impacts with respect to utilities and infrastructure resulting from this alternative would fall into two categories: (1) increased utility usage and (2) ground disturbance resulting from construction of new facilities. The utility usage would increase as a result of the contemplated developments. The estimated increases are shown in Table 10.3.3.1-1. It is not anticipated that these increases would exceed the capacity for any utility in the region.

Installation of new utility facilities and upgrades to existing ones would require creation of trenches and access and maintenance roads. The construction of roads, parking areas, and buildings, and the extension of utility lines would cause soil disturbance. Refer to Section 10.3.9 of this chapter for detail on impacts resulting from ground disturbance from new construction.

10.3.4 Noise

Transfer of ownership would have some direct impact to noise levels at the TA 21 Tract. Noises created by existing ventilation systems and by the movement of vehicles would disappear, and noise levels would decrease on parts of the tract. Traffic along East Road, however, is the primary noise source on northern portions of this land tract, and these traffic noises would remain. Indirect consequences are discussed in the following sections.

10.3.4.1 Environmental Consequences of the Contemplated Uses

If conveyed, the TA 21 Tract would be developed both commercially and industrially. This development would likely result in an increase in jobs, which would increase traffic flow. Maximum noise from traffic would not be expected to increase significantly over current conditions, but traffic noises would likely be present for a greater portion of the day as the new employees arrive at work, exit and return from lunch, perform daily errands, and return home in the afternoon.

Construction of the new commercial and industrial facilities would, however, increase ambient noise levels. Construction of new facilities would entail ground clearing, excavation, laying of foundations, erection, and finishing work. The use of heavy equipment such as front-end loaders, concrete mixers, and jackhammers would produce

Table 10.3.3.1-1. Estimated Increase in Utility Usage for the Commercial and Industrial Land Use Scenario on the TA 21 Tract

	POWER MW	ELECTRICITY GWH	GAS MCF (MLY)	WATER MGY (MLY)	SEWAGE (BAYO) MGY (MLY)	MSW TPY (MTY)
Estimated annual increase	0.7	4.0	39 (1,100)	35 (132)	19 (72)	77 (70)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	135 (511)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, tpy = tons per year, msw = municipal solid waste, mty = metric tons per year noise levels ranging from 74 to 95 dBA at a distance of 50 feet (15 meters) from the construction site (DOE 1997a, page 36).

10.3.5 Visual Resources

One direct consequence to visual resources of conveyance or transfer of ownership would be the demolition of LANL structures on the tract prior to disposition. These actions would result in visual improvement to the area.

10.3.5.1 Environmental Consequences of the Contemplated Uses

Contemplated uses would be visually compatible with current tract use and would maintain or could improve current Scenic Class IV visual resources by the replacement of less visually appealing structures.

10.3.6 Socioeconomics

Because TA 21 activities would be relocated (as opposed to terminated), there would be no direct socioeconomic consequences of the Proposed Action Alternative.

10.3.6.1 Environmental Consequences of the Contemplated Uses

Indirect socioeconomic consequences would include short-term increases in area employment and income associated with the construction of the facilities and long-term increases once the facilities are operational. Approximately 1,900 workers would be employed on the tract and 3,100 jobs would be generated in the ROI, which would, in turn, increase ROI income. Because these jobs would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

10.3.7 Ecological Resources

Direct ecological impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

The LANL Threatened and Endangered Species Habitat Management Plan would no longer be in effect for this area—thereby potentially reducing the protection afforded threatened and endangered species and their potential habitat in this area.

10.3.7.1 Environmental Consequences of the Contemplated Uses

Approximately 20 percent, or 52 acres (21 hectares) of the TA 21 Tract are currently developed. Commercial and industrial facilities would be constructed primarily within the developed areas and would replace many of the existing structures. Contemplated development would destroy or substantially modify at least 5 additional acres (2 hectares) of habitat, primarily ponderosa pine, pinyon-juniper, shrub, grassland, and wildflower areas. Highly mobile wildlife species or wildlife species with large home ranges (such as deer, elk, and birds) would be able to relocate to adjacent undeveloped areas; however, successful relocation may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development area. The impacts could include overgrazing, stress, and overwintering mortality. For less-mobile species (reptiles, amphibians, and small mammals), direct mortality could occur during the actual construction event or from habitat alteration. Development would reduce breeding and foraging habitat for wildlife currently utilizing the property and would be lost as potential hunting habitat for raptors and other predators. In addition, there would be a decrease in quality of the habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction.

Development in this tract could result in the accelerated loss of wetland vegetation present at the decommissioned industrial outfalls and loss of the small wetlands within both the TA 21 and Airport Tracts. Even if construction and development does not occur in the TA 21 or Airport Tracts' wetland, indirect impact such as additional surface runoff from an increase of impermeable surface areas (pavement), resulting in accelerated erosion and increased downstream and offsite sedimentation could occur.

There are three species that are Federal-listed as threatened or endangered that may potentially use the TA 21 Tract: the bald eagle, American peregrine falcon, and the Mexican spotted owl. With respect to the bald eagle, this area has a low level of potential use for foraging. Three Mexican spotted owl AEIs (Los Alamos Canyon, Pueblo Canyon and Sandia Canyon AEIs) overlap the TA 21 Tract, and development could affect approximately 133 acres (54 hectares) of core habitat (Los Alamos Canyon AEI) and buffer habitat comprised of approximately 92 acres (37 hectares) in the Los Alamos Canyon AEI, 63 acres (26 hectares) in the Pueblo Canyon AEI, and 18 acres (7 hectares) in the Sandia Canyon AEI. Two American peregrine falcon AEIs could be affected: 15 acres (6 hectares) of core habitat and 127 acres (51 hectares) of buffer habitat in the Pueblo Canyon AEI and 11 acres (4 hectares) of core habitat in the Los Alamos Canyon AEI (PC 1999d).

Because direct entry into the adjacent Los Alamos Canyon habitat would be available by descending established trails, increased recreational use is expected occur. However, recreational effects to the adjacent Los Alamos Canyon natural habitat are projected to be minor because the area is proposed for commercial development and not residential or recreational use.

The watershed management approach to natural resource management requires the integration of natural resource management plans across several land management agencies. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- and long-term natural resource management strategies for the Los Alamos Canyon watershed.

10.3.8 Cultural Resources

Direct impacts of the conveyance and transfer itself would result from the potential transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Eligible cultural resources are present in the TA 21 Tract and thus could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing these resources from future consideration under the *National Historic Preservation Act*.

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing them from consideration under the *Religious Freedom Restoration Act*, *American Indian Religious Freedom Act*, and Executive Order 13007, "Indian Sacred Sites." Finally, the disposition of this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing these items from consideration under the *Native American Graves Protection and Repatriation Act*, or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following paragraphs.

10.3.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts would be anticipated from the land use contemplated for the TA 21 Tract by the receiving parties. The receiving parties have identified a combination of commercial and industrial land uses on a minimum of 55 acres (22 hectares) of the tract. This analysis reflects the broad, planning-level impacts anticipated from this contemplated use.

Under the commercial and industrial development scenario, portions of the tract would be extensively altered by construction activities, including grading and trenching. These activities could result in primary impacts to NRHP-eligible resources through physical destruction, demolition, damage, or alteration. Resources avoided by construction on adjacent lands may be isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. The development of land may cause changes to the presence or integrity of, or access to natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

10.3.9 Geology and Soils

There would be no direct consequences of transfer of ownership of the TA 21 Tract. Indirect consequences would be as discussed in the following sections.

10.3.9.1 Environmental Consequences of the Contemplated Uses

The contemplated land use includes commercial and industrial development activities. There would be little to no anticipated change in land use under this scenario for the TA 21 Tract. Impacts to geology and soils would be limited to disturbances resulting from any upgrade to utilities and roadways.

10.3.10 Water Resources

Transfer of this tract may directly affect surface water quantity. Transfer would not directly affect surface water quality or groundwater quantity or quality.

10.3.10.1 Environmental Consequences of the Contemplated Uses

Surface water quantity and quality may be indirectly affected if the contemplated land use is pursued. The contemplated land use would not affect groundwater quality or quantity beneath the tract, but any associated increased water usage may contribute to the overall regional water level decline and possibly result in degradation of water quality within the aquifer.

Development and construction may potentially affect surface water quality within and downstream of the tract. Two sources of surface water, the NPDES-permitted outfalls associated with TA 21 operations, would be removed prior to disposition of the tract. This would reduce the quantity of surface water discharged into the adjacent canyons. Surface water quality could be impacted during construction and development of the tract as stormwater runoff may increase over areas that have been denuded and carry sediments and surface contaminants into the drainages. Possible mitigative measures are discussed in Chapter 16, Potential Mitigation Measures.

10.3.11 Air Resources

From a regional perspective, there would likely be a slight beneficial direct impact to air quality from the Proposed Action Alternative. LANL activities would be relocated, not terminated, and the tritium research facilities would be reconstructed. It is probable that newer process designs and newer emission control technologies would be installed. As a result, emissions of chemical and radiological air pollutants might decrease slightly from levels in the No Action Alternative. There would be little or no change to emissions of criteria pollutants. Indirect consequences are discussed in the following paragraphs.

10.3.11.1 Environmental Consequences of the Contemplated Uses

Under the Proposed Action Alternative, LANL facilities would be idled and then razed. New businesses potentially would include warehouses, service stations, repair garages, motels, stores, and office buildings. The result of this transformation would be a likely increase in emissions of criteria pollutants, a probable reduction in emissions of hazardous and other chemical air pollutants, and the elimination of radioactive air pollutants from TA 21. In short, air quality would improve somewhat.

Despite increased emissions of criteria pollutants, ambient air concentrations would likely continue to below standards established by the EPA and the State. With the removal of LANL operations, concentrations of hazardous and chemical air pollutants, which are already lower than health-based standards, would decrease. Doses from the inhalation of radioactive air pollutants would continue at approximately 2.5 to 4.0 millirem per year because most of this dose is the result of operations at the LANSCE, not the idled TA 21 operations.

10.3.11.2 Global Climate Change

It is assumed that this development would result in four office buildings (20 firms) and 50 commercial and industrial businesses. In turn, these businesses would require an estimated 56 commercial vehicles, a combination of vans, pick-up trucks, and automobiles. LANL facilities would be razed. Carbon dioxide emissions would result from the use of natural gas to heat buildings and through the use of commercial vehicles. Resultant emissions are estimated to be 2,500 tons (2,267 metric tons) of carbon dioxide per year. This would be a two-thirds reduction from emissions in the No Action Alternative, caused largely by the cessation of LANL activities. (The reduction would be for this tract alone, however. Regionally, carbon dioxide emissions could increase by 2,500 tons [2,267 metric tons] per year should tritium research continue elsewhere on LANL property.)

10.3.12 Human Health

There would be few direct impacts to human health from transfer of ownership of the TA 21 Tract. Tritium research activities would be assumed to be relocated to another LANL technical area, likely more distant from population centers than TA 21. However, because more than 90 percent of the dose to the regional populace stems from research at the LANSCE, this relocation would have little impact. Potential indirect consequences are discussed in the following sections.

10.3.12.1 Environmental Consequences of the Contemplated Uses

Commercial development would bring an estimated 1,900 new workers into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. While all doses would be within health-based standards established by other Federal agencies, the closer proximity would increase the radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.

Radiation doses received by workers would range from 2.5 millirem (at the western edge) to 4.0 millirem (at the eastern edge) per year at this tract (DOE 1999c, Chapter 5). Because this tract lies within the radiation site evaluation circle for the LANSCE, however, potential radiological impacts of the disposition and subsequent development may warrant additional consideration.

No changes in cancer risk should be expected. Nonradiological exposures would be expected to be below health-based standards. Residents would face the same hazards to floods and wildfires as workers now do but should have adequate time to evacuate the premises. Seismic events come without warning and would carry risks of physical injury from building collapses.

10.3.12.2 Chemical Accidents

Accident assessment would be the same as described in the No Action Alternative. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached TA 21, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

10.3.12.3 Radiological Accidents

Subsequent to transfer of ownership, the MEI dose at this tract would be the same as described in the No Action Alternative. The MEI doses would be greater than 200 millirem for 4 of 13 scenarios postulated in the SWEIS: 17 rem for RAD-02 (natural gas pipeline failure, explosion, and fire at the CMR Building), 220 millirem for RAD-07 (fuel leak and fire at the Waste Characterization, Reduction, and Repackaging [WCRR] Facility), 8 rem for RAD-12 (plutonium release from the Dual Axis Radiographic Hydrodynamic Test [DARHT] Facility during an earthquake), and 1.2 rem for RAD-15B (explosion followed by fire in an entire wing of the CMR Building).

For the contemplated commercial and industrial development land use, there would be substantial increases in collective tract dose and excess LCFs. For example, the LANL SWEIS estimated a collective population dose of 120,000 person-rem for all people living within a 50-mile (80-kilometer) radius of LANL, resulting in an estimated 57 excess LCFs for hypothetical accident RAD-02. This would increase by another 8,000 person-rem and four LCFs under the commercial and industrial development land use. Table 10.3.12.3-1 compares the estimated additional consequences of all hypothetical radiological accidents.

10.3.12.4 Natural Event Accidents

Natural event accidents would have no estimated chemical consequences at the TA 21 Tract. For the postulated accidents (wildfire and four earthquake scenarios), chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume would reach the tract, even under adverse weather dispersion conditions.

The MEI doses would be the same as described in the No Action Alternative. The maximum dose resulting from the postulated wildfire would be about 0.1 rem; that from the most severe earthquake would be about 30 rem. If the tract were developed commercially, however, there would be significant increases in collective tract dose

Table 10.3.12.3-1. Additional Accident Consequences Associated with the Commercial and Industrial Land Use on the TA 21 Tract

				BOTH DEVELOPMENT SCENARIOS[a]		SWEIS ESTIMATES[b]	
Accident Scenario	Accident Location	Facility	Frequency per Year	Collective Dose[c]	Excess LCF	Collective Dose[c]	Excess LCF
RAD-01	54-38	RANT	1.6×10^{-3}	57	0.03	72	0.04
RAD-02	03-29	CMR	1.5×10^{-6}	8,000	4.0	120,000	57
RAD-03	18-116	Kiva #3	4.3×10^{-6}	48	0.02	100	0.06
RAD-05	21-209	TSTA	9.1×10^{-6}	NA[d]	NA[d]	24	0.01
RAD-07	50-69	WCRR	3.0×10^{-4}	120	0.06	1,300	0.69
RAD-08	54-230	TWISP	4.3×10^{-6}	74	0.04	400	0.2
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	0	4	0
RAD-09B	54-226	TWISP	4.9×10^{-3}	47	0.02	230	0.12
RAD-12	16-411	--	1.5×10^{-6}	4,700	2.3	35,800	18
RAD-13	18-116	Kiva #3	1.6×10^{-5}	70	0.04	160	0.08
RAD-15A	03-29	CMR	3.6×10^{-5}	32	0.02	175	0.09
RAD-15B	03-29	CMR	3.2×10^{-5}	570	0.29	3,400	1.7
RAD-16	03-29	CMR	3.5×10^{-6}	2	0	56	0.03

Notes: mrem = millirem, RANT = Radioactive Assay and Nondestructive Test, TWISP = Transuranic Waste Inspectable Storage Project

[a] In addition to doses estimated in the LANL SWEIS.

[b] For the entire population within a 50-mile (80-kilometer) radius of LANL.

[c] Person-rem

[d] Not applicable. Accident could not occur at TA 21 if land were transferred.

and excess LCFs. The most severe earthquake would result in an estimated tract collective doses greater than 20,000 person-rem, and in approximately 12 excess LCFs. These exposures would be in addition to those estimated in the LANL SWEIS (340,000 person-rem and 230 excess LCFs for SITE-03B).

10.3.13 Environmental Justice

There would be no direct or indirect consequences of the Proposed Action Alternative. For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated land uses estimate that air emissions and hazardous chemical and radiological releases from LANL operations would be expected to be within regulatory limits, and no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on the tract.

The analyses also indicate that socioeconomic changes resulting from implementing the Proposed Action Alternative would not lead to environmental justice impacts. Under the Proposed Action Alternative, modest economic benefits would arise from the additional jobs created during construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local governments. Each of these impacts would be positive and would not disproportionately affect low-income or minority populations.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process.

10.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the TA 21 Tract would not immediately cause any irreversible or irretrievable commitments of resources. Subsequent commercial and industrial development would, however, cause the irretrievable commitment of resources during construction and operation of new businesses. Construction of these buildings would require the irretrievable commitment of standard building materials such as lumber and roofing materials. Energy would be expended in the form of natural gas and electricity. Additional water also would be consumed.

10.3.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the TA 21 Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources, as development of previously undisturbed areas could result in physical destruction, damage, or alteration of cultural resources on the tract. The conveyance or transfer of the tract also could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

Development also would cause adverse impact through increased need for and use of utilities. Increased demand for water, solid waste, and sewage services would have adverse effects in the immediate Los Alamos region by lowering the aquifer level more quickly, shortening the remaining lifetime of the County landfill, and increasing both the quantities of sewage that require treatment and the quantities of treated sewage discharged to the environment. The environmental effects of increased demand for electricity and natural gas would be felt elsewhere (in the Four Corners region, for example), in the form of increased emissions of air pollutants in order to generate electricity. Increased consumption of natural gas adds to global climate change through increased emissions of carbon dioxide.

Development also would lead to increases traffic by increasing the labor force within the County. The addition of an estimated 1,900 new workers would in a 10 to 15 percent increase in commuter traffic, with attendant increases in congestion and traffic noises during daylight hours. Noise levels would increase within the TA 21 Tract because the current work force is less than one-fourth that projected subsequent to development. The visual environment would deteriorate from that created by the demolition of existing LANL structures (although more modern architectural designs might result in visual improvement when compared to that of today).

Finally, development would bring more members of the public into closer proximity to LANL facilities, thereby increasing the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The location is not far from the Small Business Center Annex (on East Gate Drive), the location of LANL's MEI, due to radiological air emissions from the LANSCE on the adjacent mesa. While all doses would be within health-based standards established by other Federal agencies, the closer proximity also would increase the radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.

Finally, commercial and industrial development would increase the potential for degradation of surface water quality. Standard mitigation measures, however, can limit both short- and long-term impacts to surface water quality.

10.3.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

The actual conveyance or transfer of TA 21 Tract would not immediately cause any specific impacts on short-term uses of the environment. Environmental restoration activities at the tract, already completed before ownership is transferred, would cause some short-term disruption and use of resources but would ultimately provide for long-term improvement in environmental quality and associated productivity. Demolition of LANL facilities also would lead to improvements in the visual environment.

The tract is located immediately adjacent to the Los Alamos townsite, and land use has been commercial and industrial for five decades. Continued commercial and industrial land use would, therefore, be compatible with the long-term uses of the land.

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11.1 Affected Environment

11.1.1 Land Use

The Airport Tract consists of approximately 205 acres (83 hectares) and is located on the northeastern edge of the mesa above Pueblo Canyon and to the east of the Los Alamos townsite (see Figure 11.1.1-1, Airport Tract Layout). The bottom of Los Alamos Canyon to the south and the mesa's edge to the north define the tract's boundaries. The tract includes land on both sides of State Road 502, which serves as the main entrance to the community of Los Alamos.

Since 1948, the Airport Tract has primarily been used for commercial air transportation. Prior to that, the tract served as a landfill upon which the Los Alamos Airport was ultimately constructed. Other past activities at the tract included the use of portions of the tract for construction supply and storage. The area of the tract to the north side of East Road surrounding the Airport's runways and support buildings is primarily grassland. Areas to the south of East Road are primarily covered in juniper-savannah with open shrub, grasslands, and wildflower areas. Areas of the tract to the south of East Road are adjacent to sensitive wildlife habitat and archeological sites.

Currently, the Airport handles both commercial and private air transportation, as well as emergency transport and support (for example, medical and fire response). Los Alamos County operates the Airport, under a lease agreement from the DOE (DOE 1998b). Directly to the west of the Airport and north of East Road is a single-family residential development (DOE 1998b). Directly to the east of the Airport is the Small Business Center Annex (on East Gate Drive), consisting of offices and other light commercial and retail land uses. Other land uses along East Road to the west and in reasonable proximity to the Airport include several churches, a public swimming facility, and a park (LAC 1998). Immediately to the north of the tract is a steep drop off the mesa's edge. Land on the south side of East Road is undeveloped area that serves as a buffer area for LANL operations.

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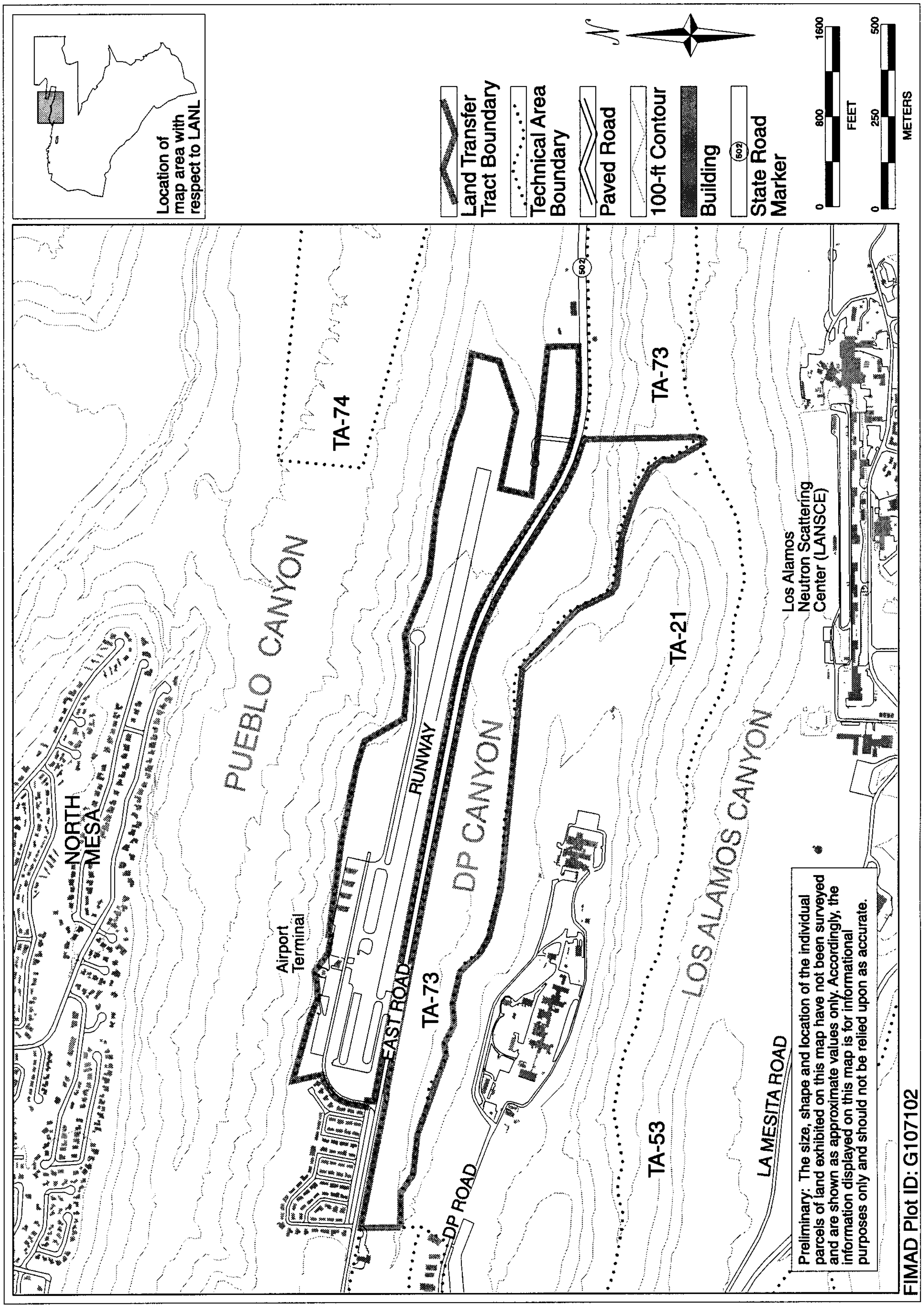

Figure 11.1.1-1. Airport Tract Layout.

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The DP Canyon crossover trail (see Figure 3.2.1-2 in Chapter 3) crosses portions of the tract located south of State Road 502 (LANL 1998c). No other recreational opportunities are associated with the Airport Tract.

Figure 11.1.1-2 shows the location of various environmental media monitoring stations on the subject land tract.

11.1.1.1 Environmental Restoration

The Airport Tract contains 24 potential release sites (PRSs) within its boundaries and has another within 50 feet (15 meters) of the tract boundary. These PRSs consist of five surface units, eight subsurface units, six outfalls, and six former material disposal areas (MDAs). Some sampling and characterization has been performed 19 of the 25 sites, and 2 have already been cleaned up. There also are four structures on the tract: the terminal building, a gas meter station, a storage building, and a storage shed. There are no other environmental restoration or decommissioning concerns at this tract.

Figure 11.1.1.1-1 shows areas with potential contamination issues (PCIs) within this tract, as well as areas with no known contamination. Only the southern tip of the tract appears to have no known contamination issues, although much of the tract has not yet been characterized. The areas to the south of East Road were formerly known as "contractors' row," and are suspected to contain substantial construction debris with potential contamination. As a result, PCI acreage is estimated to total 185 acres (75 hectares), almost the entire tract.

11.1.2 Transportation

The Los Alamos Airport is adjacent to East Road, which changes designation from State Road 502, a two-lane State highway entering the Los Alamos townsite from the east (see Figure 11.1.1-1). Current capacity of this road is approximately 2,200 passenger cars per hour (pcph). Data provided by the County of Los Alamos show that East Road carried approximately 1,500 vehicles in the peak hour in September 1998. State traffic flow maps show that the average annual weekday traffic on East Road was 17,250 vehicles in 1996 near this location. As a general rule, when peak hour traffic is 10 percent of the average annual weekday traffic, a road is at or near its capacity. Using this rule, it appears that East Road is approaching full capacity at this location.

The level of service (LOS) determined for this section of East Road was LOS E, which is defined as operating conditions of maximum capacity. Applying the U.S. Census Bureau's 1.5 percent annual growth rate to the existing traffic maintains the LOS at E in about 2018. However, it will degrade to LOS F, or traffic jam conditions, shortly after 2018. Widening State Road 502 and East Road to four lanes near the site will improve the level of service to LOS B (good operating conditions with stable traffic flow) in about 2018.

Under existing traffic volumes provided by the New Mexico State Highway and Transportation Department (NMSH&TD), State Road 502 east of the Airport operates at LOS E or F coming up the mesa, due to the mountainous terrain.

11.1.3 Infrastructure

Figure 11.1.3-1 shows the location of structures, roads, and utility lines for the Airport Tract. Industrial and security fence lines are shown on Figure 11.1.3-2. Operation of the Airport is provided by the County of Los Alamos. All utilities and structures are owned by the County, but the land is leased from the DOE. Development on the Airport Tract consists of the runway, taxiways, terminal, private hangars, parking, and associated facilities. East Road, a two-lane road, bisects the site and is separated from the airport runway by fencing. The site has all

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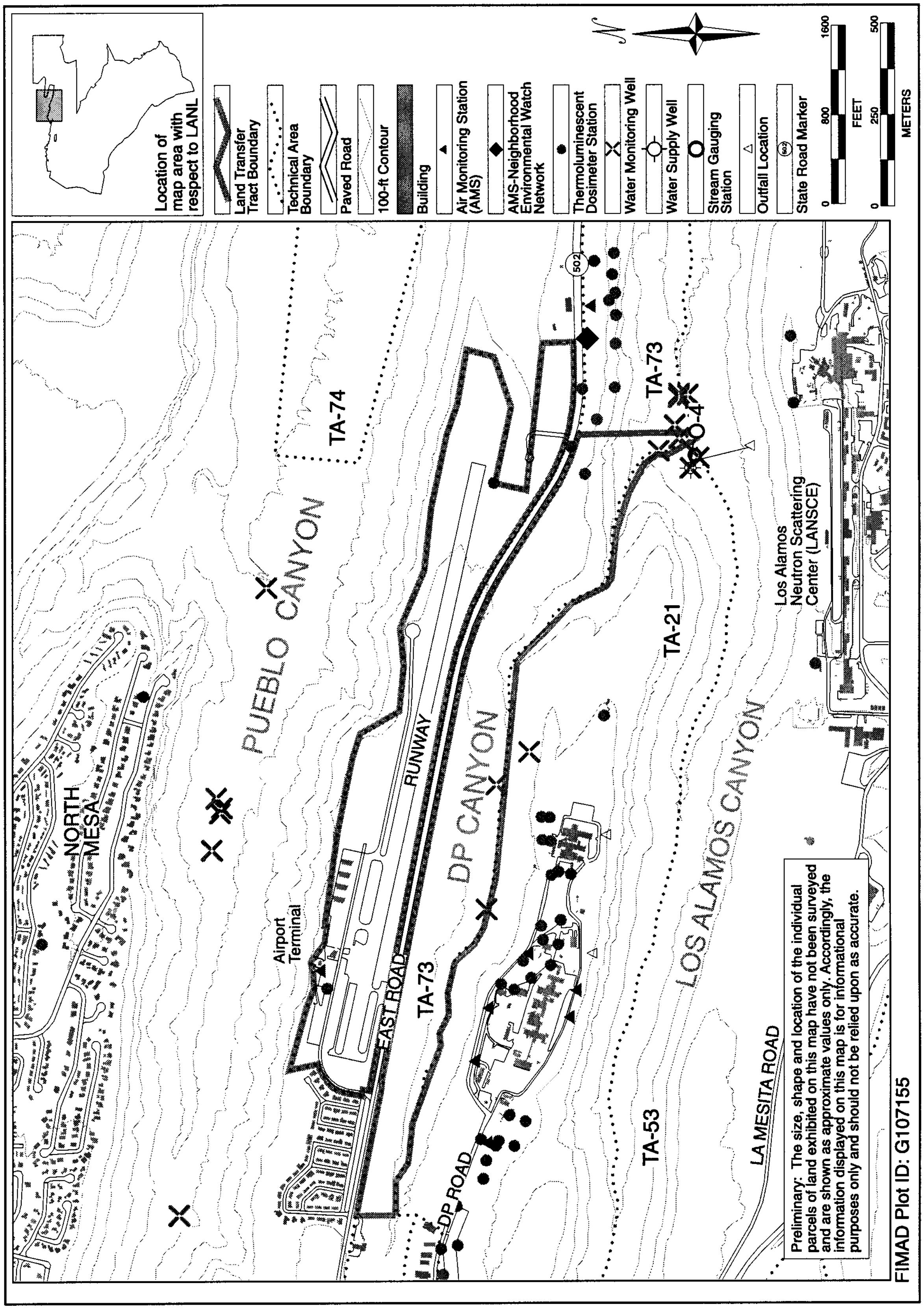

Figure 11.1.1-2. Airport Tract Monitoring and Outfall Locations.

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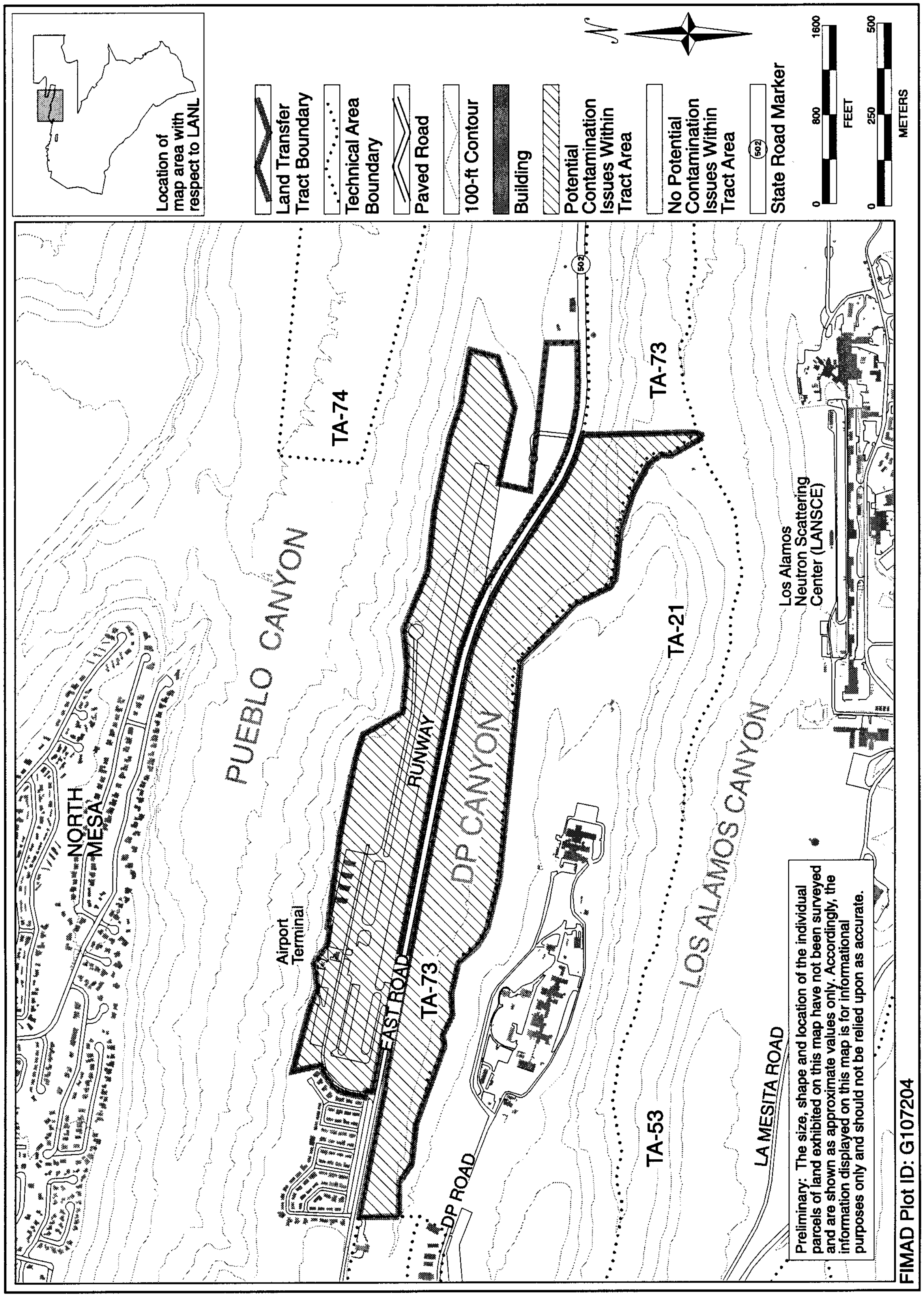

Figure 11.1.1.1-1. Airport Tract Potential Contamination Issue Areas.

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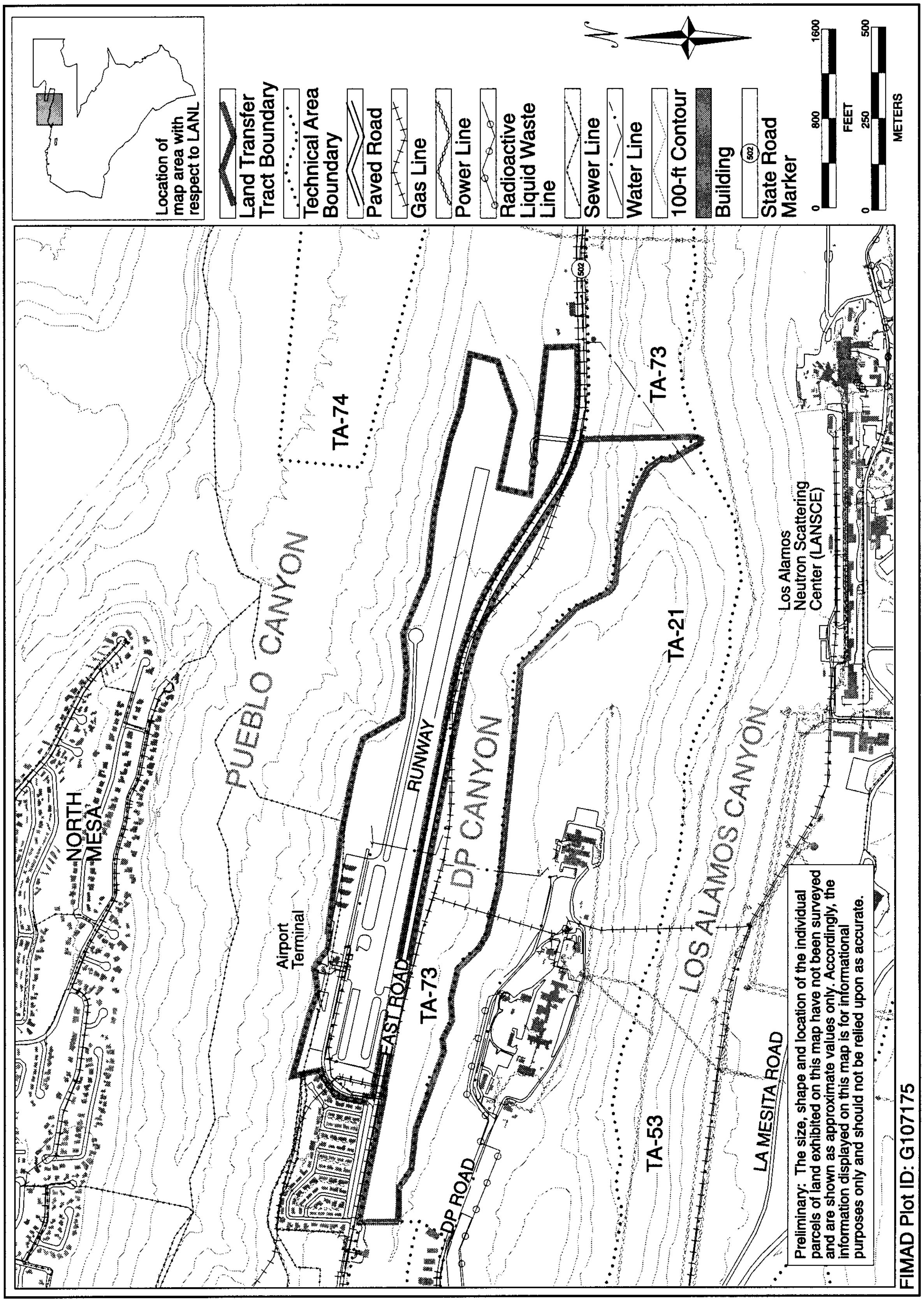

Figure 11.1.3-1. Airport Tract Utilities and Infrastructure.

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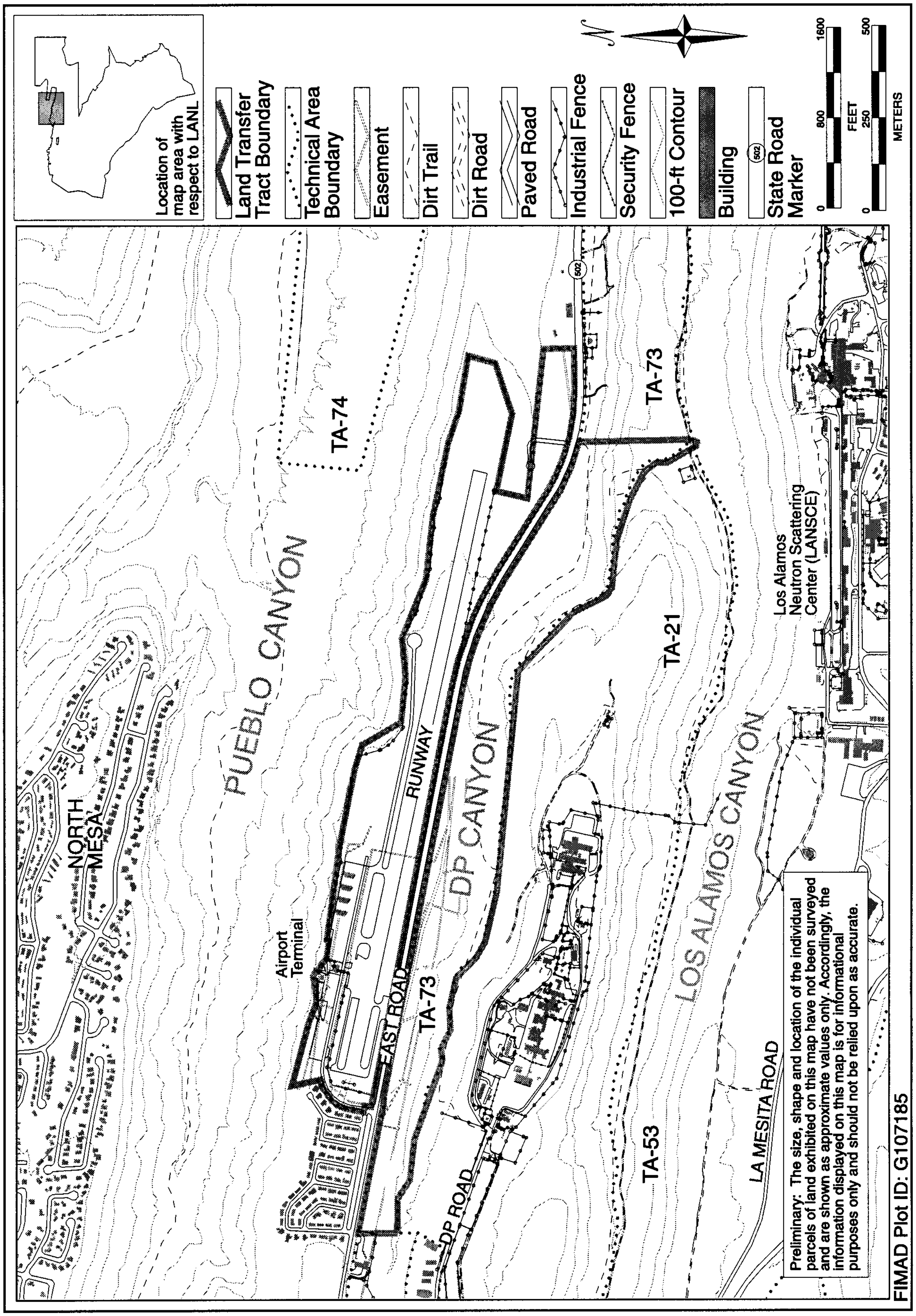

Figure 11.1.3-2. Airport Tract Industrial and Security Fence Lines.

utilities available. This tract is not metered separately for any utilities, and no figures for current utility usage are available.

11.1.4 Noise

The Airport Tract lies adjacent to East Road. Vehicular traffic from the highway is the major source of ambient noise for this tract of land. The takeoff and landing of small airplanes contribute intermittently to noise levels. Ambient noise levels vary with distance from the highway. At the northern edges of Technical Area (TA) 73, the edge most distant from the highway, ambient noise levels are estimated to be less than 40 decibels, A-weighted (dBA). At the southern edge, along the highway, background levels are likely to be in the range of 60 to 70 dBA during the daytime.

11.1.5 Visual Resources

The Airport Tract includes the developed airport facility on the north side of East Road and the undeveloped vegetated area to the south of East Road. Views from the Airport Tract include views to the north across Pueblo Canyon and south across East Road to the undeveloped portion of this tract. Views of the Airport are mainly from East Road and from the subdivision adjacent to the west. This tract was analyzed by assigning two rating units to the tract based on the difference in the visual character with regard to manmade modifications on the north and south sides of East Road. The area north of East Road, Rating Unit 1, is developed for airport functions, while the area south of the road, Rating Unit 2, is undeveloped.

After scenic quality, distance zone, and sensitivity level components were combined using the Inventory Class Matrix, it was determined that the developed airport portions of the tract have moderate public value for visual resources, Scenic Class III, and the undeveloped portions of the tract have high public value for visual resources, Scenic Class II.

11.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer.

This tract consists of the Airport, a commercial air service operated by Los Alamos County under a lease agreement with the DOE. All employment on the tract is associated with the Airport.

11.1.7 Ecological Resources

The Airport Tract occupies the mesa top adjacent to and above Pueblo Canyon. The vegetation of the tract, covering approximately 60 percent of the land area, is primarily ponderosa pine forest; pinyon-juniper woodland; and open shrub, grassland, and wildflower areas. The remaining 40 percent of the area is developed as roadway, parking lots, runway, and buildings. The flora and fauna are typical of the region. There are no perennial surface water courses or floodplains within the tract. A small willow-dominated wetland exists in the bottom of DP Canyon near the top of the drainage. This wetland overlaps portions of the Airport and TA 21 Tracts. See Appendix D of this CT EIS for further description of the wetlands and floodplains. Foraging habitat is present for the bald eagle, Mexican spotted owl, and American peregrine falcon. Los Alamos Canyon and Pueblo Canyon areas of environmental interest (AEIs) overlap the Airport Tract for both the Mexican spotted owl and American peregrine falcon. Noise is generated from vehicle traffic utilizing the Airport and from State Road 502 and aircraft landings and takeoffs. The Airport Tract is lighted at night by security and commercial lighting at the Airport and by adjacent residential areas.

11.1.8 Cultural Resources

The Airport Tract was used from the Archaic period through the Nuclear Energy period. Prior to DOE use, this tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on LANL and privately held lands.

One hundred percent of the Airport Tract has been inventoried for historic and prehistoric cultural resources. Survey results indicate that there are five cultural sites within the tract, two of which are prehistoric and three are historic. Both of the prehistoric sites have been evaluated as eligible for the National Register of Historic Places (NRHP). The historic sites include two buildings and a trash scatter that may be associated with historic developments during the Nuclear Energy period. These buildings have been evaluated as eligible for the NRHP, and the trash scatter was evaluated as not eligible. There is a potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials in the Airport Tract.

There are no known traditional cultural properties (TCPs) located within the Airport Tract. Consultations to identify TCP resources have not been conducted. TCPs may be identified during further consultations with Native American and Hispanic groups regarding the traditional uses of this tract. TCPs would not be anticipated in developed parts of the tract.

Additional information on the cultural resources of the Airport Tract is presented in Appendix E of this CT EIS.

11.1.9 Geology and Soils

The Airport Tract is located on the northeastern edge of the mesa above Pueblo Canyon and to the east of the Los Alamos townsite (see Figure 11.1.1-1). Although heavily developed, the tract is underlain by the Hackroy sandy loam and steep rock outcrops along the canyon rim. Outcrops are the upper member of the Bandelier Tuff (Tshirege), typical of the Pajarito Plateau. No major surface faulting is evident in this tract.

11.1.10 Water Resources

The Airport Tract is located on the mesa top between Los Alamos and DP Canyons, and the northern and southern boundaries extend to the bottom of these canyons. Both canyons are ephemeral drainages in the vicinity of the tract. Both Los Alamos and DP Canyon receive stormwater runoff and snowmelt from the mesa top and surrounding areas. One spring, DP Spring, flows from the DP Canyon wall but does not maintain flow into the canyon bottom. A discussion of a wetland in the bottom of DP Canyon is included in Appendix D.

There are no stream gages within the Airport Tract. There are two surface water monitoring stations located on the southern tract boundary, DPS-1 and DPS-4. There is one test well within the tract and one regional aquifer supply well several hundred feet to the southwest.

A portion of the Airport Tract is within the 100-year floodplain. Assessment of this floodplain is included in Appendix D.

11.1.11 Air Resources

Air quality at the Airport Tract is primarily affected by LANL operations at TA 21 and the Los Alamos Neutron Science Center (LANSCE). Pollutant contributions also arise from traffic on East Road and from the airplanes that use the Los Alamos Airport.

The Airport Tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Except for small amounts of carbon monoxide and ozone resulting from hydrocarbons emitted from motor vehicles and airplanes, there are no sources of criteria pollutants within the tract itself.

There are no sources within the tract that emit hazardous or other chemical air pollutants, so concentrations of these pollutants at the tract are the result of other activities, primarily those at TA 21. Analysis shows that about 130 different chemicals have been or are being used at TA 21. However, short-term exposures resulting from inhalation of chemical air pollutants at points along the current boundaries of TA 21 were all estimated to be less than health-based standards (which implies that concentrations at the Airport would likely be lower), and there are no anticipated adverse health effects. Likewise, long-term exposures (such as for sensitive receptors in Los Alamos and nearby areas) also were estimated to be less than health-based standards (DOE 1999c, Chapter 5).

Just off of the eastern edge of this tract is the location of the maximally exposed individual (MEI) for radiation doses from all of LANL's operations. The estimated dose from air pollutants for the MEI in 1997 was 2.2 millirem, which assumes an individual resided there 24 hours per day for 365 days (DOE 1999c). Other years brought higher doses, and the LANL SWEIS analysis estimated a dose of 3.1 millirem. This is at the eastern boundary of the tract. At the western edge, the dose is estimated at about 1.1 millirem (DOE 1999c, Chapter 5).

11.1.11.1 Global Climate Change

At present, this tract has only one heated structure, the terminal building. The building is small, and natural gas consumption is estimated to approximate that for a home. Greenhouse emissions are estimated to consist of only 6 tons (5 metric tons) of carbon dioxide per year.

11.1.12 Human Health

11.1.12.1 The Radiological Environment for the Airport Tract

TA 73, which encompasses the Airport, is the second closest land tract to LANL's LANSCE, which is the primary source of radioactive emissions as measured for the LANL offsite MEI. The eastern tip of this land tract is just a little farther from the LANSCE than the MEI. This tract is currently leased by the County, and LANL has no operational facilities there. The dose to non-LANL personnel on this site from the LANSCE would be less than that to the MEI. The LANL SWEIS estimates doses of 3.1 millirem per year to the MEI, and 1.1 millirem at the western edge of the tract (DOE 1999c, Chapter 5). Doses are thus within the EPA standard of 10 millirem per year. Individuals at the Airport Tract site also are assumed to be Los Alamos residents who would receive the area background dose. Radiological PRSs and other sources of contamination exist on this site, but these have not been completely characterized. This tract has the second highest potential radiation dose of all the land tracts to be considered for conveyance or transfer because of its proximity to the LANSCE.

The Airport Tract lies within one of LANL's one-half mile radiation site evaluation circles due to activities at TA 21 on the neighboring mesa, and within the edge of another such circle due to activities at the LANCE. The radiation site evaluation circles (see Figure 11.1.12.1-1) were included in LANL's 1990 Site Development Plan (LANL 1990). These circles were intended to be used as planning tools for site developers and other project managers responsible for siting new facilities or operations to inform them of the presence of existing radiation sources and the need to evaluate their proposed action(s) against this information. The circles are not representative of a particular dose of radiation to the Airport

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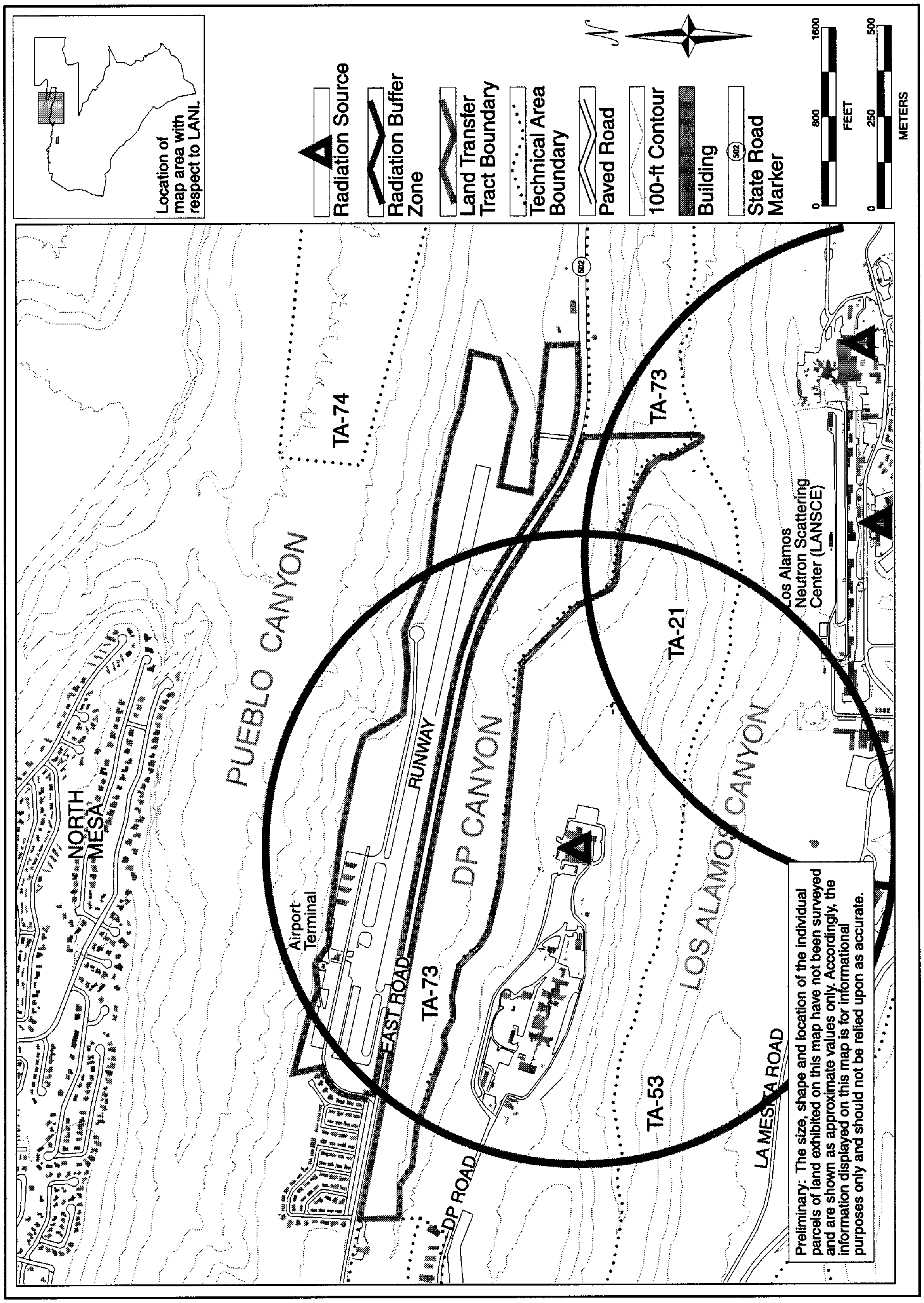

Figure 11.1.12.1-1. Airport Tract Radiation Site Evaluation Circles.

Tract under either normal or accident conditions, and are noted herein for the purposes of disclosure with regard to the nearest radiation source location relative to the tract. The quantities of radioactive material and other sources of radiation identified by these radiation evaluation circles were evaluated in the 1999 LANL SWEIS, as previously discussed.

11.1.12.2 The Nonradiological Environment for the Airport Tract

Exposures to nonradiological contaminants via an airborne pathway in the LANL vicinity have already been shown not to be significant for the affected environment (DOE 1999c). PRSs and other contamination on this tract may include nonradiological constituents, but the site has not been completely characterized. It is not known if hazardous materials are used on the tract.

11.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reached the Airport Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the LANL SWEIS, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. Using data from the LANL SWEIS, doses to the MEI at the Airport have been estimated for each of these, as shown in Table 11.1.12.3-1.

Because there are no residents and few public workers at the tract, estimated tract collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe postulated earthquake (accident SITE-03B) has an estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The earthquake scenario would release chemicals from a number of facilities, including formaldehyde from the Health Research Laboratory (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed for chemical accidents, earthquakes would have no estimated consequences at the Airport Tract. The most severe postulated earthquake, however, would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of approximately 30 Roentgen equivalent man (rem) at the tract.

The postulated site wildfire scenario would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at the Airport is estimated to be about 0.1 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Table 11.1.12.3-1. MEI Doses for the Airport Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-3}	67	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	9,500	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	51	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	11	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	120	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	92	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	58	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	2,600	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	75	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	38	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	690	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	3	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

(Because there are no residents and few public workers at the tract, estimated tract collective dose and estimated excess LCF are both zero for all five natural event accident scenarios.)

11.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile 80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

11.2 No Action Alternative

11.2.1 Land Use

There would be no anticipated change to land use at the Airport Tract under the No Action Alternative. Land use at the tract would continue to provide commercial, private, and emergency air transport services. Lease agreements between the DOE and the County of Los Alamos would be anticipated to continue. Land located to the south of State Road 502 would continue to serve as a buffer area for LANL operations.

11.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006, although some LANL sites may take longer. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the Airport Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 11.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report (DOE 1999b).

This information indicates that PRS cleanup is likely to include 9 removal actions and in situ containment for 10 former disposal areas. No cleanup is anticipated to be required for the four structures. Cleanup of PRSs is estimated to require more than 6 years for the longest cleanup segment. (Multiple sites can be restored simultaneously, so cleanup duration is determined by the site that requires the most time.) Waste volumes are projected to range to approximately 24,460 cubic yards (18,690 cubic meters). The cost estimate for remedial action at this parcel is about $28,217,000. This estimate is based on the information currently available for each PRS or structure, and is subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual "cleanup." It is possible that the administrative authority could require additional actions, resulting in greater waste volumes, a longer cleanup duration, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

11.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on Airport Road near the site, other than the anticipated annual growth rate of 1.5 percent as estimated by the U.S. Census Bureau. The future operational performance of Airport Road and East Road would remain similar to that of the existing performance, LOS E (maximum capacity), slowly degrading to LOS F (traffic jam conditions) in year 2020.

The topography of the area also affects traffic flow because the majority of the traffic that passes by the Airport Tract also climbs the mesa on East Road. The mountainous terrain of this climbing section causes a reduction of the road capacity and contributes to the degradation in LOS.

11.2.3 Infrastructure

The No Action Alternative would result in no changes in the infrastructure or utilities of this tract. The Airport would continue to be operated under lease agreement with the

DOE. The level of utility usage would not change appreciably. Thus, implementation of the No Action Alternative would have no substantial environmental impacts related to infrastructure.

11.2.4 Noise

In the No Action Alternative, the Airport Tract would continue to be used as an airport that services only private and small commercial craft. Ambient noise levels would remain the same as those which currently exist, decreasing from 60 to 70 dBA along State Road 502 to 40 dBA or less along the northern boundary of the tract.

11.2.5 Visual Resources

Under the No Action Alternative, it is expected that the tract would remain much as it is today—that is, airport facilities and forested land would not change, and current visual resources would remain the same.

11.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

11.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at the Airport Tract, as described in Section 11.1.1. Therefore, no impact to ecological resources is projected under the CT EIS No Action Alternative.

11.2.8 Cultural Resources

Under the No Action Alternative, the Airport Tract would remain the responsibility of the DOE, and the treatment of any cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. The use of the Airport Tract facilities, which may include potentially NRHP-eligible resources, would continue. Planned evaluation of these structures would continue, and information would be available to the DOE to ensure stewardship of these resources. Other positive impacts of the No Action Alternative would be the passive preservation of resources due to lack of development.

Ongoing negative impacts from natural processes (such as erosion, fire, seismic events, and aging of buildings) on the physical integrity of cultural resources would continue. Also, the potential for negative impacts from continued recreational activities (namely hiking), access by the public, and the lack of security would continue. These impacts include unintentional destruction or damage of resources, vandalism, and unauthorized collection of materials and artifacts. These impacts apply both to resources within the tract and to those located nearby but outside of the tract boundary on LANL lands.

11.2.9 Geology and Soils

Consequences would be limited to existing uses. The tract is already developed; no additional utilities, roadwork, or buildings would be required. No soil disturbance or change in availability of resources would be anticipated, except for those associated with environmental restoration activities. Existing structures are vulnerable to greater than magnitude 7 seismic events (as registered on the Richter scale) and wildfire episodes.

11.2.10 Water Resources

Continuation of the current use of this tract by the DOE would be anticipated under this alternative. Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

11.2.11 Air Resources

As projected in analyses performed for the LANL SWEIS, air quality at the tract would remain high under the No Action Alternative. Analyses indicate that the Los Alamos region would continue as an attainment area for criteria pollutants—that is, it would continue to comply with NAAQS. Similarly, analyses showed that concentrations of hazardous and other chemical air pollutants would continue to be below health-based standards for any point beyond the LANL technical areas that have chemical airborne emissions. Because there would be no chemical emissions from the Airport, and because the Airport Tract lies outside other technical area boundaries (for example, TA 21), it can be concluded that concentrations of chemical pollutants at the tract also would likely be below health-based standards. Finally, analyses indicate that concentrations of radioactive air pollutants from LANL operations at the Airport Tract would deliver doses between 2.1 (western edge) and 5.4 (eastern edge) millirem per year, or from 21 to 54 percent of the EPA standard (DOE 1999c, Chapter 5).

11.2.11.1 Global Climate Change

The affected environment and No Action Alternative land uses are identical. Hence, carbon dioxide emissions would remain at an estimated 6 tons (5 metric tons) annually.

11.2.12 Human Health

There would be no identifiable human health consequences for the No Action Alternative for the Airport Tract. Radiation doses received at this tract would be estimated to approximately double from today's levels, ranging from 2.1 millirem (at the western edge) to 4.0 millirem (at the eastern edge) per year at the tract (DOE 1999c, Chapter 5). Doses would remain, however, within the EPA standard of 10 millirem per year (DOE 1999c, Chapter 5). No changes for cancer risk should be expected for this alternative.

No significant nonradiological increases in exposures would be expected. LANL employees should have adequate time to evacuate the premises for floods or for wildfires. Because earthquakes usually come without warning, the human health impacts due to seismic events likely would be greater than flood or wildfire. Seismic events would carry risks of physical injury from building collapses.

11.2.12.1 Chemical Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time the air plume reached the Airport Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

11.2.12.2 Radiological Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. The MEI doses would be greater than 500 millirem for 3 of 13 scenarios postulated in the LANL SWEIS. The estimated tract collective dose and estimated excess LCF would both be zero.

11.2.12.3 Natural Event Accidents

Accident assessment would be the same as discussed in the Affected Environment of this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be about 0.1 rem; the maximum dose from the most severe earthquake would be approximately

30 rem. Because there are no residents and few public workers at the tract, the estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

11.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations, which would continue under the No Action Alternative, would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents at LANL would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

11.3 Proposed Action Alternative

There are no DOE facilities or activities on this tract that would need to be relocated or otherwise would be affected by the proposed disposition of this tract, except for several environmental monitoring stations. Environmental effects involved in the relocation of these monitoring stations would be negligible. Under the Proposed Action Alternative, the Airport would transfer to the new owner and would remain operational at least for the duration of the current lease agreement. Therefore, there would be no direct consequences of the transfer of ownership of the tract other than those associated with potential loss of Federal protection of cultural and ecological resources (see Sections 11.3.7 and 11.3.8 respectively).

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections.

11.3.1 Land Use

11.3.1.1 Description of Contemplated Uses

Land uses contemplated for the Airport Tract include a combination of commercial development and airport, and industrial uses (see Figure 11.3.1.1-1). The following paragraphs provide description of these land uses.

Land use identified for the Airport Tract could include the continued use of approximately 93 acres (38 hectares) to the north of State Road 502 for the Airport and related uses. An area of about 16 acres (6 hectares) to the west and adjacent to the Airport also could be developed for heavy commercial land uses.

Land uses to the south of East Road could include the development of about 90 acres (36 hectares) as an office and business park based on Airport-related industry and potential retail uses. Both the office and business park proposed to the south of East Road and the heavy commercial use proposed to the north of East Road lie in areas of limited development potential due to airport flight and clear zones restricting slope, building height, and other aspects of development. Table 11.3.1.1-1 summarizes the attributes of the land uses proposed for the Airport Tract.

11.0 AIRPORT TRACT

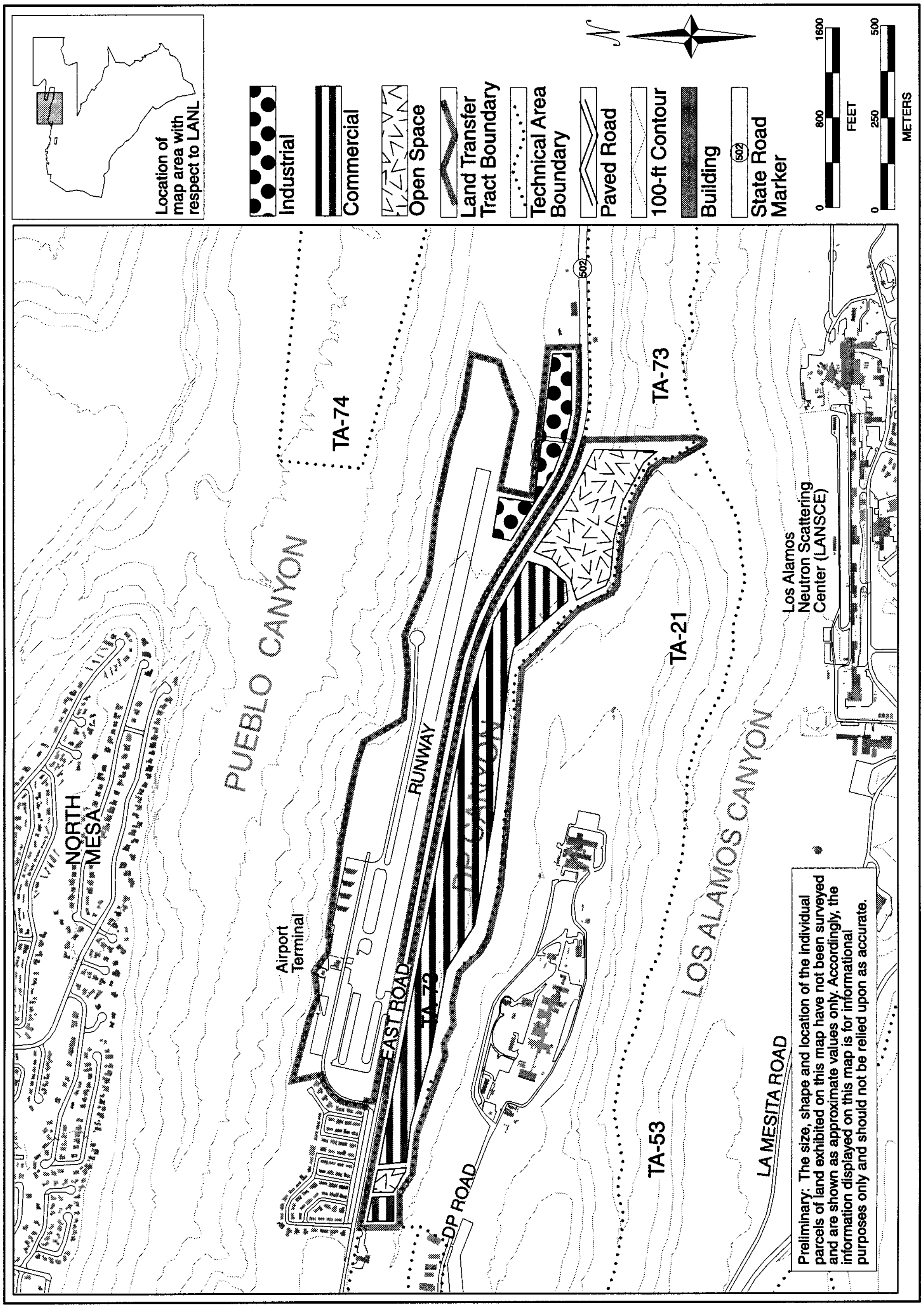

Figure 11.3.1.1-1. Airport Tract Contemplated Land Uses.

Table 11.3.1.1-1. Attributes of Future Land Uses for the Airport Tract Under the Airport, Commercial, and Industrial Land Use Scenario (North and South of State Road 502)

AIRPORT, COMMERCIAL, AND INDUSTRIAL LAND USE—NORTH OF EAST ROAD
• The Airport, which consists of approximately 93 acres (38 hectares) would continue to dominate land use as a public airport to the north of State Road 502. • An area east of the Airport and also north of State Road 502 (16 acres [6 hectares]) could be developed for industrial land uses. • Because of the location of the Airport at the entryway to the community, some screening and landscaping could be added as a component of the development of the area.
COMMERCIAL AND INDUSTRIAL LAND USE—SOUTH OF EAST ROAD
• Areas to the south of East Road (approximately 90 acres [36 hectares]) could be developed as an office and business park based on airport-related industry and/or retail uses. • When fully developed, lands on both sides of East Road would be occupied by 200 businesses with 3,100 total employees and 120 commercial vehicles.

11.3.1.2 Environmental Consequences of the Contemplated Uses

There would be little anticipated change in land uses associated with the development proposed for the Airport Tract, where Airport activities would remain the dominant land use. Although these land uses would be disturbed to the north and to the south of State Road 502 under this scenario, retail, commercial, and heavy commercial land use, and/or the continuation of Airport activities would each be viewed as compatible with existing and adjacent land use of the Airport Tract.

11.3.1.3 Environmental Restoration

No additional environmental restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer.

11.3.2 Transportation

11.3.2.1 Environmental Consequences of the Contemplated Uses

The airport, commercial development and industrial land use scenario anticipates development of additional office and industrial facilities at the Airport Tract. The Institute of Transportation Engineers (ITE) land use codes utilized to estimate the trips generated by these proposed developments were 130, Industrial Park, and 750, Office Park. These ITE land use codes allow estimation of the trips generated by these facilities based on the number of acres proposed for each land use type.

Table 11.3.2.1-1 shows the number of trips the ITE Trip Generation Manual (ITE 1997) estimates could be generated by this development. As shown in the table, the proposed development would add 1,554 entering trips to the Airport Tract and State Road 502 in the weekday morning peak hour and an additional 1,324 exiting trips in the

Table 11.3.2.1-1. Estimated Increase in Traffic for the Airport, Commercial, and Industrial Land Use Scenario

ITE ESTIMATED TRAFFIC VOLUMES FOR AIRPORT TRACT								
Land Use	**ITE Land Use Code**	**24 Hour Two-Way Volume**	**Morning Peak Hour Trips**		**Evening Peak Hour Trips**		**Saturday Peak Hour Trips**	
			Enter	**Exit**	**Enter**	**Exit**	**Enter**	**Exit**
Industrial Park 16 acres (6 hectares)	130	1,010	135	28	35	132	24	51
Office Park 90 acres (36 hectares)	750	13,256	1,419	250	298	1,192	0	0
Total		14,266	1,554	278	333	1,324	24	51

weekday evening peak hour. Assuming that all of these trips are new trips results in a doubling of traffic on State Road 502. This would exceed the capacity of State Road 502, causing operating conditions to degrade below LOS F, or traffic jam conditions. Widening State Road 502 to a four-lane section is this area would improve the LOS to E (maximum capacity).

A bridge could be constructed to connect the eastern edge of the TA 21 Tract with the Airport Tract. This connection would improve the ingress and egress to the proposed DP Road commercial area, including this tract. This also would alleviate the traffic problems that currently exist where DP Road intersects with Trinity Drive. However, it would increase the number of trips at the Airport Road-East Road intersection. This scenario would likely require the installation of a traffic signal at the Airport Road-East Road intersection.

11.3.3 Infrastructure

11.3.3.1 Environmental Conseqences of the Contemplated Uses

The environmental impacts resulting directly from the disposition of this tract would be minimal with respect to the utilities and infrastructure. The Airport would remain in operation with no change in the utility usage or the infrastructure. Thus, no new impacts to utilities and infrastructure would result directly from conveyance or transfer of this tract. Environmental Consequences of the Contemplated Uses.

The contemplated development, as described in Section 11.3.1.1, would require enhancement of existing utilities. Water, electricity, gas, and sewage lines would need to be extended to service new structures. Additionally, utility usage would increase, though the amount would depend on the type of industries present. As it relates to utilities and infrastructure, the contemplated use is discussed in the following paragraphs.

Indirect environmental impacts with respect to utilities and infrastructure resulting from this alternative and associated with this land would include increased utility usage and ground disturbance resulting from construction of new facilities. Utility usage in the existing developments on the Airport Tract would not be expected to change. The contemplated industrial and commercial developments would result in increases in utility usage. The estimated increases are shown in Table 11.3.3.1-1. It is not anticipated that these increases would exceed the capacity for any utility in the region.

The industrial and business park developments would require enhancement of the existing utility lines. Installation of new utility facilities and upgrades to existing ones would require creation of trenches and access and maintenance roads. The construction of roads, parking areas, and buildings, and extension of utility lines would cause soil disturbance. Refer to Section 11.3.9 of this chapter for detail on impacts resulting from ground disturbance from new construction.

11.3.4 Noise

11.3.4.1 Environmental Consequences of the Contemplated Uses

If developed commercially, roads and structures would be constructed. Construction of new facilities would entail ground clearing, excavation, laying of foundations, erection, and finishing work. The use of heavy equipment such as front-end loaders, concrete mixers, and jackhammers would produce noise levels ranging from 74 to 95 dBA at a distance of 50 feet (15 meters) from the construction site (DOE 1997a, page 36). Construction noises would not be permanent, however. Once fully developed, traffic from employees and other travelers would comprise the majority of noise in the area. Noise levels along State Road 502 would likely remain the same, at about 60 to 70 dBA. Noises along the northern parts of the tract, however, would increase significantly due to increased traffic along new roads and due to commercial and industrial activities in addition to the existing airport activities.

11.3.5 Visual Resources

11.3.5.1 Environmental Consequences of the Contemplated Uses

Contemplated airport, commercial development, and industrial land uses north of East Road would maintain current Scenic Class III, moderate public value for the visual resources. Development in the southern portion of the tract would impact high value Scenic Class II views from the road and from the Airport.

Table 11.3.3.1-1. Estimated Increase in Utility Usage for the Commercial and Industrial Land Use Scenario on the Airport Tract

	PEAK POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (BAYO) mgy (mly)	MSW tpy (mty)
Estimated annual increase	1.9	11	110 (3,120)	100 (379)	31 (117)	220 (200)
Available system capacity	5	200	5,040 (142,700)	297 (1,125)	135 (511)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, tpy = tons per year, msw = municipal solid waste, mty = metric tons per year, NA = not applicable

11.3.6 Socioeconomics

11.3.6.1 Environmental Consequences of the Contemplated Uses

The Airport would be expected to continue operating in a similar fashion under this alternative. Employment would remain the same. Some of the land could be used for industrial and commercial development. There would be short-term increases in area employment and income associated with the construction of facilities and long-term increases once the facilities are operational. Approximately 3,100 workers would be employed on the tract and 4,327 jobs would be generated in the ROI, which would in turn increase ROI income. Because these jobs would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

11.3.7 Ecological Resources

Direct ecological impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

11.3.7.1 Environmental Consequences of the Contemplated Uses

Continued use of the 93 acres (38 hectares) for the Airport and support activities would not change the natural resource environment, and development of the 16 acres (6 hectares) to the west would have small impact. The development of the remaining approximately 90 acres (36 hectares) on the mesa could contribute to the isolation of the DP Canyon habitat to slopes and canyon bottoms. Approximately 90 acres (36 hectares) of primarily ponderosa pine forest and pinyon-juniper woodland could be converted to developed areas or landscaping.

Highly mobile wildlife species or wildlife species with large home ranges (such as deer, elk, and birds) would be able to relocate to adjacent undeveloped areas. However, successful relocation may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development area. Species relocation may result in additional pressure to lands already at or near carrying capacity. The impacts could include overgrazing, stress, and overwintering mortality. For less-mobile species (reptiles, amphibians, and small mammals), direct mortality could occur during the actual construction event or ultimately result from habitat alteration. The loss of acreage due to development would result in a reduction of breeding and foraging habitat for wildlife currently utilizing the property. The developed tract also would be lost as potential hunting habitat for raptors and other predators. In addition to the area to be disturbed, there would be a decrease in quality of the habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction.

Development in this tract could result in the direct loss of wetland vegetation and function. Even if construction and development does not occur in the wetland, indirect impacts such as additional surface runoff from an increase of impermeable surface areas (pavement), resulting in accelerated streambed erosion and increased downstream and offsite sedimentation could occur.

There are three species that are Federal-listed as threatened or endangered that may potentially use the Airport Tract area: the bald eagle, American peregrine falcon, and the Mexican spotted owl. With respect to the bald eagle, this area has a very low level of potential use for foraging. Development of this tract, which is within the AEI (DP, Los Alamos, and Pueblo Canyons) for both the American peregrine falcon and Mexican spotted owl, may alter the foraging behavior of these species. For the Mexican spotted owl, loss of the entire tract would affect approximately 5 acres (2 hectares) of core habitat and 120 acres (49 hectares) of buffer habitat in the Los Alamos Canyon AEI and overlapping Pueblo Canyon AEI habitat consisting of 52 acres (21 hectares) of core habitat and 143 acres (58 hectares) of buffer habitat. Approximately 154 acres (62 hectares) and 9 acres (4 hectares) of American peregrine falcon AEI core habitat in Pueblo Canyon and Los Alamos Canyon, respectively, and 44 acres (18 hectares) of Pueblo Canyon AEI buffer habitat overlapping the Airport Tract area could be affected (PC 1999d). Because direct entry into the adjacent Los Alamos Canyon and Pueblo Canyon habitat would require descending a steep cliff face, increased recreational use is expected to be limited. Therefore, recreational impacts to the adjacent Los Alamos and Pueblo Canyons natural habitat would be expected to be minor. DP Canyon may receive increased recreational use because it would be fronted by development in areas now vacant.

The watershed management approach to natural resource management requires the integration of natural resource management plans across several land management agencies. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- and long-term natural resource management strategies for the DP Canyon, Los Alamos Canyon, and Pueblo Canyon watersheds.

11.1.8 Cultural Resources

Direct impacts of the conveyance and transfer itself to cultural resources would result from the transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Eligible cultural resources are present in the Airport Tract that could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing these resources from future consideration under the *National Historic Preservation Act.*

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing them from consideration under the *Religious Freedom Restoration Act, American Indian Religious Freedom Act,* and Executive Order 13007, “Indian Sacred Sites.” Finally, the disposition for this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing these resources from consideration under the *Native American Graves Protection and Repatriation Act,* or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following sections.

11.1.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts to cultural resources would be anticipated from the land use contemplated for Airport Tract by the receiving parties. This analysis reflects the broad, planning-level impacts anticipated from this contemplated use.

Under the airport, commercial, and industrial development scenario, portions of the tract would be extensively altered by construction activities, grading, and trenching. These activities could result in primary impacts to eligible resources through physical destruction, demolition, damage, or alteration. Resources avoided by construction may be isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. The development of land may cause changes to the presence or integrity of, or access to natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

11.1.9 Geology and Soils

11.1.9.1 Environmental Consequences of the Contemplated Uses

The contemplated use for Airport Tract is airport, commercial development, and industrial, which would require ground disturbance for construction of buildings and installation of utilities. Both existing and new structures would be vulnerable to greater than magnitude 7 seismic events (as registered on the Richter scale) and wildfire episodes.

11.1.10 Water Resources

Transfer of this tract would not directly affect surface water or groundwater quantity or quality. These resources may be indirectly affected, however, if development is pursued, as discussed in the following sections.

11.1.10.1 Environmental Consequences of the Contemplated Uses

The contemplated land uses would not affect groundwater quality or quantity beneath the tract, but any associated increased water usage may contribute to the overall regional water level decline and possibly result in degradation of water quality within the aquifer.

Surface water quality may be indirectly affected if the contemplated land use is pursued. Development and construction may potentially affect surface water quality within and downstream of the tract. Surface water quality could be impacted during construction and development of the tract because stormwater runoff may increase over areas that have been denuded and carry sediments and surface contaminants into the drainages.

11.1.11 Air Resources

11.1.11.1 Environmental Consequences of the Contemplated Uses

If this tract were developed commercially and industrially, new roads and structures would be constructed. The tract itself would have increased emissions of criteria pollutants due to space heating, increased motor vehicle traffic, and, perhaps, steam-generating boilers. However, ambient air concentrations would likely remain within Federal and State standards, and the Los Alamos region would remain an attainment area. Emissions of hazardous and other chemical air pollutants would likely be absent or regulated. If there are emissions from any new businesses on this large tract of land, those emissions would be subject to Federal and State new-source performance standards. Sources would require an air permit and pollution control measures if emissions exceed certain minimum values. Therefore, regulations, permits, and controls would keep emissions below levels hazardous to human health. It is assumed that there would be no new sources of radioactive air pollutants; in which case, inhalation of radioactive air emissions from LANL would be the same as in the No Action Alternative, ranging from 2.1 (western edge) to 5.4 (eastern edge) millirem per year, or from 21 percent to 54 percent of the EPA standard.

11.1.11.2 Global Climate Change

Contemplated land use includes retention of the airport, and commercial and industrial development of 105 acres (43 hectares) of land. An estimated 200 new businesses, mostly firms in office buildings, could be placed on this tract. These businesses would employ more than 3,000 and would require a combined fleet of 120 commercial vehicles (pick-up trucks, vans, and automobiles). Vehicular use and space and water heating combined would result in estimated emissions of about 6,900 tons (6,258 metric tons) of carbon dioxide annually (versus 6 tons [5 metric tons] per year in the No Action Alternative).

11.1.12 Human Health

11.1.12.1 Environmental Consequences of the Contemplated Uses

Commercial development would bring an estimated 3,100 new workers into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. While all doses would be within health-based standards established by other Federal agencies, the closer proximity would increase radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.

Radiation doses received by workers at the Airport Tract would range from 2.1 millirem (at the western edge) and 5.4 millirem (at the eastern edge) per year at this tract (DOE 1999c, Chapter 5). Because this tract lies within the radiation site evaluation circle for TA 21, however, use of the undeveloped areas of the tract may require additional consideration.

No changes in cancer risk should be expected. Nonradiological exposures would be expected to be below health-based standards. New workers would face the same hazards to floods and wildfires as workers now do, and should have adequate time to evacuate the premises. Seismic events come without warning, and would carry risks of physical injury from building collapses.

11.1.12.2 Chemical Accidents

Accident assessment would be the same as described in the No Action Alternative. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time the air plume reached the Airport Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

11.1.12.3 Radiological Accidents

Subsequent to transfer of ownership, the MEI dose at this tract would be the same as described in the No Action Alternative. MEI doses would be greater than 200 millirem for 4 of 13 scenarios postulated in the LANL SWEIS: 17 rem for RAD-02 (natural gas pipeline failure, explosion, and fire at the CMR Building), 200 millirem for RAD-07 (fuel leak and fire at the Waste Characterization, Reduction, and Repackaging [WCRR] Facility), 8 rem for RAD-12 (plutonium release from the Dual Axis Radiographic Hydrodynamic Test [DARHT] Facility during an earthquake), and 1.1 rem for RAD-15B (explosion followed by fire in an entire wing of the CMR Building).

Under the contemplated land use scenario, there would be substantial increases in collective tract dose and excess LCFs. For example, the LANL SWEIS estimated a collective population dose of 120,000 person-rem for all people living within a 50-mile (80-kilometer) radius of LANL, resulting in an estimated 57 excess LCFs for hypothetical accident RAD-02. This would increase by another 12,000 person-rem and six excess LCFs under the development scenarios for the Airport Tract. Table 11.3.12.3-1 compares the estimated additional consequences of all hypothetical radiological accidents.

11.1.12.4 Natural Event Accidents

Natural event accidents would have no estimated chemical consequences at the Airport Tract. For the postulated accidents (wildfire and four earthquake scenarios), chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) concentrations by the time any air plume would reach the tract, even under adverse weather dispersion conditions.

MEI doses would be the same as described in the No Action Alternative. The maximum dose resulting from the postulated wildfire would be about 0.1 rem; that from the most severe earthquake would be about 30 rem. If the tract were developed commercially, however, there would be significant increases in collective tract dose and excess LCFs. The most severe earthquake would result in an estimated tract collective dose greater than 30,000 person-rem and in approximately 20 excess LCFs. These exposures would be in addition to those

Table 11.3.12.3-1. Additional Accident Consequences Associated with Airport, Commercial, and Industrial Land Use Scenario on the Airport Tract

				AIRPORT, COMMERCIAL, AND INDUSTRIAL LAND USE[a]		SWEIS ESTIMATES[b]	
Accident Scenario	**Accident Location**	**Facility**	**Frequency per Year**	**Collective Dose[c]**	**Excess LCF**	**Collective Dose[c]**	**Excess LCF**
RAD-01	54-38	RANT	1.6×10^{-3}	83	0.04	72	0.04
RAD-02	03-29	CMR	1.5×10^{-6}	12,000	5.9	120,000	57
RAD-03	18-116	Kiva #3	4.3×10^{-6}	63	0.03	100	0.06
RAD-05	21-209	TSTA	9.1×10^{-6}	13	0.01	24	0.01
RAD-07	50-69	WCRR	3.0×10^{-4}	150	0.07	1,300	0.69
RAD-08	54-230	TWISP	4.3×10^{-6}	110	0.06	400	0.2
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	0	4	0
RAD-09B	54-226	TWISP	4.9×10^{-3}	72	0.04	230	0.12
RAD-12	16-411	--	1.5×10^{-6}	3,200	1.6	35,800	18
RAD-13	18-116	Kiva #3	1.6×10^{-5}	93	0.05	160	0.08
RAD-15A	03-29	CMR	3.6×10^{-5}	47	0.02	175	0.09
RAD-15B	03-29	CMR	3.2×10^{-5}	860	0.43	3,400	1.7
RAD-16	03-29	CMR	3.5×10^{-6}	4	0	56	0.03

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; TSTA = Tritium Systems Test Assembly; TWISP = Transuranic Waste Inspectable Storage Project

[a] In addition to doses estimated in the LANL SWEIS.

[b] For the entire population within a 50-mile (80-kilometer) radius of LANL.

[c] Person-rem.

estimated in the LANL SWEIS (340,000 person-rem and 230 excess LCFs for SITE-03B).

11.1.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated land uses estimate that air emissions and hazardous chemical and radiological releases from LANL operations would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on this tract.

The analyses also indicate that socioeconomic changes resulting from implementing the Proposed Action Alternative would not lead to environmental justice impacts. Under the Proposed Action Alternative, modest economic benefits would arise from the additional jobs created during construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local governments. Each of these impacts would be positive and would not disproportionately affect environmental justice.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process.

11.1.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the Airport Tract would not immediately cause any irreversible or irretrievable commitments of resources. Subsequent commercial and industrial development would, however, cause irreversible deterioration of the visual environment along East Road.

New development also would cause the irretrievable commitment of resources during construction and operation of new businesses and office buildings. Construction of these buildings would require the irretrievable commitment of standard building materials such as lumber and roofing materials. Energy consumption would be expended in the form of natural gas and electricity. Additional water also would be consumed. In addition, continued use of the existing airport facilities would maintain the irretrievable commitment of resources currently utilized to operate the Airport.

11.1.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the Airport Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources because development of previously undisturbed areas could result in physical destruction, damage, or alteration of cultural resources on the tract. The conveyance or transfer of this tract could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

Subsequent commercial and industrial use of currently undeveloped portions of the tract would have unavoidable adverse impacts in several resource areas. One such impact would be deterioration of the visual environment within the tract, from adjacent residential areas, and from more distant vistas.

Development also would cause adverse impact through the increased need for and use of utilities. Increased demand for water, solid waste, and sewage services would have adverse effects in the immediate Los Alamos region by lowering the aquifer level more quickly, shortening the remaining lifetime of the County landfill, and increasing both the quantities of sewage that require treatment and the quantities of treated sewage discharged to the environment. The environmental effects of increased demand for electricity and natural gas would be felt elsewhere (in the Four Corners region, for example), in the form of increased emissions of air pollutants in order to generate electricity. Increased consumption of natural gas adds to global climate change through increased emissions of carbon dioxide.

Development also would lead to increased traffic by increasing the labor force within the County. The addition of an estimated 3,000 new workers would result in a 20 to 25 percent increase in commuter traffic, with attendant increases in congestion and traffic noises during daylight hours. Noise levels would increase substantially within the Airport Tract with the coming and going of the work force and, especially, delivery vehicles that include would large trucks, vans, and tractor trailers.

Development would bring more members of the public into closer proximity to LANL facilities, thereby increasing the number of people exposed to radiological and chemical air pollutants emitted by LANL operations. The location is not far from the Small Business Center Annex (on East Gate Drive), the location of LANL's MEI due to radiological air emissions from the LANSCE on the adjacent mesa. While all doses would be within health-based standards established by other Federal agencies, the closer proximity also would increase radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities.

Finally, commercial and industrial development would increase the potential for degradation of surface water quality. Standard mitigation measures, however, can limit both short- and long-term impacts to surface water quality.

11.1.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

The actual conveyance or transfer of the Airport Tract would not immediately cause any specific impacts on short-term uses of the environment. The tract is located immediately adjacent to the Los Alamos townsite, adjacent to areas already developed residentially and commercially. Additional commercial and industrial development use would, therefore, not be incompatible with the long-term uses of the land.

12.0 WHITE ROCK Y TRACT

12.1 Affected Environment

12.1.1 Land Use

The White Rock Y Tract consists of approximately 540 acres (218 hectares) and incorporates the alignments and intersections of State Road 502, State Road 4, and the easternmost portion of East Jemez Road. State Road 502 bounds the tract to the north, across from the Technical Area (TA) 74 Tract. The White Rock Y Tract shares its southern boundary with Pueblo of San Ildefonso lands, just south of East Jemez Road. State Road 4 and Bandelier National Monument (BNM) lie to the east, and TA 72 lies to the west (see Figure 12.1.1-1, White Rock Y Tract Layout). The tract can be accessed by any of these three roadways.

The tract is moderately forested with ponderosa pine and pinyon-juniper woodlands. Numerous archaeological sites and one possible historic structure are present at the site. Portions of the tract also are adjacent to wetlands and sensitive wildlife habitat. The Los Alamos Canyon Trail is the single well-established trail, crossing the northwest edge of the site.

Current land use at the tract is limited to the wells, power lines, and transportation facilities constructed previously in support of LANL operations (DOE 1998b). In addition, a portion of the tract is used for recreational rock climbing. Adjacent land uses to the north and south include activities associated with the use and maintenance of State Road 502 and East Jemez Road. To the west, activities are based on LANL operations at TA 72, which serves as a training area and firing range for LANL's security force. Directly to the east across State Road 4, land use is dominated by the tourism and National Park Service activities at BNM.

Figure 12.1.1-2 shows the environmental media monitoring stations located on the subject land tract.

12.1.1.1 Environmental Restoration

The White Rock Y Tract has no potential release sites (PRSs). It contains six structures, all of which are part of the County water supply system. The structures include a water tank, a booster pump station, a water well, a chlorinator station, a sand trap, and a fluorine

12.0 WHITE ROCK Y TRACT

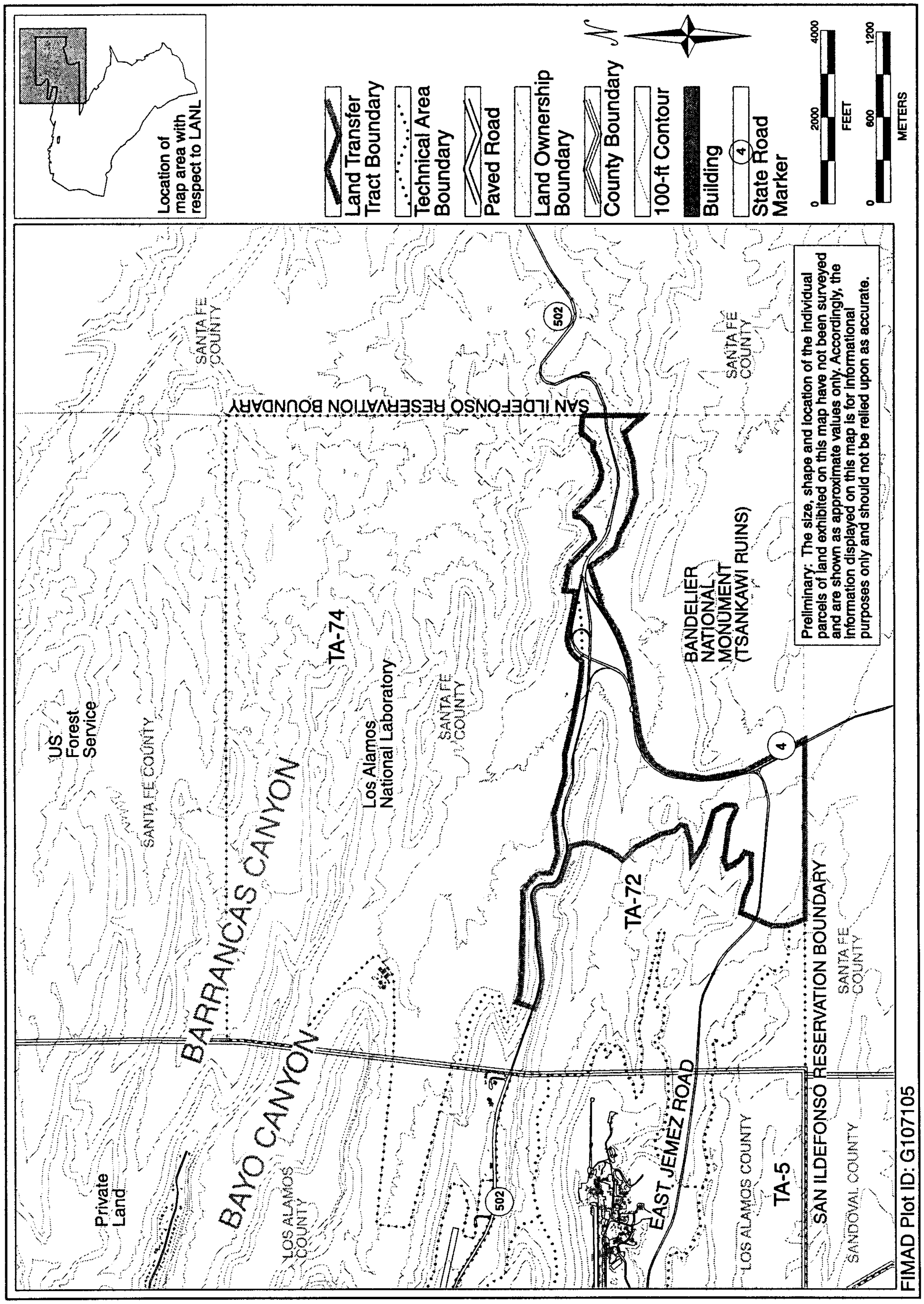

Figure 12.1.1-1. White Rock Y Tract Layout.

12.0 WHITE ROCK Y TRACT

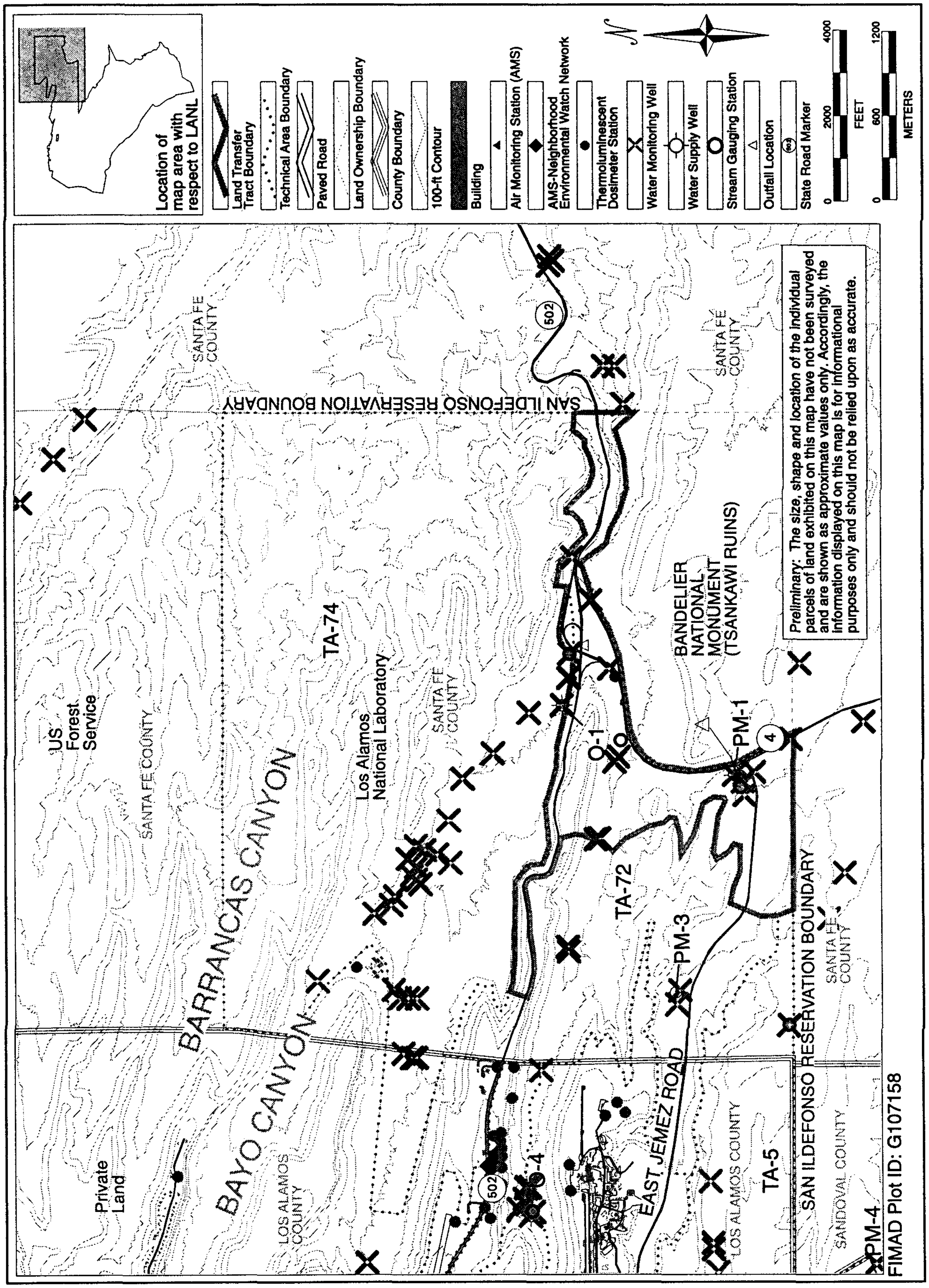

Figure 12.1.1-2. White Rock Y Tract Monitoring Stations and Outfall Locations.

station. In addition, the tract is traversed by Los Alamos and Sandia Canyons, both of which may contain residual contamination from past LANL operations. Characterization performed to date indicates the presence of several radioactive isotopes in stream channel sediments. Although additional sampling may be performed, sampling conducted to date indicates that existing levels of contamination in the canyon systems are lower than levels that would elicit health concerns.

Figure 12.1.1.1-1 shows areas with the potential contamination issues (PCIs) within this tract, as well as areas with no known contamination. Only the southernmost part of the tract, near to and south of East Jemez Road, appears to have no known contamination issues, although much of the tract has not yet been characterized. PCI acreage is estimated to total 306 acres (124 hectares), more than half of the tract.

12.1.2 Transportation

The White Rock Y Tract incorporates the alignments and intersections of State Road 502, State Road 4, and the easternmost part of East Jemez Road. The site includes the State-owned, grade-separated interchange at State Road 5 and State Road 502. Table 12.1.2-1 shows the geometry, capacity, 1996 traffic volumes, and 1996 and 2018 level of service (LOS) for these three roadways. The annual traffic growth rate used at this location was 2.29 percent according to the New Mexico State Highway and Transportation Department (NMSH&TD), Transportation Planning Division (NMSH&TD 1997).

As shown in Table 12.1.2-1, the LOS for both State Road 4 and East Jemez Road is expected to degrade from LOS E (maximum capacity) to LOS F (traffic jam conditions) by the year 2018. Although State Road 502 operates at LOS B near the White Rock Y under current conditions, it is likely to be at or over capacity in the two-lane section that climbs the mesa.

12.1.3 Infrastructure

Figure 12.1.3-1 shows the location of roads, fence lines, and utility lines on the White Rock Y Tract. This tract is largely undeveloped. State Road 502 and State Road 4 and East Jemez Road traverse the tract. An interchange between State Road 502 and State Road 4 is present. Electricity, gas, and water lines and several water wells are located on the site.

12.1.4 Noise

The White Rock Y Tract straddles State Road 502 along its northern boundary and State Road 4 along its eastern boundary. The only source of ambient noise for this tract is vehicular traffic. Traffic can be quite heavy during early morning and late afternoon.

Table 12.1.2-1. Traffic Volume Estimates

LOCATION	NUMBER OF LANES	CURRENT CAPACITY (pcph)	1996 PEAK HOUR TRAFFIC VOLUMES	1996 LEVEL OF SERVICE	2018 LEVEL OF SERVICE
State Road 502	2 EB/3WB	3,100 EB/4,650 WB	1,805	B	C
State Road 4	2	2,200	1,570	E	F
East Jemez Road	2	1,550	1,000	E	F

Notes: pcph = passenger cars per hour, EB = eastbound, WB = westbound

12.0 WHITE ROCK Y TRACT

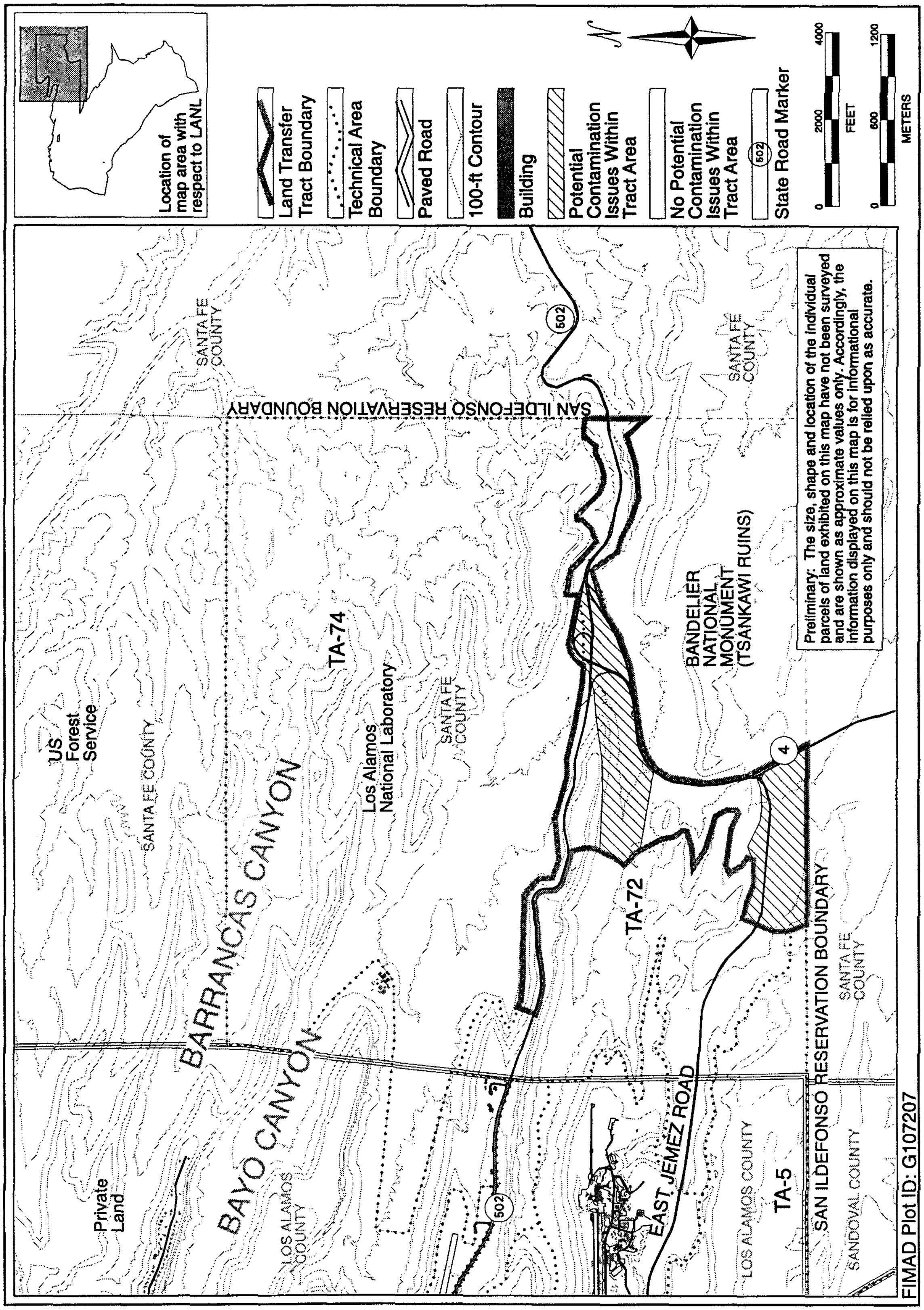

Figure 12.1.1.1-1. White Rock Y Tract Potential Contamination Issue Areas.

12.0 WHITE ROCK Y TRACT

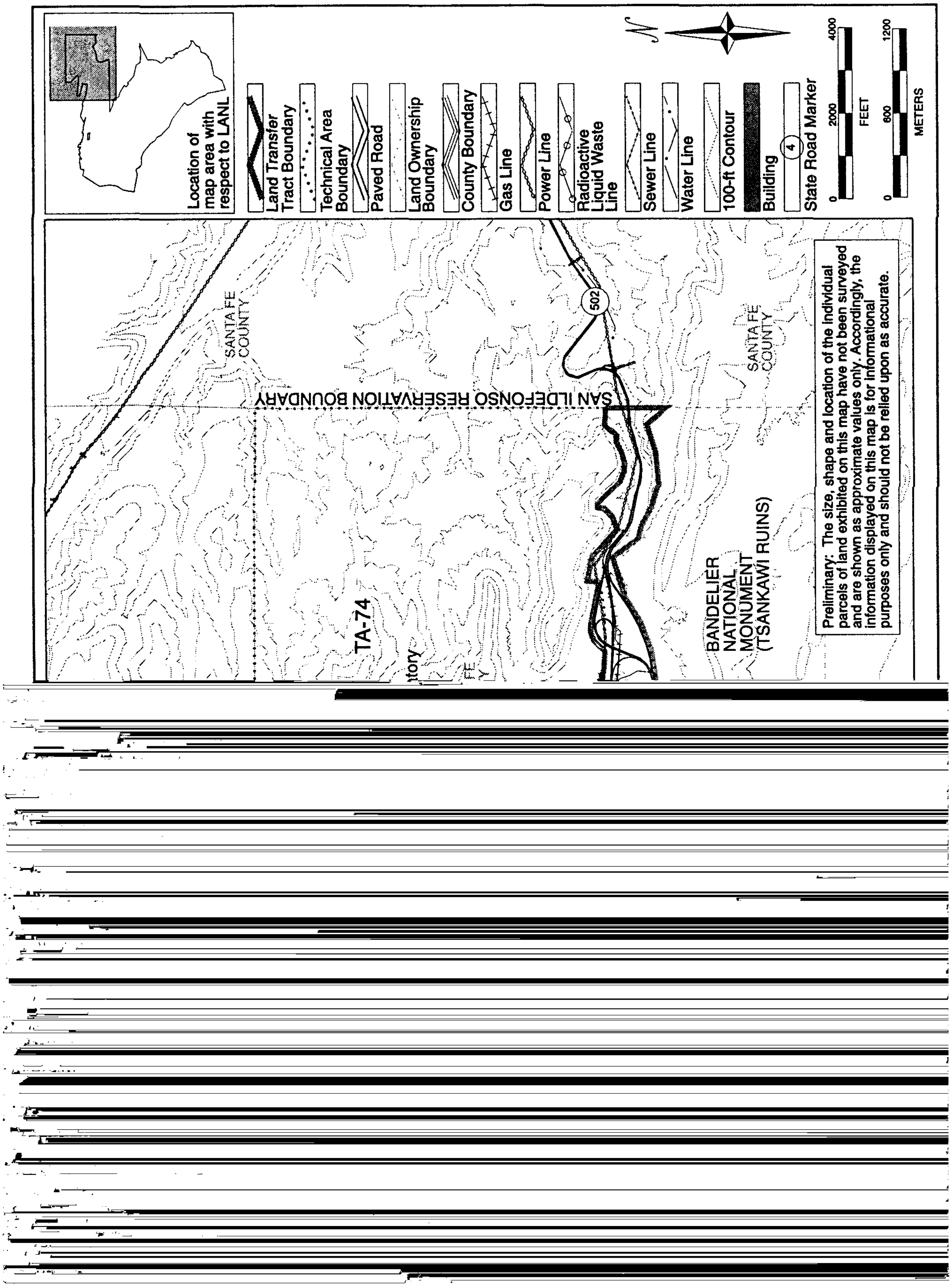

Figure 12.1.3-1. White Rock Y Tract Utilities and Infrastructure.

Noise levels decrease with distance from the highways. Immediately adjacent to the highways, noise levels are likely to be in the range of 60 to 70 decibels, A-weighted (dBA) for most traffic conditions, increasing to 90 dBA when large vehicles such as tractor trailers pass.

12.1.5 Visual Resources

The White Rock Y Tract includes fairly steep side slopes of a mesa with some vegetation. Road cuts for State Road 502 are quite dominant in the landscape. There are good views looking from the roads of the surrounding landscape. The tract also includes a high, narrow, rocky mesa that is fairly prominent in the landscape. Views from the mesa of the surrounding landscape are quite spectacular. The White Rock Y Tract is located directly across State Road 4 from the Tsankawi unit of BNM and is well within the viewshed of Tsankawi mesa. Visitors are attracted to the Tsankawi unit because of its solitude, peace and tranquillity, and the opportunity to explore the archeological resources in such a setting. The view from Tsankawi mesa is breathtaking and encompasses most of the area proposed for transfer.

For the purposes of the visual resource analysis, this tract was divided into two rating units based on land characteristics. Rating Unit 1 includes the areas directly adjacent to the roads. Rating Unit 2 includes the mesa area west of the intersection of State Road 502 and State Road 4.

Three components were analyzed for Rating Unit 1. Scenic quality was determined to be “B” due the common scenic character of the landform combined with the manmade modifications. The distance zone was designated as “foreground/middleground” due to the proximity of the unit to State Road 502 and State Road 4, major viewing points. The sensitivity level was considered to be “high” due to high visibility from nearby viewpoints. The combination of these components using the Inventory Class Matrix results in a Scenic Class of II for Rating Unit 1.

Three components were analyzed for Rating Unit 2. Scenic quality was determined to be “A” primarily due to interesting landforms within and adjacent to the rating unit. The distance zone for the rating unit was determined to be “foreground/middleground” because of the proximity to viewpoints along State Road 502 and State Road 4. The sensitivity level was determined to be “high” due to the high visibility of the site. The combination of these components using the Inventory Class Matrix results in a Scenic Class of II for Rating Unit 2. Both units within the tract fall into Scenic Class II, indicating visual resources of high public value.

12.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer.

The White Rock Y Tract is used currently only for transportation to other parts of LANL and for utilities, such as water wells. There is no employment associated with this tract.

12.1.7 Ecological Resources

The predominate vegetation in the White Rock Y Tract is pinyon-juniper woodland interspersed with shrubs, grasslands, and wildflowers. Los Alamos Canyon and its perennial stream and floodplain cross the White Rock Y Tract. The ephemeral Sandia Canyon stream and portions of its floodplain also are present in this tract. The tract includes a portion of a 100-year floodplain, with the water flow primarily routed into conduits and transported under State Road 4 and State Road 502. Wetlands are present in association with the streambed and associated floodplains. See Appendix D for further description of the wetlands and floodplains. Flora and fauna are expected to be characteristic of the region. The tract contains suitable habitat for the bald eagle, Mexican spotted owl, and American peregrine falcon. Areas of environmental interest (AEIs) for the Mexican spotted owl (Los Alamos Canyon AEI) and American peregrine falcon (Pueblo Canyon and Los Alamos Canyon AEIs) are defined within this tract. Noise in the vicinity of the tract results from motor vehicles using State Road 4 and State Road 502. Lighting is primarily from motor vehicles.

12.1.8 Cultural Resources

White Rock Y was used from the Paleo-Indian Period through the Nuclear Energy period, with most intensive use dating to the Coalition and Classic periods. The tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on LANL, BNM, and San Ildefonso Pueblo lands.

One hundred percent of the White Rock Y Tract has been inventoried for historic and prehistoric cultural resources. Survey results indicate that there are 41 cultural sites within the tract, 36 of which are prehistoric and 5 of which are historic. Of the prehistoric sites, 19 are considered to be eligible and 7 as potentially eligible for listing on the National Register of Historic Places (NRHP); 10 are considered not eligible. Of the five historic sites, four are potentially eligible, and the other is not eligible. One of the potentially eligible sites is a building dating to the Cold War era. There is a high potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials.

Formal consultations to identify traditional cultural property (TCP) resources have not been conducted. There is a high probability that TCPs will be identified during further consultations with Native American and Hispanic groups regarding the traditional uses of this tract. The Pueblo of San Ildefonso has indicated, in general terms, that TCPs are present on this tract. TCPs would not be anticipated in developed parts of the tract.

Additional information on the cultural resources of the White Rock Y Tract is presented in Appendix E of this CT EIS.

12.1.9 Geology and Soils

Soil members include the Penistaja sandy loam, the Servilleta loam, and the Prieta silt loam. No major surface faulting is evident on this tract. Existing structures are vulnerable to greater than magnitude 7 seismic events (as measured on the Richter scale) and wildfire episodes.

12.1.10 Water Resources

Figure 12.1.1-1 shows the location of the White Rock Y Tract. The tract is transected by Los Alamos and Sandia Canyons. Both canyons are natural ephemeral drainages in the vicinity of the tract; however, Los Alamos Canyon receives treated sanitary effluent from the County's Bayo Wastewater Treatment Plant at its confluence with Pueblo Canyon. This effluent-supported reach extends to the tract's eastern boundary. There are no known springs within the tract. The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) and LANL have identified wetlands on this tract. Wetlands assessments are included in Appendix D.

There are two stream gages within the White Rock Y Tract operated by LANL. A summary of the flow data for two recent years is presented in Table 12.1.10-1. These stations also are surface water monitoring stations. There is one regional aquifer supply well and two new regional aquifer test wells

Table 12.1.10-1. Los Alamos and Sandia Canyons Gaging Summary

WATER YEAR	LOCATION	# DAYS/ YEAR OF FLOW	TOTAL VOLUME (acre-feet)	MAXIMUM FLOW RATE (gpm)
1997	Los Alamos Canyon	91	173	76,745
1996	Los Alamos Canyon	32	15	15,259
1997	Sandia Canyon	3	0.9	4,448
1996	Sandia Canyon	1	1	1,795

Note: gpm = gallons per minute

Sources: LANL 1996b, LANL 1998e

within the tract. The two test wells have been drilled but not completed yet. There is one National Pollutant Discharge Elimination System (NPDES)-permitted outfall associated with the supply well.

The White Rock Y Tract lies within the 100-year floodplain as modeled by LANL for Los Alamos and DP Canyons. Assessment of these floodplains is included in Appendix D.

12.1.11 Air Resources

The White Rock Y Tract straddles State Road 502 along its northern boundary, and State Road 4 forms its eastern boundary. The tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Small quantities of hydrocarbon-generated ozone and carbon monoxide from vehicular highway traffic are the only emissions of criteria pollutants from within the tract.

There are no emissions of hazardous or other chemical air pollutants at this tract, which means that any exposures are the result of air carried from other locations. Analyses performed for the LANL SWEIS estimate that concentrations of chemical air pollutants will not exceed health-based standards for any point beyond the LANL boundary, and there are no adverse health effects expected. (DOE 1999c, Chapter 5). From this information, the same conclusion can be applied to the White Rock Y Tract.

There also are no emissions of particulate radioactive air pollutants from within the boundaries of the White Rock Y Tract. However, cesium-137 in soils emits direct radiation that is detected by LANL's monitoring network. Estimates for this location, however, indicate doses of less than 1 millirem per year, or less than 10 percent of the EPA standard.

12.1.11.1 Global Climate Change

There are no structures or other stationary sources emitting greenhouse gases located on this tract.

12.1.12 Human Health

12.1.12.1 The Radiological Environment for the White Rock Y Tract

No one resides or works on this land, and visitors remain there only for a short time. It is expected that radiation doses would be much less than that to the LANL offsite maximally exposed individual (MEI) due to the much greater distance from the primary source of radioactive air emissions at LANL (from the Los Alamos Neutron Science Center [LANSCE]). Similarly, background radiation doses would be the same as for the Los Alamos townsite. While there are no PRSs on this tract, there are known sources of radioactive contamination on and upstream of the tract (from cesium-137 contaminated sediments).

12.1.12.2 The Nonradiological Environment for the White Rock Y Tract

Exposures to nonradiological contaminants via an airborne pathway in the LANL vicinity have already been shown not to be significant for the affected environment (DOE 1999c). Sources of contamination other than PRSs on this tract may include nonradiological constituents; the site is not completely characterized.

It is postulated that all three types of natural disasters examined in the LANL SWEIS could occur on this land (flood, seismic events, and wildfire). This site does not have hazardous materials present. No additional nonradiological exposures would be expected from natural event accidents.

12.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reached the White Rock Y Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the SWEIS, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. Using data from the LANL SWEIS, doses to the MEI at the White Rock Y Tract have been estimated for each of these, as shown in Table 12.1.12.3-1.

Because there are no residents and no public workers at the tract, estimated tract collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe postulated earthquake (accident SITE-03B) has an estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The earthquake scenario would release chemicals from a number of facilities, including formaldehyde from the Health Research Laboratory (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed above, earthquakes would have no estimated chemical consequences at the White Rock Y Tract. The most severe postulated earthquake, however, would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of approximately 8 Roentgen equivalent man (rem) at the tract.

The postulated site wildfire would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the earthquake scenarios. The largest quantities of radioactive materials are released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at White Rock Y Tract is estimated to be about 0.2 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Because there are no residents and no public workers at the tract, the estimated tract collective dose and estimated excess LCF are both zero for all five natural event accident scenarios.

12.0 WHITE ROCK Y TRACT

Table 12.1.12.3-1. MEI Doses for the White Rock Y Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-3}	98	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	5,400	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	97	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	3	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	72	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	330	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	5	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	230	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	2,600	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	140	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	22	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	420	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	3	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

12.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

12.2 No Action Alternative

12.2.1 Land Use

There would be no anticipated changes in land use at the White Rock Y under the No Action Alternative. TA 72 operations to the west of the tract would continue consistent with future LANL projections. Similarly, the water wells and transportation routes located at the tract would remain in support of LANL operations.

12.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in the DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006, although some LANL sites could take longer. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the White Rock Y Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 12.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report to Support Land Conveyance and Transfer Under Public Law 105-119, Revision 1 (DOE 1999b).

This information indicates that no decommissioning of the six structures would be necessary. Cleanup of canyon sediments may be required, resulting in about 3,770 cubic yards (2,880 cubic meters) of waste from these minimal restoration activities. Cost estimates for remedial action at this parcel range from about $1,880,000 to $10,424,000. These estimates are based on the information currently available for each PRS or structure, and are subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual “cleanup.” It is possible, however, that the administrative authority could require even more restoration, resulting in greater waste volumes, a longer cleanup duration, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

12.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on State Road 502, State Road 4, or East Jemez Road near the tract. It is expected that the future operational performance of these roadways would remain similar to that of the existing performance, assuming that the future annual growth rate is 1.5 percent as predicted the U.S. Census Bureau.

12.2.3 Infrastructure

The No Action Alternative would result in no changes in the infrastructure or utilities of the White Rock Y Tract. The tract would continue to be used as a corridor for transportation and utilities. No appreciable increase in utilities or infrastructure usage is expected; thus, the impacts to utilities and infrastructure would not change.

12.2.4 Noise

In the No Action Alternative, ambient noise levels would remain much as they are currently, typically from 60 to 70 dBA, but up to 90 dBA. Noises would continue to vary with time of day (with traffic volume) and with distance from the highways.

12.2.5 Visual Resources

Under the No Action Alternative, it is expected that the visual character of the site would remain much as it exists today. Visual characteristics of the landforms and manmade modifications would not be expected to change in any substantial way.

12.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

12.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at White Rock Y Tract, as described in Section 12.1.1. Therefore, no impact to ecological resources is projected under the CT EIS No Action Alternative.

12.2.8 Cultural Resources

Under the No Action Alternative, the White Rock Y Tract would remain the responsibility of the DOE, and the treatment of the cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. Other positive impacts of the No Action Alternative would be the passive preservation of resources due to lack of development. Ongoing negative impacts from natural processes (such as erosion, fire, seismic events, and aging of buildings) on the physical integrity of cultural resources would continue. Also, the potential for impacts from continued recreational activities (such as hiking and climbing), access by the public, and the lack of security would continue. These impacts include unintentional destruction or damage of resources, vandalism, and unauthorized collection of materials and artifacts. These impacts apply both to resources within the tract and to those located nearby but outside of the tract boundary on LANL, BNM, and San Ildefonso Pueblo lands.

12.2.9 Geology and Soils

Consequences of the No Action Alternative would be limited to those of existing uses. The tract is already developed; no additional utilities, roadwork, or buildings would be required. No soil disturbance or change in availability of resources would be anticipated from implementing the No Action Alternative.

12.2.10 Water Resources

Continuation of the current use of this tract by the DOE would be anticipated under this alternative. Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

12.2.11 Air Resources

In the No Action Alternative, air quality would remain high, as it is today. For criteria pollutants, ambient air concentrations would remain within air quality standards. Similarly, concentrations of hazardous and other chemical air pollutants would remain within health-based standards. Analysis of doses received from radioactive air emissions result in estimated doses of 1.0 to 1.8 millirem per year, less than one-fifth of the EPA standard.

12.2.11.1 Global Climate Change

There would be no structures or other stationary sources emitting greenhouse gases located on this tract.

12.2.12 Human Health

There would be no identifiable human health consequences of the No Action Alternative for the White Rock Y Tract. No changes in cancer risk would be expected for this alternative.

12.2.12.1 Chemical Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reached the White Rock Y Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

12.2.12.2 Radiological Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. MEI doses would be greater than 500 millirem for 2 of 13 scenarios. The estimated tract collective dose and estimated excess LCF would both be zero.

12.2.12.3 Natural Event Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be about 0.2 rem; the maximum dose from the most severe earthquake would be approximately 8 rem. Because there would be no residents and no public workers at the tract, estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

12.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations, which would continue under the No Action Alternative, would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents at LANL would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

12.3 Proposed Action Alternative

There are no DOE facilities or activities on this tract that would have to be relocated or otherwise affected by the proposed disposition of this tract except for the relocation of some environmental media monitoring stations onto LANL land. These direct consequences would be minor and bounded by the indirect consequences. Therefore, direct consequences of the transfer of ownership of the tract will not be discussed for each resource area other than those associated with potential loss of Federal protection of cultural and ecological resources (see Sections 12.3.7 and 12.3.8 respectively).

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections. Where the impacts from the two contemplated uses differ, they are broken out and discussed separately.

12.3.1 Land Use

12.3.1.1 Description of Contemplated Uses

Land uses proposed for the White Rock Y Tract include (1) cultural preservation, and (2) natural areas, transportation, and utilities. The following paragraphs provide an overview of these scenarios.

Cultural Preservation Land Use Scenario

Land use under this scenario would be dominated by cultural practices and activities necessary to meet continuing stewardship needs. In order to ensure preservation of the tract, access to the site by members of the general public would be eliminated. Although the tract would not be developed, portions of the tract would be used for utilities, utility corridors and roadways, as they are currently, with minimum future additions to infrastructure.

Natural Areas, Transportation, and Utilities Land Use Scenario

Under this scenario, land use would be based on maintaining the tract as a natural area. The general public would have access to the site for recreational purposes. Although the tract would not be developed, portions of the tract would be used for additions or improvements to utilities (such as wells or power lines), or utility corridors, including construction of roads for improved access. This use would be much as it is currently, with some additional infrastructure facilities.

Table 12.3.1.1-1 and Table 12.3.1.1-2 summarize the attributes of each of the potential scenarios.

Table 12.3.1.1-1. Attributes of Future Land Use for the White Rock Y Tract Under the Cultural Preservation Land Use Scenario

CULTURAL PRESERVATION LAND USE
• Entire tract is held in cultural preservation. • Land use would be dominated by cultural practices and activities necessary to meet continuing stewardship needs. • Future use of the tract for recreation by members of the general public would be precluded.

Table 12.3.1.1-2. Attributes of Future Land Use for the White Rock Y Tract Under the Natural Areas, Transportation, and Utilities Land Use Scenario

NATURAL AREAS, TRANSPORTATION, AND UTILITIES LAND USE
• Entire tract would be held as an undeveloped natural area and “passively” managed. • Portions of the tract could be used for additions or improvements to utilities (wells, power lines) or utility corridors, including construction of roads for improved access. • The general public would have access to the tract for recreational purposes.

12.3.1.2 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

There would be some anticipated change in land use associated with the cultural preservation land use scenario proposed for the White Rock Y Tract. Access to the tract for public recreation and other uses would be denied, and these recreational opportunities would be lost. Continued use of the existing utilities and transportation facilities at the site would remain. The decrease in activity at and in proximity to the tract from the change in access associated with this scenario would likely prove beneficial to adjacent land use, including BNM and TA 72 operations.

Natural Areas, Transportation, and Utilities Land Use Scenario

There would be some anticipated change to land use associated with the proposed natural areas, transportation, and utilities scenario. Some degree of land disturbance associated with the additions or improvements to utilities, utility corridors, and access roads would be expected. Impacts associated with these activities would be temporary in nature and would not be anticipated to result in any major change in land use.

Activity at and in proximity to the tract would be anticipated to increase under this scenario. Unrestricted access to the tract could increase pedestrian traffic in areas adjacent to wetlands, archaeological and historical sites, and sensitive habitat. The potential for these resources to be effected is discussed in detail in the ecological and cultural resource sections for this tract. Although this would not be anticipated to adversely impact lands within the tract, it could be potentially nonbeneficial to adjacent land uses. Because of the likely increase in activity adjacent to BNM, activities required in support of resource management at BNM could intensify. Management of site security at TA 72 could be similarly affected.

12.3.1.3 Environmental Restoration

No additional environmental restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer.

12.3.2 Transportation

12.3.2.1 Environmental Consequences of the Contemplated Uses

Both the cultural preservation land use scenario and the natural areas, transportation, and utilities land use scenario would result in transportation system impacts similar to the No Action Alternative. These land use scenarios as currently defined would, in large part, result in the continuation of existing land uses. The possible construction of new roads to improve access to utilities on the tract would have no impact on traffic circulation in the area. Therefore, it is expected that the future operational performance of State Road 502, State Road 4, and East Jemez Road would remain similar to that of the existing performance, assuming that the future annual growth rate is 1.5 percent as predicted the U.S. Census Bureau.

12.3.3 Infrastructure

12.3.3.1 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

Under this land use scenario, no changes would be anticipated that would affect the utilities and infrastructure. Easements for continued use of utilities and the transportation corridor would likely continue. Thus, this land use would have no direct or indirect consequences to utilities and infrastructure.

Natural Areas, Transportation, and Utilities Land Use Scenario

Under this land use scenario, most of the tract would be maintained as a natural area. Some of the land, however, would be used for additions or improvements to utilities such as well construction or utility corridors. Improvements to the utilities are considered as positive impacts to the area's utilities and infrastructure as they would improve the existing capacity.

However, soil would be disturbed by activities related to improvements in the utilities. Refer to Section 12.3.9 for more information on soil disturbance related to this land use scenario.

12.3.4 Noise

12.3.4.1 Environmental Consequences of the Contemplated Uses

Continued use of the White Rock Y Tract as a transportation corridor is contemplated under both land use scenarios for this tract. Assuming that the two state highways remain in use, ambient noise levels would remain as they are projected for the No Action Alternative, typically ranging to 70 dBA, with spikes to 90 dBA.

12.3.5 Visual Resources

12.3.5.1 Environmental Consequences of the Contemplated Uses

The Scenic Class II designation for this tract is associated with a relatively high public value for the visual resource. The visual resource objective for this scenic class is to retain the existing character of the landscape as much as possible. The contemplated uses for this tract include natural areas, transportation and utilities, or cultural preservation. Either use would retain existing visual character and would not impact visual resources.

12.3.6 Socioeconomics

12.3.6.1 Environmental Consequences of the Contemplated Uses

The contemplated uses of this tract would have little or no impact on employment, income, population, or housing. There may be some modest economic activity associated with improvements to utilities and infrastructure.

12.3.7 Ecological Resources

Direct impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

The watershed management approach to natural resource management requires the integration of natural resource management plans across several land management agencies. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- and long-term natural resource management strategies for the White Rock Y Tract.

The LANL Threatened and Endangered Species Habitat Management Plan would no longer be in effect for this tract—thereby potentially reducing the protection afforded threatened and endangered species and their potential habitat in the White Rock Y Tract. This plan has designated approximately 19 acres (8 hectares) within this tract as Los Alamos Canyon area of environmental interest (AEI) core habitat for the Mexican spotted owl, and for the American peregrine falcon approximately 53 acres (21 hectares) (Pueblo Canyon AEI) and 237 acres

(96 hectares) (Los Alamos Canyon AEI) are defined as AEI core habitat along with 111 acres (45 hectares) of Pueblo Canyon AEI buffer habitat (PC 1999d).

12.3.7.1 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

Under the cultural preservation scenario, the potential impacts to natural resources would be similar to the undeveloped but publicly accessible alternative. However, wildlife disturbance, both visual and auditory, from recreational use would be diminished. Consequently, habitat for most species would be augmented and improved.

Natural Areas, Transportation, and Utilities Land Use Scenario

The White Rock Y Tract has about 540 acres (219 hectares) of pinyon-juniper woodland with open areas occupied by shrubs, grasslands, and wildflowers. Under this land use scenario, the tract would continue to be passively managed as a natural area. While the site is not proposed for specific development under these alternatives, portions of the tract would be used for additions or improvement to utilities or utility corridors, including construction or roads for improved access. The general public potentially would have increased access for recreational purposes. Increased recreation access, especially if it includes motorized recreational vehicles, may cause animals (in some species) to alter their activity and feeding patterns, potentially resulting in increased stress, decreased reproduction, or the temporary or permanent abandonment of the affected area. Motorized recreational vehicles could result in further habitat degradation due to noise, an increase in the number of trails, and increased erosion. Foraging habitat for the American peregrine falcon and bald eagle could be affected. The White Rock Y Tract comprises approximately 2 percent of American peregrine falcon and bald eagle general habitat available at LANL (LANL 1998b). Development of utility improvements and minor roadway construction would have associated habitat loss but generally would be expected to be minor.

12.3.8 Cultural Resources

Direct impacts of the conveyance or transfer itself would result from the transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 Code of Federal Regulations [CFR] 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Eligible cultural resources are present in the White Rock Y Tract and thus could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing them from future consideration under the *National Historic Preservation Act*.

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing these resources from consideration under the *Religious Freedom Restoration Act, American Indian Religious Freedom Act*, and Executive Order 13007, “Indian Sacred Sites.” Finally the disposition of this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing them these items consideration under the *Native American Graves Protection and Repatriation Act* or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following sections.

12.3.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts would be anticipated from the land uses contemplated by the receiving parties for the White Rock Y Tract. The two land uses identified for the White Rock Y Tract include (1) cultural preservation and (2) natural areas, transportation, and utilities. This analysis reflects the broad, planning-level impacts anticipated from each contemplated use.

Cultural Preservation Land Use Scenario

Under the cultural preservation scenario, the White Rock Y Tract would be used for cultural stewardship needs by the receiving party. Access to these lands by the general public would be restricted to protect culturally important resources. It is anticipated that this scenario would involve little or no construction or development; but, cultural preservation uses and users would be defined by the receiving party.

Dedicating the tract to cultural preservation would be anticipated to have a beneficial impact on the cultural resources present. The restriction of access by the general public would be anticipated to help protect the resources from vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Another beneficial impact would be the passive preservation of resources and continued access to TCPs afforded to traditional practitioners of the receiving party.

Ongoing negative impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue. There also may be potential adverse impacts to some current traditional users if general access is precluded or restricted.

Natural Areas, Transportation, and Utilities Land Use Scenario

Under the natural areas, utilities, and transportation scenario, the tract would be held as an undeveloped, publicly accessible natural area. The maintenance of natural areas would allow the passive preservation of cultural resources on the tract by restricting more destructive types of land use.

Portions of the tract also would be used for additions or improvements to utilities and road networks. It is anticipated that there may be construction and other ground disturbing activities required for maintaining utilities and establishing new roads. These activities could result in the physical destruction, damage, or alteration of the cultural resources present. Resources avoided by construction may become isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. These activities may cause changes to the presence or integrity of, or access to, natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

The sanctioning of recreational uses and the construction of roads would increase access to cultural resources. Increased access could cause unintentional destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies.

12.3.9 Geology and Soils

12.3.9.1 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

Under the cultural preservation land use scenario, there would be no disturbance for development. The tract would remain susceptible to wildfires, which could increase erosion potential.

Natural Areas, Transportation, and Utilities Land Use Scenario

With the proposed natural areas, transportation, and utilities scenario, some degree of land disturbance associated with the additions or improvements to utilities, utility corridors, and access roads would be expected. Existing and upgraded structures would be vulnerable to greater than magnitude 7 seismic events (as measured on the Richter scale) and wildfire episodes.

12.3.10 Water Resources

12.3.10.1 Environmental Consequences of the Contemplated Uses

Transfer of this tract under either contemplated land use would not directly or indirectly affect surface water or groundwater quality or quantity.

12.3.11 Air Resources

12.3.11.1 Environmental Consequences of the Contemplated Uses

Continued use of the White Rock Y Tract as a transportation corridor is included as part of both contemplated uses. As such, there would be no additional activities or additional emission of air pollutants. Air quality would remain the same (high) as in the No Action Alternative. Specifically, NAAQS would be met for criteria pollutants; concentrations of hazardous and other chemical air pollutants would remain below health-based standards; and doses from radioactive pollutants would remain less than 2 millirem per year or less than 20 percent of the EPA standard.

12.3.11.2 Global Climate Change

Contemplated use for the White Rock Y Tract would be largely unchanged following disposition. Accordingly, there would be few or no structures or other stationary sources emitting greenhouse gases located on this tract.

12.3.12 Human Health

12.3.12.1 Environmental Consequences of the Contemplated Uses

The consequences for human health for both contemplated uses would be the same as discussed for the No Action Alternative. The public could be in closer proximity to LANL but not closer than the offsite MEI with respect to the LANL operations producing the radioactive air emissions. Therefore, radiological doses would be the same as for the No Action Alternative.

12.3.12.2 Chemical Accidents

Accident assessment would be the same as discussed in the No Action Alternative. For all postulated chemical accidents, concentrations in the air plume released by potential accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reached the White Rock Y Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

12.3.12.3 Radiological Accidents

Accident assessment would be the same as discussed in the No Action Alternative. MEI doses would be greater than 500 millirem for 2 of 13 scenarios postulated in the LANL SWEIS. The estimated tract collective dose and estimated excess LCF would both be zero.

12.3.12.4 Natural Event Accidents

Accident assessment would be the same as discussed in the No Action Alternative. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be approximately 0.2 rem; the maximum dose from the most severe earthquake would be about 8 rem. However, because there is no planned development of this tract, and hence, there would be no workers or residents, the estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

12.3.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated land uses estimate that air emissions and hazardous chemical and radiological releases associated with LANL operations would be expected to be within regulatory limits and that no latent cancer fatalities would likely result. The human health analyses also indicate that radiological releases from LANL-generated accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on the tract.

The analyses also indicate that socioeconomic changes resulting from implementing the Proposed Action Alternative would not lead to environmental justice impacts.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process. Legal counsel for the Pueblo of San Ildefonso expressed the opinion that the conveyance and use of this tract would result in an environmental justice impact on the Pueblo's population.

12.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the White Rock Y Tract would not immediately cause any irreversible or irretrievable commitments of resources. Because only minimal road and utility improvements would be made under the proposed land use scenarios, a minor irreversible commitment of ecological habitat and cultural resources could occur.

The natural areas, transportation, and utilities land use scenario would cause irretrievable commitments of minor quantities of resources during upgrade of the roads and utilities. These resources include energy expended in the form of electricity and the burning of fossil fuels.

12.3.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the White Rock Y Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources because new development could result in physical destruction, damage, or alteration of cultural resources on the tract. The conveyance or transfer of the tract also could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract. Subsequent upgrading of roads and utilities on the tract could cause adverse impacts to ecological habitat, including loss of a small amount of habitat.

12.3.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

Because there would be virtually no change in the use of this land tract under the proposed land uses, neither the actual conveyance or transfer nor the future use would cause any specific impacts on short-term uses of the environment. Similarly, there would be no noticeable impact to the long-term ecological productivity of the area.

13.0 TECHNICAL AREA 74 TRACT

13.1 Affected Environment

13.1.1 Land Use

Technical Area (TA) 74 represents a large area of LANL buffer lands, consisting of approximately 2,715 acres (1,100 hectares) (DOE 1998b). The tract is located east of the Los Alamos townsite and below the mesa upon which the townsite is built. The northern half of the site is dominated by lower Bayo Canyon; the southern half includes much of Pueblo Canyon.

U.S. Forest Service (USFS) property borders the tract to the north. State Road 502 forms the southern border of the tract and provides the primary vehicle access. State Road 502 also serves to separate TA 74 from the northeast edge of the White Rock Y Tract and the northwest edge of the Bandelier National Monument (BNM). Pueblo of San Ildefonso lands lie to the east, and the Airport Tract is to the west (see Figure 13.1.1-1, Technical Area 74 Tract Layout). Access to the tract is currently gated and limited to Federal, State, and local government personnel on official business. However, access by others may be coordinated on a case-by-case basis. Although not subject to Los Alamos County land use controls, the tract is zoned by the County as Federal lands for planning purposes (LAC 1998).

The TA 74 Tract is isolated from LANL operations and contains numerous archaeological sites and sensitive wildlife habitat (LANL 1990). The site is heavily forested with ponderosa pine and pinyon-juniper woodlands (DOE 1999c).

Existing uses at the tract include activities associated with the State highway maintenance facility, which includes two buildings, and the water wells and tanks present at the site. Adjacent land uses includes the Bayo Wastewater Treatment Plant located in the west-central portion of the tract, land practices of the Pueblo of San Ildefonso to the east, and ongoing airport activities to the west. Land use directly to the south and southwest includes the use and maintenance of State Road 502 and the White Rock Y intersection of State Road 502 and State Road 4. Directly to the southeast, land use is dominated by tourism and National Park Service activities at BNM. Land uses to the north on USFS lands include hiking, horseback riding, climbing, bird watching,

13.0 TECHNICAL AREA 74 TRACT

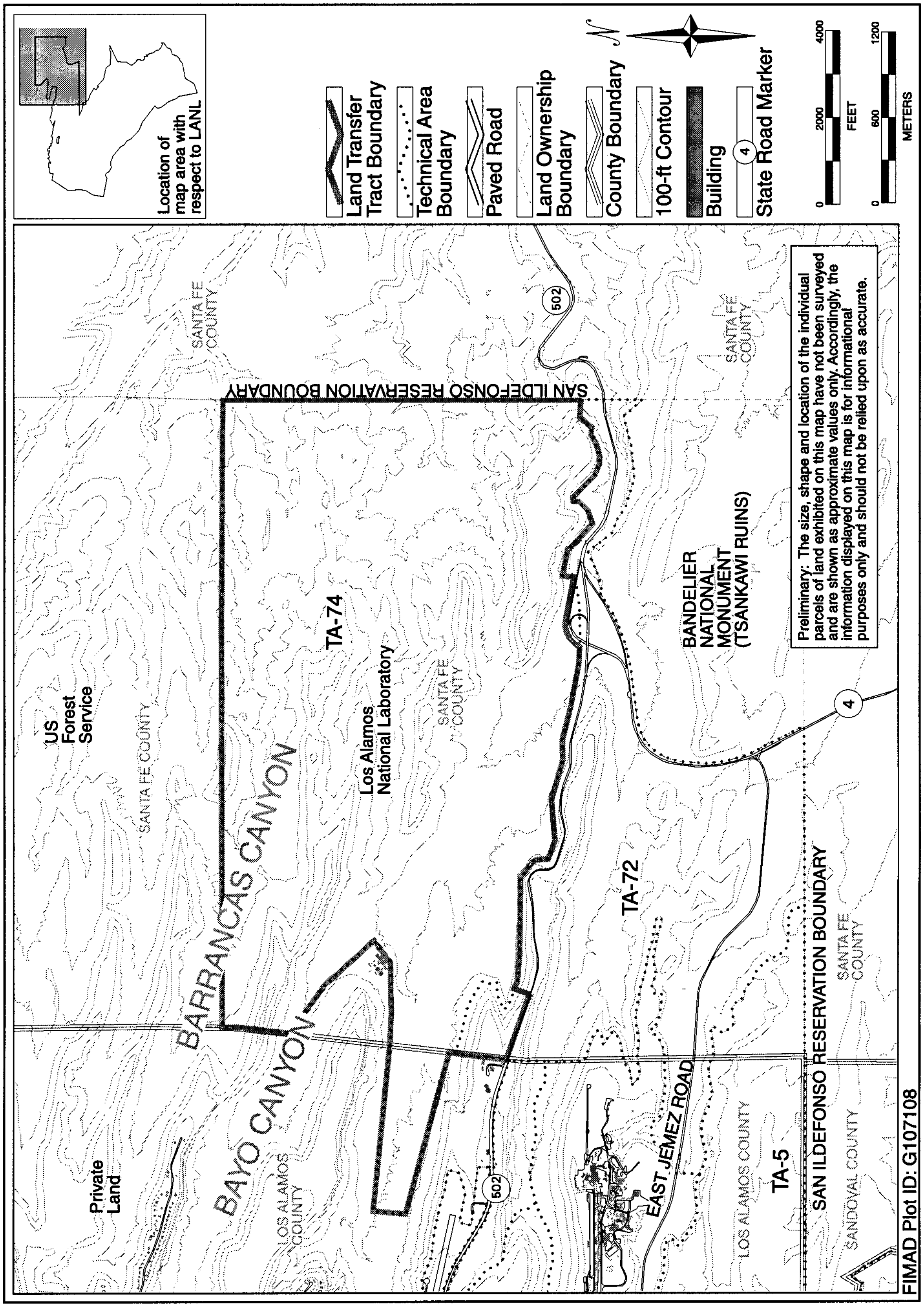

Figure 13.1.1-1. Technical Area 74 Tract Layout.

and forest management activities. The road into the tract and several unpaved roads within the tract serve as fire-break roads for the USFS and provide access to adjacent land, including the Bayo Wastewater Treatment Plant.

There are three well-established trails that cross the tract (see Figure 3.2.1-2 in Chapter 3). The Otowi Mesa Trail crosses between the northwest corner of the tract and the northwest side of the tract. The Bayo Canyon Trail enters the tract from the northwest and continues in a southeasterly direction to its terminus within the TA 74 Tract. The Camp Hamilton Trail trends roughly south and north along the western edge of the tract (LANL 1998c). Although access via the gated main road is limited, access is available to the general public for recreational purposes (hiking, horseback riding, climbing) via these trails.

Figure 13.1.1-2 shows the environmental media monitoring stations located on and near the subject land tract.

13.1.1.1 Environmental Restoration

The TA 74 Tract has four potential release sites (PRSs): one surface unit, one subsurface unit, and two outfalls. Three PRSs are located on a mesa point at the southwest corner of the tract, near the Small Business Center Annex (on East Gate Drive). The fourth PRS, a former disposal area for construction debris, is situated on the canyon below this mesa. All four PRSs have been characterized, and remediation has been performed. Further cleanup is not likely to be necessary. The tract also contains three DOE-owned structures (a water tower, water tank, and a well) that are part of the County water supply system.

The TA 74 Tract also is traversed by Pueblo and Bayo Canyons, both of which may contain residual contamination from past LANL operations. Characterization performed to date indicates the presence of several radioactive isotopes in stream channel sediments. Although additional sampling may be performed, sampling conducted to date indicates that existing levels of contamination in the canyon systems are orders of magnitude lower than levels that would elicit health concerns.

Figure 13.1.1.1-1 shows areas with potential contamination issues (PCIs) within this tract, as well as areas with no known contamination. The eastern half of the tract from Barranca Mesa to the White Rock Y Tract is thought to have no known contamination issues, although much of the tract has not yet been characterized. The western half of the tract is the site of dispersed plutonium in sediments. PCI acreage is estimated to total 1,150 acres (465 hectares), about 40 percent of the tract.

13.1.2 Transportation

The TA 74 Tract is adjacent to the White Rock Y Tract, which incorporates the alignments and intersections of State Road 502 and State Road 4 (see Figure 13.1.1-1). Table 13.1.2-1 shows the geometry, capacity, 1996 traffic volumes, and 1996 and 2018 levels of service (LOSs) for these roadways. The annual traffic growth rate used at this location was 2.29 percent according to the New Mexico State Highway and Transportation Department (NMSH&TD), Transportation Planning Division (NMSH&TD 1997).

The traffic counts to conduct this analysis are the same as those used for the White Rock Y Tract, discussed in Chapter 12, Section 12.1.2.

As shown in Table 13.1.2-1, the LOS for both State Road 4 and East Jemez Road is expected to degrade from LOS E (maximum capacity) to LOS F (traffic jam conditions) by the year 2018. Although State Road 502 operates at LOS B near the White Rock Y under current conditions, it is likely to be at or over capacity in the two-lane section that climbs the mesa.

13.0 TECHNICAL AREA 74 TRACT

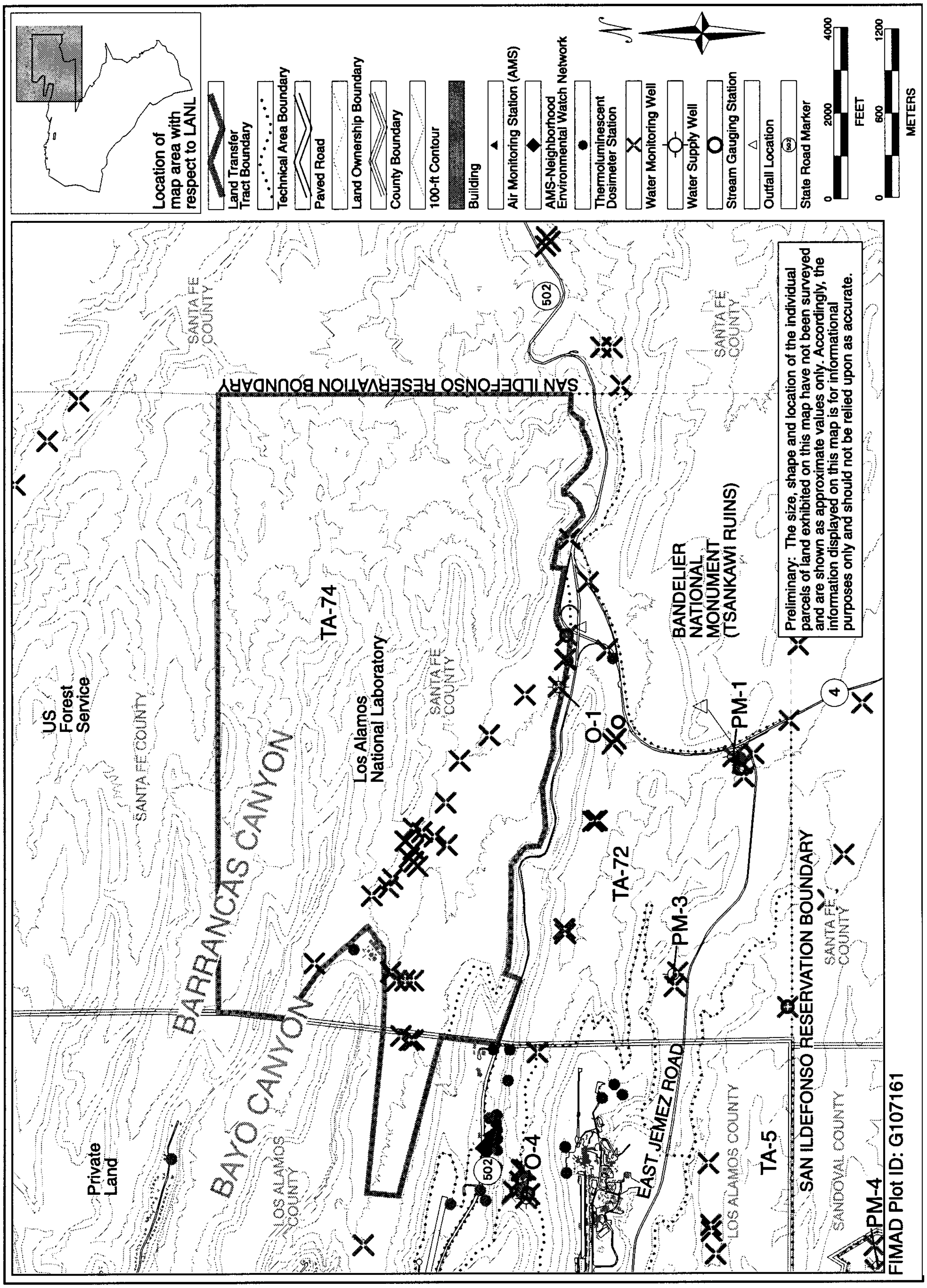

Figure 13.1.1-2. Technical Area 74 Tract Monitoring Stations and Outfall Locations.

13.0 TECHNICAL AREA 74 TRACT

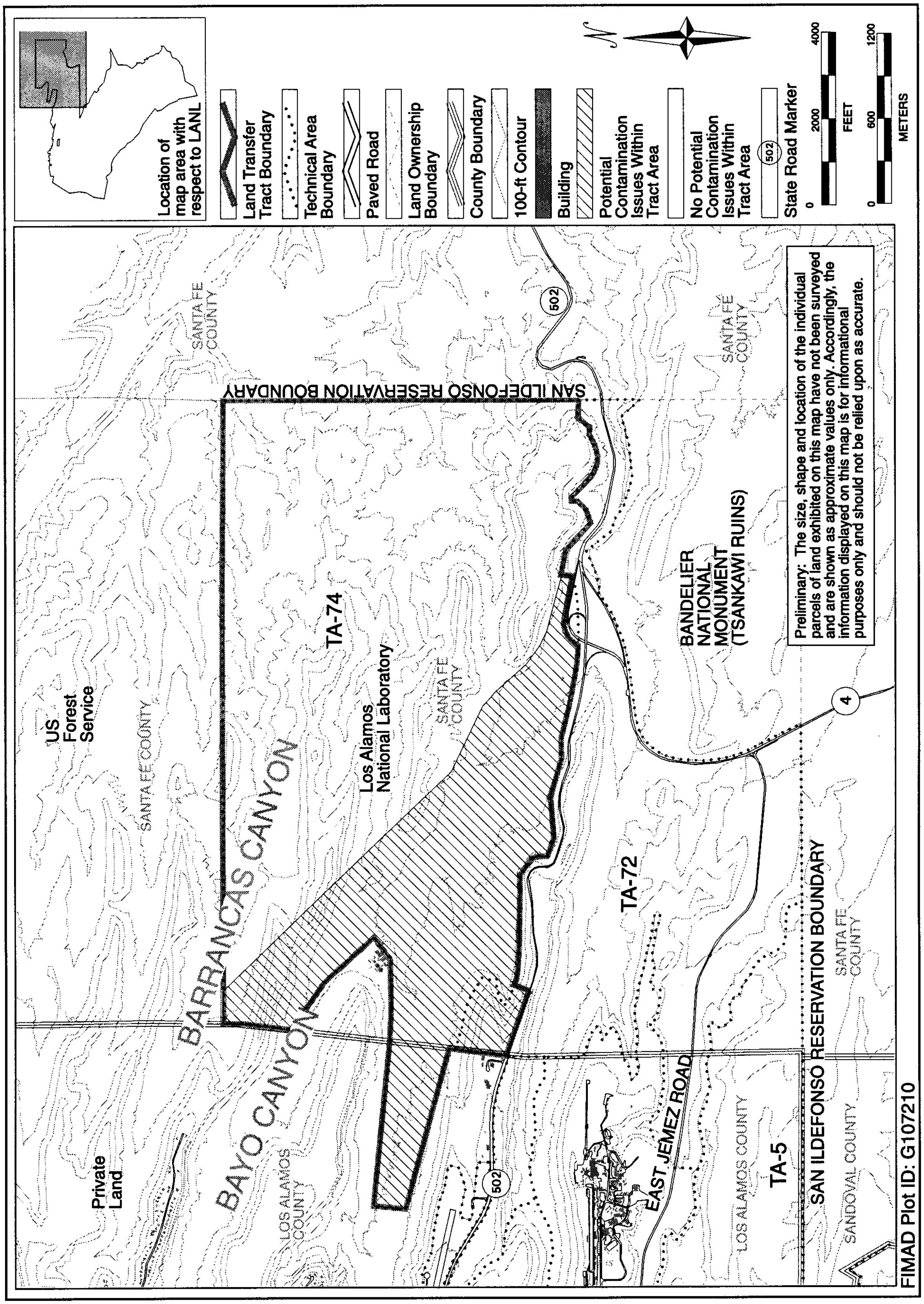

Figure 13.1.1.1-1. Technical Area 74 Tract Potential Contamination Issue Areas.

Table 13.1.2-1. Traffic Volume Estimates

LOCATION	NUMBER OF LANES	CURRENT CAPACITY (pcph)	1996 PEAK HOUR TRAFFIC VOLUMES	1996 LEVEL OF SERVICE	2018 LEVEL OF SERVICE
State Road 502	2 EB/3 WB	3,100 EB/4,650 WB	1,805	B	C
State Road 4	2	2,200	1,570	E	F

Notes: pcph = passenger cars per hour, EB = eastbound, WB = westbound

13.1.3 Infrastructure

Figure 13.1.3-1 shows the location of roads and utility lines on the TA 74 Tract. Developments on this tract include water wells, a water tank, and a State highway maintenance facility. Several dirt roads and trails traverse the tract. Electric power lines cross the tract boundaries on the west end of the tract. Natural gas and sewage lines are not present on the tract.

A new wastewater treatment facility has been proposed to replace the aging Bayo Wastewater Treatment Plant (DOE 1999c). The proposed plant would accommodate future growth and meet stricter water discharge compliance regulations and would be built close to the existing plant. Once the new facility was completed, the existing plant would be abandoned. While the proposed plant installation is independent of the decision to convey or transfer the TA 74 Tract, the increased effluent from the new plant may have impacts on this tract.

13.1.4 Noise

TA 74 is the largest of the land tracts under consideration for transfer. Ambient noises exist only along the southern edge of the tract, which parallels State Road 502 at distances varying from zero to several hundred feet. Ambient noise levels along this southern edge are estimated at 60 to 90 decibels, A-weighted (dBA). However, for the remaining 90 percent-plus of the tract, ambient noise levels are likely in the range of 10 to 20 dBA (largely undisturbed).

13.1.5 Visual Resources

The TA 74 Tract includes areas of Pueblo Canyon and associated side slope areas toward the north. The site is fairly undisturbed, and the scenery is visually interesting. There are several unpaved roads and trails within the site, as well as water wells and road maintenance facilities. State Road 502 runs along the southern boundary of the tract. There are good views into the site from State Road 502 and State Road 4.

The TA 74 Tract is located directly across State Road 4 from the Tsankawi unit of BNM and is well within the viewshed of Tsankawi mesa. Visitors are attracted to the Tsankawi unit because of its solitude, peace and tranquillity, and the opportunity to explore the archeological resources in such a setting. The view from Tsankawi mesa is breathtaking and encompasses most of the area slated for transfer. This tract was analyzed by assigning two rating units to the tract based on the two characteristic landforms: the side slope area roughly on the north side, Rating Unit 1, and the lowland area along Pueblo Canyon, Rating Unit 2.

13.0 TECHNICAL AREA 74 TRACT

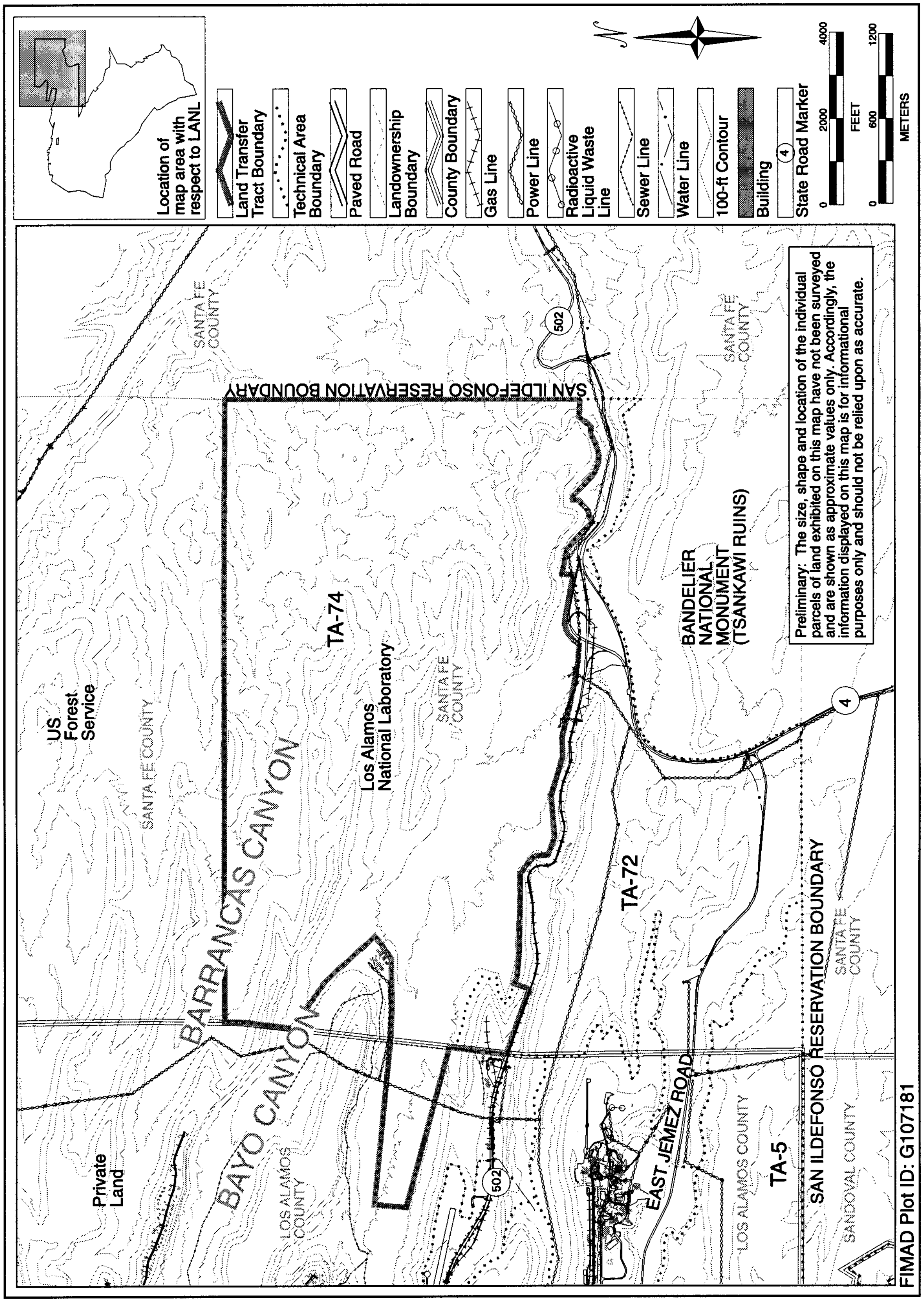

Figure 13.1.3-1. Technical Area 74 Tract Utilities and Infrastructure.

13.0 TECHNICAL AREA 74 TRACT

Three components were analyzed for Rating Unit 1. Scenic quality was determined to be "A" due the above average scenic character of the landform combined with subtle manmade modifications. The distance zone was designated as "foreground/middle-ground" due to the proximity of the unit to State Road 502, a major viewing point. The sensitivity level was considered to be "high" due to public interest and high visibility from nearby viewpoints.

The combination of these components using the Inventory Class Matrix results in a Scenic Class of II for Rating Unit 1.

Three components were analyzed for Rating Unit 2. Scenic quality was determined to be "A" primarily due to interesting and somewhat unique vegetation and landforms within and adjacent to the unit and subtle manmade modifications. The distance zone was determined to be "foreground/middle-ground" because of the proximity to viewpoints along State Road 502. The sensitivity level was determined to be "high" due to the high visibility of the site from viewpoints on State Road 502.

The combination of these components using the Inventory Class Matrix, result in a Scenic Class of II for Rating Unit 2. Both units within the tract are designated as Scenic Class II, indicating visual resources with high public value.

13.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer.

The TA 74 Tract is largely unimproved and currently accommodates water wells, a water tank, and a highway maintenance facility. There is little employment associated with this tract.

13.1.7 Ecological Resources

Vegetation communities present with the TA 74 Tract are basically ponderosa pine forest; pinyon-juniper woodland; and open shrub, grassland, and wildflower areas. Maintained dirt roads are the primary development within the tract. Pueblo, Bayo, and Los Alamos Canyons cross this tract. An ephemeral stream is associated with each canyon. Floodplains within the TA 74 Tract are not well defined. Wetland areas are present downstream of the Bayo Wastewater Treatment Plant. See Appendix D for further description of the wetlands and floodplains. Flora and fauna are characteristic of the region. Suitable habitat is present for the Mexican spotted owl, American peregrine falcon, and bald eagle. Los Alamos Canyon and Pueblo Canyon areas of environmental interest (AEIs) are defined within this land tract for the Mexican spotted owl and American peregrine falcon. Noise levels within TA 74 are associated with vehicular traffic on State Road 4 and State Road 502, and with casual recreational use. Current lighting in the tract is associated with vehicles and distant residential and commercial facilities.

13.1.8 Cultural Resources

TA 74 was used from the Archaic period through the Nuclear Energy period. The tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, the nearby resources are located on LANL, BNM, Santa Fe National Forest, and San Ildefonso Pueblo lands.

One hundred percent of the TA 74 Tract has been inventoried for historic and prehistoric cultural resources. Survey results indicate that there are 100 cultural sites within the tract, 97 of which are prehistoric and 3 of which are historic. Of the prehistoric sites, 76 have been evaluated as eligible to the National Register of Historic Places (NRHP) and 21 as potentially eligible for listing on the NRHP. Of the three historic sites, two are potentially eligible, and the other has been determined not eligible. There are no buildings present on the TA 74 Tract. There is a very high potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials.

Formal consultations to identify traditional cultural property (TCP) resources have not been conducted. There is a very high probability that TCPs will be identified during further consultations with Native American and Hispanic groups regarding the traditional uses of this tract. The Pueblo of San Ildefonso has indicated, in general terms, that TCPs are present on this tract.

Additional information on the cultural resources of the TA 74 Tract is presented in Appendix E of this CT EIS.

13.1.9 Geology and Soils

The TA 74 Tract is heavily forested and is susceptible to wildfires. There are minor north-south treading faults visible in the north east corner of the tract, and the existing water wells and tanks are susceptible to a greater than magnitude 7 seismic event as measured on the Richter scale.

13.1.10 Water Resources

Figure 13.1.1-1 shows the location of the TA 74 Tract. The tract is transected by Pueblo and Bayo Canyons. Both canyons are natural ephemeral streams in the vicinity of the tract; however, Pueblo Canyon receives treated sanitary effluent from the County's Bayo Wastewater Treatment Plant. This effluent-supported reach extends to the confluence with Los Alamos Canyon. There is one known spring, Hamilton Bend Spring, that does not flow consistently. The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) and LANL identify wetlands in this tract. Assessment of these wetlands is included in Appendix D.

There is one stream gage and a surface water monitoring station within the TA 74 Tract. There is one regional aquifer supply well and one regional aquifer test well within the tract. There is one National Pollutant Discharge Elimination System (NPDES)-permitted outfall associated with the supply well.

Portions of the TA 74 Tract associated with the canyon bottoms lie within the 100-year floodplain. Floodplain assessments are included in Appendix D.

13.1.11 Air Resources

TA 74 is the largest of the land tracts under consideration for disposition. Air quality at the tract is high. Neither hazardous nor radioactive air pollutant sources exist at the tract. Small amounts of hydrocarbon-generated ozone and carbon dioxide are emitted by vehicles passing through the southern edge of the tract on State Road 502; but no criteria pollutants are emitted from anywhere else on this large tract of land.

The tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Analyses performed for the LANL SWEIS estimate that concentrations of chemical air pollutants will not exceed health-based standards for any point beyond the LANL boundary (DOE 1999c, Chapter 5), and no adverse human health effects are expected. From this information, we can extrapolate that the same conclusion can be applied to TA 74. Estimates for this location indicate doses from radioactive emissions at LANL range from 2 millirem at its western edge to less than 1 millirem per year, or less than 10 percent of the EPA standard, for most of the rest of the tract.

13.1.11.1 Global Climate Change

With the exception of the highway maintenance facility, there are no structures or other stationary sources of greenhouse gases located on this tract. Accordingly, emissions of greenhouse gases are small.

13.1.12 Human Health

13.1.12.1 The Radiological Environment for the TA 74 Tract

The TA 74 Tract is the second most remote of the 10 land tracts. It is the second farthest from LANL and would be less affected by LANL radioactive air emissions than many of the other tracts. Radiation doses to members of the public who currently use this tract would be much less than that to the LANL offsite maximally exposed individual (MEI) (an effective dose equivalent [EDE] of 1.93 millirem) and would not even approach the regulatory limit of 10 millirem per year. Background radiation would be the same as that given for any individual in the Los Alamos townsite area (an EDE of 360 millirem plus 53 millirem for medical and dental).

The major consideration on this tract is that many of the sediments on the southwest corner are contaminated with plutonium. A risk analysis is being prepared to address the human health risk for these sediments by the LANL Environmental Restoration (ER) Project. This information is not available currently.

13.1.12.2 The Nonradiological Environment for the TA 74 Tract

Exposures to nonradiological contaminants via an airborne pathway in the LANL vicinity have already been shown not to be significant for the affected environment (DOE 1999c). No PRSs or other known sources of nonradiological contamination exist for this tract. Therefore, no additional nonradiological exposures would be expected.

13.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reaches TA 74, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the LANL SWEIS, as discussed in Chapter 4, Section 4.1.12 in this CT EIS. Using data from the LANL SWEIS, doses to the MEI at TA 74 have been estimated for each of these, as shown in Table 13.1.12.3-1.

Because there are no residents and few public workers at the tract, estimated tract collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe postulated earthquake (accident SITE-03B) has an estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The postulated earthquake would release chemicals from a number of facilities,

Table 13.1.12.3-1. MEI Doses for the TA 74 Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-3}	38	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	2,600	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	29	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	1	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	40	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	100	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	66	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	1,000	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	44	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	12	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	220	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	2	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; CMR = Chemistry and Metallurgy Research; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

including formaldehyde from the Health Research Laboratory (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed, earthquakes would have no estimated chemical consequences at TA 74. The most severe postulated earthquake, however, would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of approximately 8 Roentgen equivalent man (rem) at the tract.

The postulated site wildfire scenario would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G. The maximum dose at TA 74 is estimated to be about 0.1 rem. Such a wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Because there are no residents and few public workers at the tract, estimated tract collective dose and estimated excess LCF are both zero for all five natural event accident scenarios.

13.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by DOE are assessed for the 50-mile (80 kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

13.2 No Action Alternative

13.2.1 Land Use

There would be no anticipated change in land use at the TA 74 under the No Action Alternative. The limitations on gated access to the tract would remain. There also would be no anticipated change in adjacent land use as currently defined.

13.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006, although some LANL sites may take longer. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the TA 74 tract, as briefly discussed in the Affected Environment portion of this chapter, Section 13.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report (DOE 1999b).

This information indicates that although characterization of the four PRSs would be necessary, no remedial action is likely to be required. Similarly, no cleanup of structures should be required. Some removal of sediments from the canyon systems may be necessary, and as much as 98,880 cubic yards (74,910 cubic meters) of waste may result. Characterization of PRSs is estimated to require 18 months. Cost estimates for remedial action at this parcel range from about $3,683,000 to $215,666,000. These estimates are based on the information currently available for each PRS or structure, and are subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual "cleanup." It is possible, however, that the administrative authority could require even more restoration, resulting in greater waste volumes, a longer cleanup duration, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

13.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on State Road 502 or State Road 4 near the tract. It is expected that the future operational performance of these roadways would remain similar to that of the existing performance, assuming that the future annual growth rate is 1.5 percent as predicted the U.S. Census Bureau.

13.2.3 Infrastructure

The No Action Alternative would result in no changes in the infrastructure or utilities of the TA 74 Tract. The water wells and tank and the State highway maintenance facility on the tract would remain in operation under a special use permit. No appreciable increase in utility usage on the tract would be anticipated. Thus, implementing the No Action Alternative would have no new impacts to utilities and infrastructure.

13.2.4 Noise

Noise levels in the No Action Alternative would be unchanged from those that exist currently (60 to 90 dBA along State Road 502, but less than 20 dBA for most of the tract).

13.2.5 Visual Resources

Under the No Action Alternative, it is expected that the tract would remain unchanged with regard to visual resources. Vegetation, landforms, and views into the site would remain as they are today for all areas of the tract. The Scenic Class II determination for the tract is associated with a relatively high public value for the visual resource, which would be retained under the No Action Alternative.

13.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

13.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at the TA 74 Tract, as described in Section 13.1.1. Therefore, no impact to ecological resources would be anticipated under the CT EIS No Action Alternative.

13.2.8 Cultural Resources

Under the No Action Alternative, the TA 74 Tract would remain the responsibility of the DOE, and the treatment of the cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. Other positive impacts of the No Action Alternative would be the passive preservation of resources due to lack of development and the continued access to TCPs afforded to traditional practitioners in most areas of the tract.

Ongoing adverse impacts from natural processes (such as erosion) on the physical integrity of cultural resources would continue, as well as the potential impacts of fire and seismic events. Also, the potential for impacts from continued recreational activities (such as hiking and horseback riding) access by the public, and the lack of security would continue. These impacts include unintentional destruction or damage of resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. These impacts apply both to resources within the tract and to those located nearby but outside of the tract boundary.

13.2.9 Geology and Soils

Consequences would be limited to existing uses. There would be no anticipated change in land use at the TA 74 Tract as currently described under the No Action Alternative.

13.2.10 Water Resources

Continuation of the current use of this tract by the DOE would be anticipated under this alternative. Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

13.2.11 Air Resources

Air quality under the No Action Alternative would be largely unchanged from that of today. Criteria pollutant concentrations would remain within NAAQS. Concentrations of hazardous and other chemical air pollutants would remain below health-based standards. Doses from radioactive pollutants would range from 4.2 millirem at its western edge to less than 1 millirem per year, or less than 10 percent of the EPA standard, along the eastern portions of the tract (DOE 1999c, Chapter 5).

Emissions of greenhouse gases under the No Action Alternative would be small and unchanged from those of today.

13.2.12 Human Health

There are no identifiable human health consequences of implementing the No Action Alternative for the TA 74 Tract. No changes in cancer risk should be expected for this alternative.

13.2.12.1 Chemical Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reached TA 74, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public health consequences at the tract.

13.2.12.2 Radiological Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. MEI doses would be greater than 500 millirem for 2 of 13 scenarios postulated in the LANL SWEIS. The estimated tract collective dose and estimated excess LCF would both be zero.

13.2.12.3 Natural Event Accidents

Accident assessment would be the same as discussed in the Affected Environment section of this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be about 0.1 rem; the maximum dose from the most severe earthquake would be approximately 8 rem. Because there would be no residents and few workers at the tract, estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

13.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations, which would continue under the No Action Alternative, would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents at LANL would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

13.3 Proposed Action Alternative

There are no DOE facilities or activities on this tract that would have to be relocated or otherwise affected by the proposed disposition of this tract. Under the Proposed Action Alternative, the State highway maintenance facility special use permit would transfer to the new owner, and the facility would remain operational, at least for the duration of the current permit agreement. Therefore, there would be no direct consequences of the transfer of ownership of the tract other than those associated with potential loss of Federal protection of ecological and cultural resources (see Sections 13.3.7 and 13.3.8 respectively).

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections. Where the impacts from the two contemplated uses differ, they are broken out and discussed separately.

13.3.1 Land Use

13.3.1.1 Description of Contemplated Uses

Land uses proposed for the TA 74 Tract include cultural preservation and natural areas and utilities. The following paragraphs provide an overview of each of these scenarios.

Table 13.3.1.1-1 and Table 13.3.1.1-2 summarize the attributes of each of these potential scenarios.

Cultural Preservation Land Use Scenario

Land use under this scenario would be dominated by cultural practices and activities necessary to meet continuing stewardship needs. In order to ensure future preservation of resources at the tract, future use of the tract for hiking, horseback riding, or other recreational use by members of the general public would be eliminated.

Table 13.3.1.1-1. Attributes of Future Land Use for the TA 74 Tract Under the Cultural Preservation Land Use Scenario

CULTURAL PRESERVATION LAND USE
• Entire tract would be held in cultural preservation. • Land use would be dominated by cultural practices and activities necessary to meet continuing stewardship needs. • Future use of the tract for hiking, horseback riding, or other recreation by members of the general public would be eliminated.

Table 13.3.1.1-2. Attributes of Future Land Use for the TA 74 Tract Under the Natural Areas and Utilities Land Use Scenario

NATURAL AREAS AND UTILITIES LAND USE
• Entire tract would be held as a natural area and “passively” managed. • Although the site would remain primarily undeveloped, some land at the tract would be used for additions to or improvements of utilities such as well construction, enlargement of sewage treatment facilities (currently adjacent to the site), utility corridors, and roadways. • Access to the majority of the tract by the general public would be unrestricted.

Natural Areas and Utilities Land Use Scenario

Land use under this scenario would maintain the tract for use as a natural area. The site would be passively managed, remaining primarily undeveloped. The general public would have unrestricted access to the majority of the tract for recreational purposes. Some of the land would be used for additions to or improvements of utilities such as well construction, the enlargement or replacement of sewage treatment facilities (currently adjacent to the tract), utility corridors, and roadways.

13.3.1.2 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

There would be some anticipated direct impacts resulting from changes to access for the tract under the cultural preservation scenario. Activities associated with the State highway maintenance facility would likely be excluded under this scenario, as would other access (for example, USFS, the Bayo Wastewater Treatment Plant) currently available via the main road.

The State highway maintenance facility would either require relocation or a negotiated agreement. An easement could be negotiated between the USFS and the land owner to accommodate continued access for resource and emergency management purposes. Alternative access to the Bayo Wastewater Treatment Plant already exists. Although the change in access to the tract would be inconvenient and require additional coordination and/or contingency planning by Federal, State, and local personnel, impacts associated with the change in access would be minor.

Indirect impacts associated with the land use proposed under the cultural preservation scenario also would result in the loss of access to the tract for recreational purposes; therefore, recreational opportunities on the tract would be lost. However, access into the site via the gated main road is already restricted, limiting the extent of recreational use. Although the loss of the remaining access to the tract would be viewed as an adverse impact, when considered within the context of existing limitations it would be a minor impact.

Natural Areas and Utilities Land Use Scenario

There also would be some change to land use under the natural areas and utilities scenario. Some degree of land disturbance related to new construction or improvement of utilities, utility corridors, and roadways would occur. However, any impacts associated with the development of utilities, utility corridors, and roads would be temporary in nature and likely result in only minimal local impacts.

The degree of land disturbance or habitat loss from expansion of the existing sewage treatment facility would be design dependent. No major impacts would be expected to occur. Access to the tract likely would be improved under this scenario and would be beneficial to recreational land uses.

13.3.1.3 Environmental Restoration

No additional environmental restoration actions would be required under the Proposed Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer.

13.3.2 Transportation

13.3.2.1 Environmental Consequences of the Contemplated Uses

The cultural preservation land use scenario and the natural areas, transportation, and utilities land use scenario would both result in transportation system impacts similar to the No Action Alternative. This land use scenario as currently defined would, in large part, result in the continuation of existing transportation conditions. The possible construction of new roads to improve access to utilities on the tract would have no impact on traffic circulation in the area. Therefore, it would be expected that the future operational performance of State Road 502 and State Road 4 would remain similar to that of the existing performance, assuming that the future annual growth rate is 1.5 percent as predicted the U.S. Census Bureau.

13.3.3 Infrastructure

13.3.3.1 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

Under this land use scenario, no change would be anticipated that would affect existing utilities and infrastructure. Easements for continued use of utilities would likely continue. No direct or indirect consequences would be anticipated. However, use of the existing road through the tract for access to the wastewater treatment plant may cease.

Natural Areas and Utilities Land Use Scenario

Under this land use scenario, most of the tract would be maintained as a natural area. Some of the land, however, could be used for additions or improvements to utilities, such as well construction, the construction of sewage treatment facilities (discussed previously in this chapter), or utility corridors or roadways. These additions or improvements would result in soil disturbance. Refer to Section 13.3.9 for more details on soil disturbance related to this land use scenario. Otherwise, improvements to the utilities are considered as positive impacts to the area's utilities and infrastructure because they will improve the existing capacity.

13.3.4 Noise

13.3.4.1 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

Under the contemplated cultural preservation land use scenario, noise levels would remain at current levels. Ambient noises along the southern edge of the tract, which parallels State Road 502, would remain at an estimated 60 to 90 dBA. However, for the remaining 90 percent-plus of the tract, ambient noise levels would remain at estimated levels of 10 to 20 dBA (largely undisturbed).

Natural Areas and Utilities Land Use Scenario

Under the natural areas and utilities land use scenario, the area would likely see modest increases in vehicle use and recreational activity, and increases in noise associated with utility and road construction. Daytime ambient noise levels likely would increase due to these uses. Nighttime noises, however, are not likely to be significantly different from the solitude that currently exists over much of the tract.

13.3.5 Visual Resources

13.3.5.1 Environmental Consequences of the Contemplated Uses

The Scenic Class II determination for the tract is associated with a relatively high public value for the visual resource. The visual resource objective for this scenic class is to retain the existing character of the landscape. Under both contemplated uses, the visual character would be retained, and visual resources would not be impacted.

13.3.6 Socioeconomics

13.3.6.1 Environmental Consequences of the Contemplated Uses

The contemplated uses for this site, largely preservation activity or natural areas, would have little or no impact on employment, income, population, or housing. Modest economic activity may be associated with improvements to utility infrastructure.

13.3.7 Ecological Resources

Direct impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

The watershed management approach to natural resource management requires the integration of natural resource management plans across several land management agencies. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- and long-term natural resource management strategies for the Barrancas Canyon, Bayo Canyon, and Pueblo Canyon watersheds.

Transfer of this tract would result in a much less rigorous environmental review and protection process for future improvement to utilities or construction of utility corridors and other related activities. Neither the County of Los Alamos nor the Pueblo of San Ildefonso have regulations that would match the Federal review and protection process such as required under NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508). The LANL Threatened and Endangered Species Habitat Management Plan would no longer be in effect for this tract area—thereby potentially reducing the protection afforded threatened and endangered species and their potential habitat in TA 74 area.

13.3.7.1 Environmental Consequences of the Contemplated Uses

The TA 74 Tract is the largest tract proposed for disposition and contains approximately 2,715 acres (1,100 hectares) of ponderosa pine forest and pinyon-juniper woodlands, with open shrub, grassland, and wildflower areas.

Cultural Preservation Land Use Scenario

Under the cultural preservation scenario, the potential impacts to natural resources would be similar to the natural area land use scenario. However, wildlife disturbance, both visual and auditory, from recreational use would be diminished. Consequently, habitat for most species would be augmented and improved.

Natural Areas and Utilities Land Use Scenario

Under the natural areas and utilities land use scenario, most land would be passively managed as a natural area. Increased recreation access, especially if it includes motorized recreational vehicles, may cause animals (in some species) to alter their activity and feeding patterns, potentially resulting in increased stress, decreased reproduction, or the temporary or permanent abandonment of the affected area. Motorized recreational vehicles could result in further habitat degradation due to noise, an increase in the number of trails, and increased erosion. Foraging habitat is present within this land tract for American peregrine falcon, bald eagle, and Mexican spotted owl and contains AEIs for the American peregrine falcon (including potential nest sites) and Mexican spotted owl (LANL 1998b). The area contains overlapping Mexican spotted owl core and buffer habitat for the Los Alamos Canyon (18 acres [7 hectares] of buffer habitat) and Pueblo Canyon (16 acres [6 hectares] and

31 acres [13 hectares] of core and buffer habitat respectively) AEIs. Pueblo Canyon AEI habitat for the American peregrine falcon consists of 808 acres (327 hectares) of core habitat and 392 acres (159 hectares) of buffer habitat (PC 1999d). Increased recreation could affect these species' use of this land tract. Improvement to utilities or new corridors would be expected to have minor and short-term consequences to the wildlife of the area.

13.3.8 Cultural Resources

Direct impacts of the conveyance and transfer itself would result from the transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 CFR 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Eligible cultural resources are present in the TA 74 Tract and thus could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing them from future consideration under the *National Historic Preservation Act.*

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing them from consideration under the *Religious Freedom Restoration Act, American Indian Religious Freedom Act,* and Executive Order 13007, "Indian Sacred Sites." Finally, the disposition of this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing these items from consideration under the *Native American Graves Protection and Repatriation Act,* or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following sections.

13.3.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts would be anticipated from the land uses contemplated by the receiving parties for the TA 74 Tract. The two land uses identified for the TA 74 Tract include cultural preservation and natural areas and utilities. This analysis reflects the broad, planning-level impacts anticipated from each contemplated use.

Cultural Preservation Land Use Scenario

Under the cultural preservation scenario, the TA 74 Tract would be used for cultural stewardship needs by the receiving party. Access to these lands by the general public would be restricted to protect culturally important resources. It is anticipated that this scenario would involve little or no construction or development, but cultural preservation uses and users would be defined by the receiving party.

Dedicating the tract to cultural preservation would be anticipated to have a beneficial impact on the cultural resources present. The restriction of access by the general public would be anticipated to help protect the resources from vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Another beneficial impact would be the passive preservation of resources and continued access to TCPs afforded to traditional practitioners of the receiving party. There also may be potential impacts to some traditional users if general access is precluded or restricted.

Natural Areas and Utilities Land Use Scenario

Under the natural areas and utilities scenario, the tract would be held as an undeveloped, publicly accessible natural area. The maintenance of natural areas would have the beneficial impact of allowing the passive preservation of cultural resources on the tract by restricting more destructive types of land use. Portions of the tract also would be used for additions or improvements to utilities. It is anticipated that there may be construction and other ground disturbing activities required for maintaining and improving utilities. These activities could result in the physical destruction, damage, or alteration of the cultural resources present.

Resources avoided by construction may become isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. These activities may cause changes to the presence or integrity of, or access to natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

The sanctioning of recreational uses would increase the access to and use of this tract by the general public. Increased access could cause possible destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies.

13.3.9 Geology and Soils

13.3.9.1 Environmental Consequences of the Contemplated Uses

Cultural Preservation Land Use Scenario

Under cultural preservation land use scenario, all existing recreational usage would be eliminated. Wildfires would increase soil erosion and transport in surface streams. Little potential exists for seismic impacts.

Natural Areas and Utilities Land Use Scenario

Some degree of land disturbance related to new construction or improvement of utilities and utility corridors would occur. However, any impacts associated with the development of utilities and utility corridors would be temporary in nature and likely only result in minimal loss of lands. The degree of land disturbance or loss from expansion of the existing wastewater treatment facility would be design dependent. Existing or expanded structures would be vulnerable to greater than magnitude 7 seismic events (as measured on the Richter scale) and wildfire episodes. Wildfires would increase soil erosion and transport in surface streams.

13.3.10 Water Resources

13.3.10.1 Environmental Consequences of the Contemplated Uses

Contemplated uses of this tract would not impact surface water or groundwater quantity or quality.

13.3.11 Air Resources

13.3.11.1 Environmental Consequences of the Contemplated Uses

For both contemplated land uses, there would continue to be no emissions of hazardous or radioactive air pollutants. Further, although there could be a slight increase in emissions of criteria pollutants, concentrations would remain well within State and Federal standards. Air quality would remain the same as in the No Action Alternative.

13.3.11.2 Global Climate Change

Under this cultural preservation scenario, the existing State highway maintenance facility may be removed and there would be no sources of carbon dioxide emissions on the tract. Under the other scenario, the highway maintenance facility would remain, and there would continue to be small emissions of carbon dioxide, as in the No Action Alternative.

13.3.12 Human Health

13.3.12.1 Environmental Consequences of the Contemplated Uses

The impacts to human health of both contemplated land uses would be similar to the No Action Alternative. Any onsite radiological or nonradiological contamination would be cleaned up prior to conveyance or transfer. The public could be in closer proximity to LANL but not closer than the offsite MEI with respect to the LANL operations producing the radioactive air emissions. Therefore, radiological doses would be the same as for the No Action Alternative.

13.3.12.2 Chemical Accidents

Accident assessment would be the same as discussed in the No Action Alternative. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time air plume reaches TA 74, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

13.3.12.3 Radiological Accidents

Accident assessment would be the same as in the No Action Alternative. The MEI doses would be greater than 500 millirem for 3 of 13 scenarios postulated in the LANL SWEIS. The estimated tract collective dose and estimated excess LCF would both be zero.

13.3.12.4 Natural Event Accidents

Accident assessment would be the same as discussed in the No Action Alternative. Neither the wildfire nor any of the earthquake accident scenarios would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be less approximately 0.1 rem; the maximum dose from the most severe earthquake would be about 8 rem. Because there is no planned development of this tract, and hence, there would be few workers and no residents, estimated tract collective dose and estimated excess LCF would both be zero for all five natural event accident scenarios.

13.3.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated uses estimate that air emissions and hazardous chemical and radiological releases from normal LANL operations would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from LANL-generated accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on the tract.

The analyses also indicate that socioeconomic changes resulting from implementing either of the proposed alternatives would not lead to environmental justice impacts.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process. Legal counsel for the Pueblo of San Ildefonso expressed the opinion that conveyance and use of this tract would result in an environmental justice impact on the Pueblo's population.

13.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations. The conveyance or transfer of the tract also could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

The actual conveyance or transfer of the TA 74 Tract would not immediately cause any irreversible or irretrievable commitment of resources. Because only minimal road and utility improvements would be made under the proposed land use scenarios, a very minor irreversible commitment of ecological habitat and potentially cultural resources would occur.

The natural areas, transportation, and utilities land use scenario would cause irretrievable commitments of minor quantities of resources during upgrade of the roads and utilities. These resources include energy expended in the form of electricity and the burning of fossil fuels.

13.3.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of TA 74 Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources, as new development could result in physical destruction, damage, or alteration of cultural resources on the tract. The conveyance or transfer of the tract also could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

13.3.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

Because there would be virtually no change in the use of this land tract, neither the actual conveyance or transfer nor the future land uses would cause any specific impacts on short-term uses of the environment. Similarly, there would be no noticeable impact to the long-term ecological productivity of the area. Under the cultural preservation land use scenario, the long-term productivity of this land tract could increase slightly due to the restriction on recreational use.

14.0 WHITE ROCK TRACT

14.1 Affected Environment

14.1.1 Land Use

The White Rock Tract consists of about 100 acres (40 hectares) and is located north of the White Rock residential community (see Figure 14.1.1-1, White Rock Tract Layout). Lands belonging to the Pueblo of San Ildefonso lie to the north of the tract, and to the west is LANL's current low-level radioactive waste facility located in Technical Area (TA) 54. State Road 4 provides the primary access to the site (DOE 1998b).

Vegetation at the tract includes pinyon-juniper woodlands and juniper savannah. The tract was historically part of TA 54 but is separated from the developed portions of the TA 54 by elevation. The tract was never used for LANL activities beyond providing electrical power from a small substation, water from a pump station and water lines, and serving as a buffer area between residents and LANL operations.

Existing land use at the White Rock Tract includes activities associated with a water pump station, an electrical substation, and power lines. A small Visitor Center on land leased to the County is located at the tract also (DOE 1998b).

Adjacent land uses are based on that of the White Rock commercial and residential activities and include retail and light commercial industry, offices, commercial storage, single-family dwellings, and a small amount of high-density residential areas (approximately 9 acres [3.6 hectares]). The largest and most active businesses serve the local communities, including a supermarket, gas stations, and local retail establishments (LAC 1997). Land use to the north includes the open areas of undeveloped Pueblo land. There are no recognized trails within the tract; no other recreational opportunities exist at the tract (LAC 1997 and DOE 1999c).

Another land use involves structures or facilities that are associated with Federal, State, or local permits. Examples of such facilities or structures are air monitoring stations, wastewater discharge outfalls, and water monitoring or supply wells. Figure 14.1.1-2 shows the environmental media monitoring stations located on and near the subject land tract.

14.0 WHITE ROCK TRACT

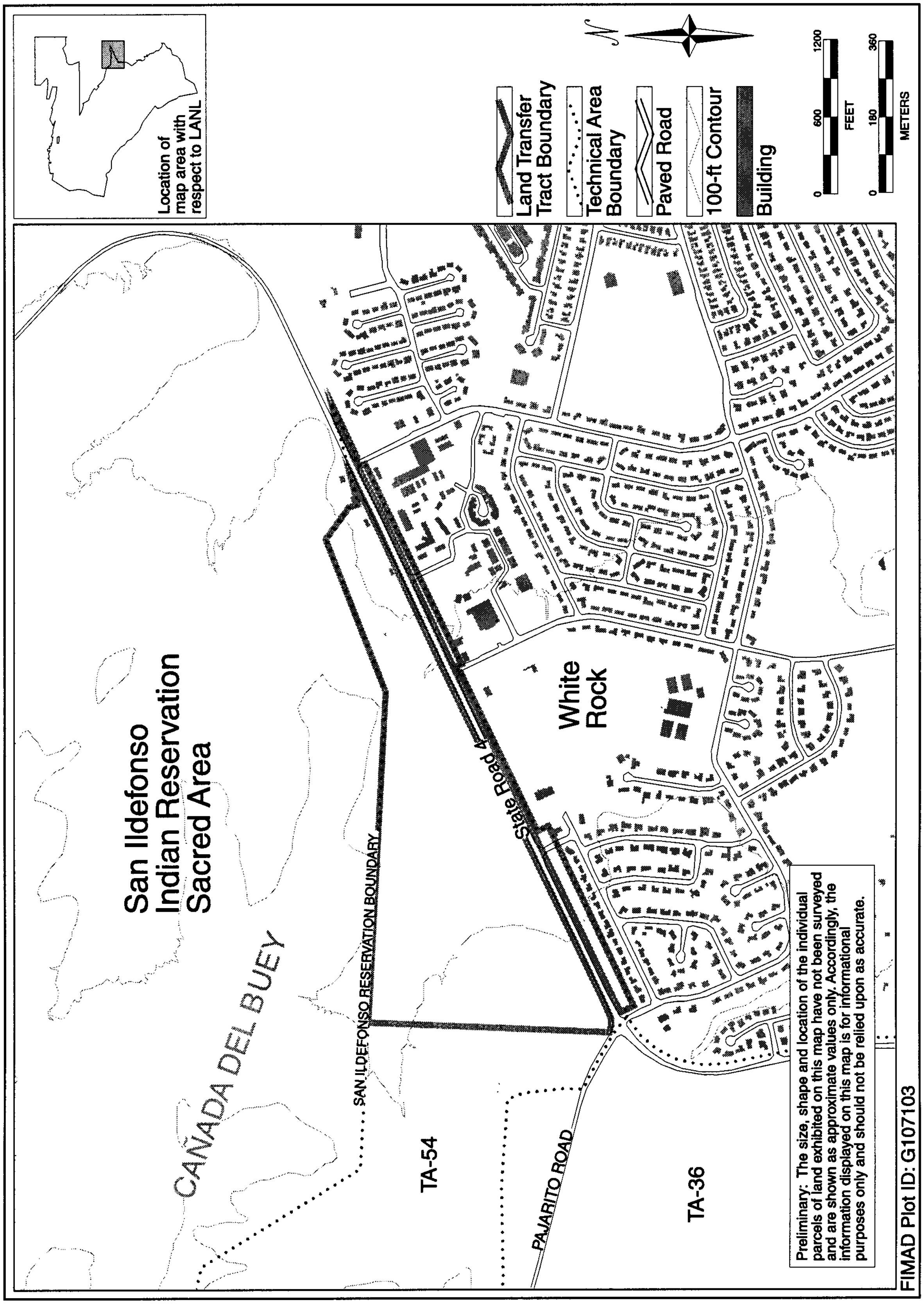

Figure 14.1.1-1. White Rock Tract Layout.

14.0 WHITE ROCK TRACT

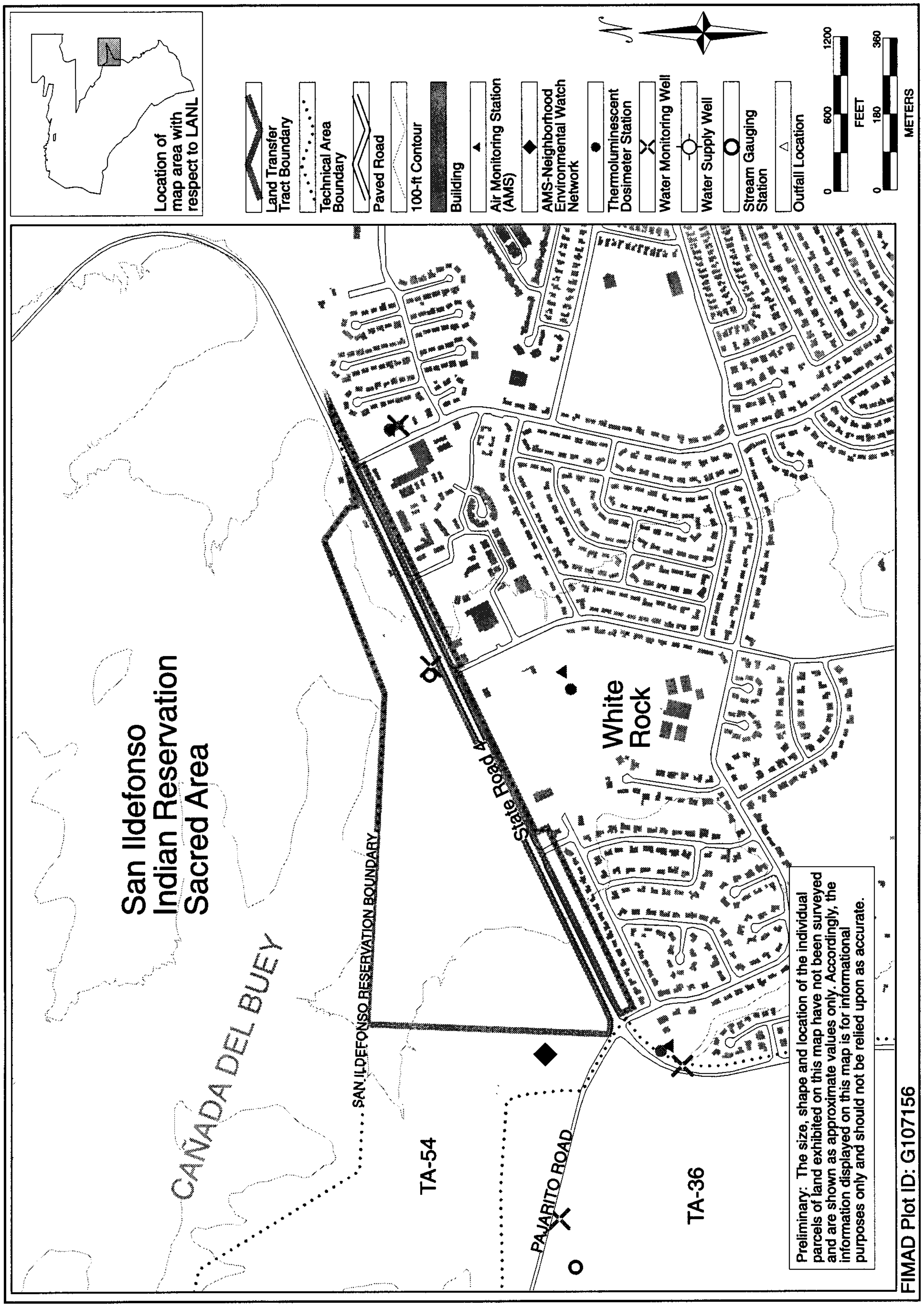

Figure 14.1.1-2. White Rock Tract Monitoring Stations and Outfall Locations.

14.0 WHITE ROCK TRACT

14.1.1.1 Environmental Restoration

There are no potential release sites (PRSs) within the White Rock Tract. There is only one DOE-owned structure; a pumping station for the water supply system. No sampling or characterization of the tract has been performed to date. A portion of the tract lies within the stream channel and floodplain of Cañada del Buey, and sampling of this canyon system has detected low levels of several radioactive isotopes.

Figure 14.1.1.1-1 shows areas with the potential contamination issues (PCIs) within this tract, as well as areas with no known contamination. Only the western half appears to have no known contamination issues, although much of the tract has not yet been characterized. The western half of the tract is the site of dispersed plutonium in sediments. PCI acreage is estimated to total 38 acres (15 hectares), about 40 percent of the tract.

14.1.2 Transportation

This site has access to State Road 4, a four-lane State highway (see Figure 14.1.1-1). East and west of White Rock, State Road 4 is a two-lane highway and will be analyzed as such. State Road 4 also intersects with Pajarito Road, a two-lane road, at the eastern edge of the tract. The current capacity of State Road 4 at this location is approximately 2,375 passenger cars per hour (pcph). The current capacity of Pajarito Road is approximately 1,900 pcph. Table 14.1.2-1 shows the geometry, capacity, 1996 traffic volumes, and 1996 and 2018 level of service (LOS) for these two roadways.

As shown in the table, the LOS for both State Road 4 and Pajarito Road is expected to degrade from LOS D (below average operating conditions) to LOS E (maximum capacity) by the year 2018.

14.1.3 Infrastructure

Figure 14.1.3-1 shows the location of structures, roads, fence lines, and utility lines on the White Rock Tract. A small building on land leased to the County as a Visitor Center is present on the tract. Two electrical power lines traverse this tract immediately north of State Road 4. A water line and pumping substation are located on the tract. Except for the pumping station and Visitor Center, there are no facilities located on this tract that use gas, water, or electricity. However, all utilities are available to the site. This tract is not metered separately for any utilities, and no figures for current utility usage are available.

Table 14.1.2-1. Traffic Volume Estimates

LOCATION	NUMBER OF LANES	CURRENT CAPACITY (pcph)	1996 PEAK HOUR TRAFFIC VOLUMES	1996 LEVEL OF SERVICE	2018 LEVEL OF SERVICE
State Road 4	2	2,375	1,107	D	E
Pajarito Road	2	1,900	700	D	E

14.0 WHITE ROCK TRACT

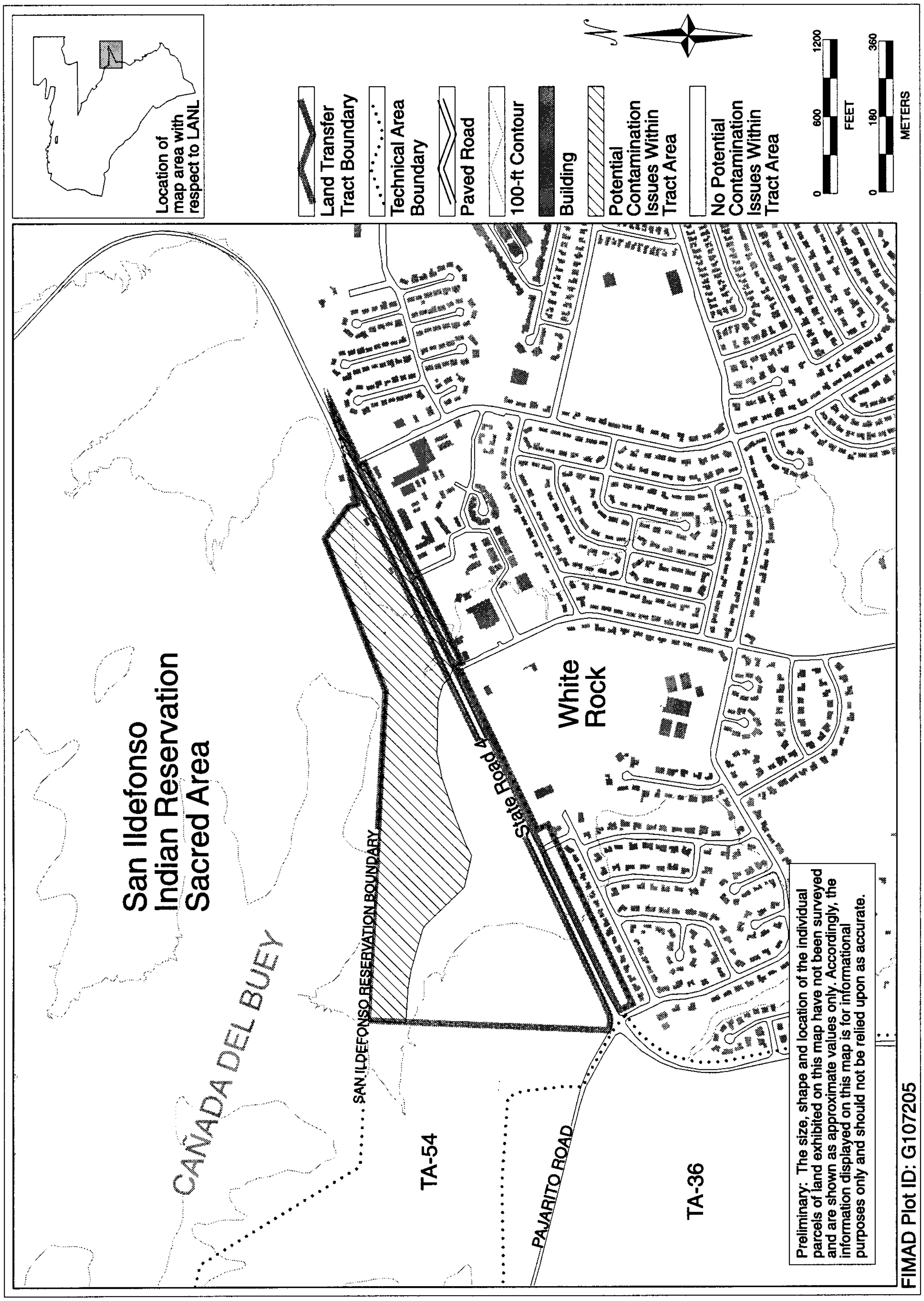

Figure 14.1.1.1-1. White Rock Tract Potential Contamination Issue Areas.

14.0 WHITE ROCK TRACT

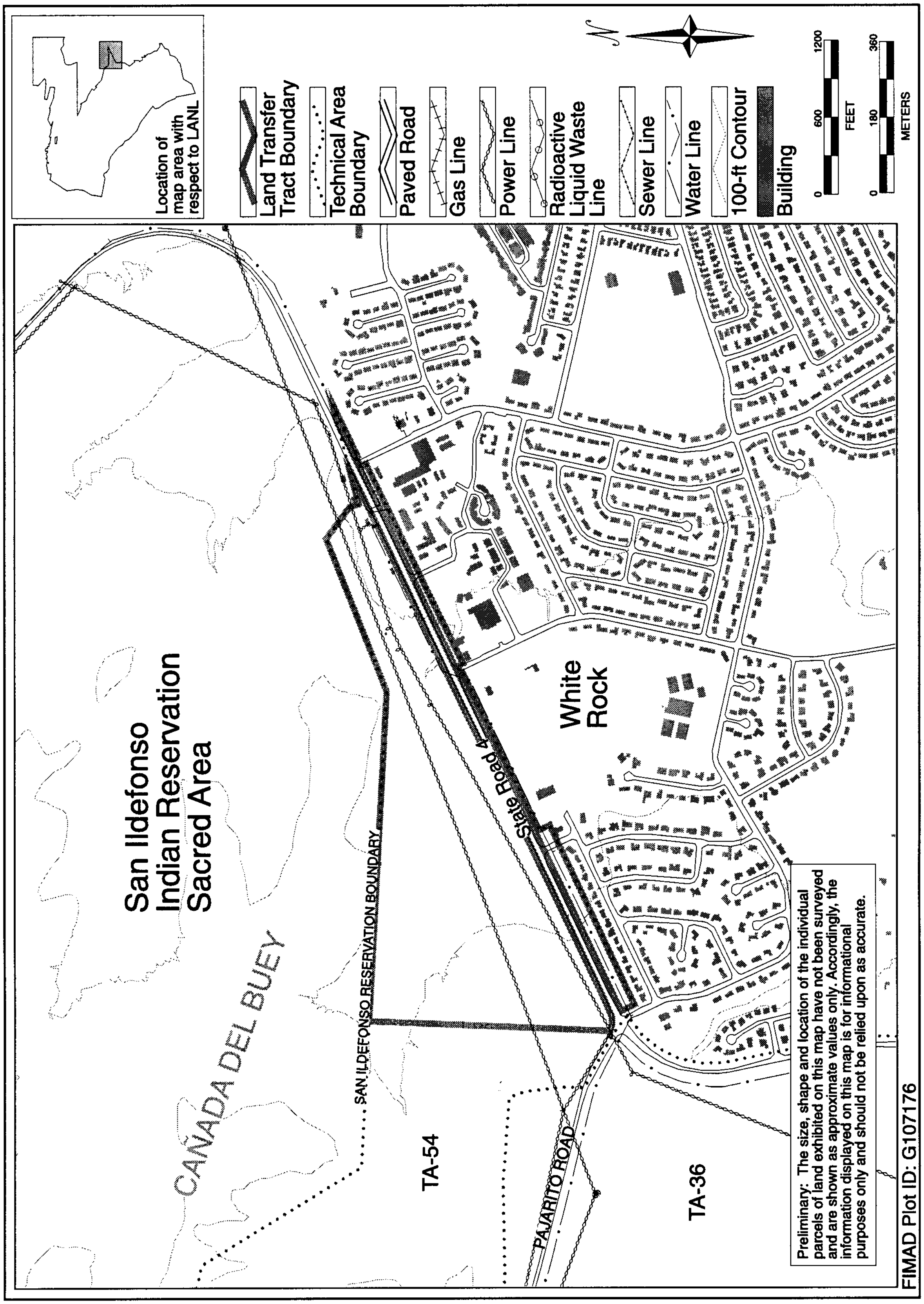

Figure 14.1.3-1. White Rock Tract Utilities and Infrastructure.

14.1.4 Noise

The White Rock Tract is undeveloped except for utility lines, the Visitor Center, and a water pump station. It is bounded on the north by the San Ildefonso Pueblo, an area largely unused. Its western edge is formed by TA 54, but disposal activities are located about 1 mile (1.6 kilometers) away. Contributions to ambient noise levels, therefore, come from the southern borders of this triangular-shaped tract (State Road 4 and the town of White Rock). Measurements of noise levels in White Rock itself have been made and were found to range from 38 to 51 decibels, A-weighted (dBA) (DOE 1999c, Chapter 4). However, noises along the southern border of this tract, especially immediately adjacent to the State highway, are estimated to be higher (in the range of 60 to 70 dBA).

14.1.5 Visual Resources

The White Rock Tract is located along the north side of State Road 4 across from the town of White Rock. Most of the site is forested, but there are some structures on the east end of the tract. Views into this area are mainly from State Road 4 and the development along the road. The tract includes areas north of the boundary of San Ildefonso Pueblo. Views into this site are primarily from San Ildefonso Pueblo. This tract was analyzed by assigning two rating units to the tract based on the proximity to State Road 4. Rating Unit 1 extends along State Road 4 and across State Road 4 from the development in White Rock along the southeast side of the road. Rating Unit 2 includes the remaining area, roughly triangular in shape beyond Rating Unit 1 to the northwest.

Scenic quality, distance zone, and sensitivity levels were combined using the Inventory Class Matrix. Visual resources in Rating Unit 1 were judged to be Scenic Class III, moderate public value, and resources in Rating Unit 2 were determined to be Scenic Class IV, low public value.

14.1.6 Socioeconomics

The most meaningful economic region of influence (ROI) for all of the tracts is the regional setting described in Chapter 3 of this CT EIS. Labor and housing markets extend well beyond any of the tract boundaries affected by the proposed land transfer.

The White Rock Tract is used currently only for utilities and the Visitor Center. There is little or no employment associated with the tract.

14.1.7 Ecological Resources

The White Rock Tract is covered by approximately 75 percent pinyon-juniper woodland vegetation and 20 percent developed areas (roadway, a pump station, and the Visitor Center). The remaining areas are occupied by shrubs, grasslands, and wildflowers. Surface water channels associated with Cedro, Mortandad, Cañada del Buey, Sandia, and Pajarito Canyons are present on or close to this tract. One floodplain (Cañada del Buey) crosses this tract. Wetlands have been identified in association with the floodplain. See Appendix D for further description of the wetlands and floodplains. Pajarito Canyon, located south and west of the tract, contains wetlands within the stream channel. Flora and fauna present within the tract are expected to be characteristic of the region. Habitat for the American peregrine falcon and bald eagle has been identified in this tract. No area of environmental interest (AEI) overlaps the White Rock Tract (PC 1999d). However, the southwestern willow flycatcher AEI core zone is adjacent to, but not within, the southwestern edge of the tract. No southwestern willow flycatcher habitat exists within the White Rock Tract. Noise in the vicinity results from road traffic on State Road 4 and Pajarito Road. Portions of this tract are illuminated at night by commercial lighting from adjacent developed areas in White Rock.

14.1.8 Cultural Resources

The White Rock Tract was used from the Coalition period through the Nuclear Energy period. The tract was part of the Ramon Vigil Spanish land grant. The ROI for this tract includes the land tract itself, plus nearby cultural resources located off the tract. For this tract, these nearby resources are located on San Ildefonso Pueblo and LANL lands.

One hundred percent of the White Rock Tract has been inventoried for historic and prehistoric cultural resources. Survey results indicate that there are four prehistoric sites and one historic site within the tract. Three of the prehistoric sites have been evaluated as eligible for listing on the National Register of Historic Places (NRHP) and one as potentially eligible. The one historic site, a Cold War era structure, has been evaluated as not eligible for the NRHP. There is a potential for unidentified resources, including subsurface archaeological deposits and unrecorded burials.

Formal consultations to identify traditional cultural property (TCP) resources have not been conducted. It is probable that TCPs will be identified during further consultations with Native American and Hispanic groups regarding the traditional uses of this tract. The Pueblo of San Ildefonso has indicated, in general terms, that TCPs are present on this tract. TCPs would not be anticipated in developed parts of the tract.

Additional information on the cultural resources of the White Rock Tract is presented in Appendix E of this CT EIS.

14.1.9 Geology and Soils

Current activity at the tract is limited to the continued use of the Visitor Center, the electrical substation, and power lines (DOE 1998b). Existing structures are vulnerable to greater than magnitude 7 seismic events and wildfire episodes. Soil members include the Penistaja sandy loam, the Servilleta loam, and the Prieta silt loam. No major surface faulting is evident on this tract.

14.1.10 Water Resources

Figure 14.1.1-1 shows the location of the White Rock Tract. The tract is transected by Cañada del Buey, which is an ephemeral stream in the vicinity of the tract. There are no known springs within the tract. There are no regional aquifer water supply wells or test wells within 0.5 mile (0.8 kilometer) of this tract. The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) identifies wetlands in the White Rock Tract. Assessment of these wetlands is included in Appendix D.

There is one stream gage within the White Rock Tract, which is the only surface water monitoring station on the tract. There is another stream gage upstream of the tract in Pajarito Canyon where water quality is monitored. There are no groundwater monitoring stations located within the tract. The closest groundwater monitoring locations maintained by the LANL Environmental Surveillance and Compliance Program are for shallow groundwater and do not pertain to water quality or quantity associated with this tract.

The White Rock Tract lies within the 100-year floodplain. Assessment of this floodplain is included in Appendix D.

14.1.11 Air Resources

The White Rock Tract consists of 100 acres (40 hectares) and is relatively removed from LANL activities. Because LANL activities are a distance away, contributions to air quality come primarily from the southern borders of this triangular-shaped tract (State Road 4 and the town of White Rock).

Air quality at the tract is high. Neither hazardous nor radioactive air pollutant sources exist at the tract. Small amounts of ozone generated from hydrocarbons and carbon dioxide are emitted by vehicles passing through the southern edge of the tract on State Road 502; but no criteria pollutants are emitted from anywhere else on this large tract of land. The tract is part of New Mexico Region 3, an attainment area that meets National Ambient Air Quality Standards (NAAQS) for criteria pollutants.

Approximately 40 different hazardous and other chemicals have been used at TA 54; almost all of these are used at the small laboratories at the entrance to TA 54 at its western edge, a distance of about 3 miles (5 kilometers) from the White Rock Tract. Chemical use at both TA 18 and TA 36 is limited, with small quantities of 15 chemicals reported for TA 18, and small quantities of just 8 chemicals reported for TA 36. Analyses performed for the LANL SWEIS estimate that concentrations of chemical air pollutants will not exceed health-based standards for any point beyond the LANL boundary (DOE 1999c, Chapter 5), and no adverse health effects are expected. From this information, we can extrapolate that the same conclusion can be applied to the White Rock Tract for emissions from TA 18 and TA 36. Concentrations of chemicals used at TA 54 are all from 1 percent to 10 percent of health-based standards at the TA 54 boundary. Therefore, it is probable that concentrations at the White Rock Tract also are below health-based standards.

Estimates for this location indicate doses from radioactive emissions from LANL to residents of White Rock. From the three nearest technical areas, estimated doses are 0.01, 0.24, and 0.02 millirem per year from TA 18, TA 36, and TA 54, respectively (DOE 1999c, Appendix B). The combined dose is thus less than 10 percent of the EPA standard of 10 millirem per year.

14.1.11.1 Global Climate Change

At present, this tract sits largely idle. Heating is required for the Visitor Center and one LANL water pumping station at the White Rock Tract. Carbon dioxide emissions are estimated to be 23 tons (21 metric tons) per year. There are no other greenhouse gas emissions.

14.1.12 Human Health

14.1.12.1 The Radiological Environment for the White Rock Tract

No people reside on this tract. Only a part-time staff works on this land, and visitors remain there only for a short time. It is expected that radiation doses are much less than that to the LANL offsite maximally exposed individual (MEI) due to the much greater distance from the LANL primary source of radioactive air emissions (the Los Alamos Neutron Science Center [LANSCE]). Similarly, background radiation doses are essentially the same as for the Los Alamos townsite. While there are no PRSs on this tract, there are known sources of radioactive contamination from silt migration along the canyon areas.

14.1.12.2 The Nonradiological Environment for the White Rock Tract

Exposures to nonradiological contaminants via the airborne pathway in the LANL vicinity have already been shown to be minor for the affected environment (DOE 1999c). No PRSs or other known sources of nonradiological contamination exist for this tract. Therefore, no additional nonradiological exposures would be expected.

14.1.12.3 Facility Accidents

Chemical Accidents

The LANL SWEIS posits six chemical accidents, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. For all postulated accidents, chemical concentrations in the air plume released by the potential accidents would be below both Emergency Response Planning Guideline (ERPG)-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reaches the White Rock Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents have no estimated public consequences at the tract.

Radiological Accidents

There are 13 credible radiological accident scenarios postulated in the LANL SWEIS, as discussed in Chapter 4, Section 4.1.12 of this CT EIS. Using data from the LANL SWEIS, doses to the MEI at the White Rock Tract have been estimated for each of these, as shown in Table 14.1.12.3-1.

Because there are no residents and few public workers at the tract, estimated tract collective dose and estimated excess latent cancer fatality (LCF) are both zero.

Natural Event Accidents

There are five natural event accident scenarios postulated in the LANL SWEIS: four earthquakes and one wildfire. The most severe earthquake (accident SITE-03B) has an estimated frequency of 3×10^{-5} per year, or once every 330,000 years. The postulated earthquake would release chemicals from a number of facilities, including formaldehyde from the Health Research Laboratory (Building 43-01) and chlorine from the chlorinating station within the Los Alamos townsite (Building 00-1109). As discussed, earthquakes would have no estimated chemical consequences at the White Rock Tract. The most severe postulated earthquake, however, would release significant quantities of radioactive materials from several buildings, especially from the Chemistry and Metallurgy Research (CMR) Building (Building 03-29). Radiological consequences are estimated to result in a maximum dose of approximately 6 Roentgen equivalent man (rem) at the tract.

The postulated site wildfire scenario would burn about 8,000 acres (3,240 hectares) within LANL boundaries, or about 30 percent of LANL, including most of Mortandad Canyon and parts of Los Alamos and DP Canyons east of TA 21. Chemical releases would be less severe than in the earthquake scenarios. The largest quantities of radioactive materials would be released from the transuranic (TRU) waste storage domes at Area G, about 1 mile (1.6 kilometers) from the White Rock Tract. The maximum dose at the tract is estimated to be about 1 rem. Such wildfire has an estimated frequency of 0.1 per year, or once every 10 years.

Because there are no residents and few public workers at the tract, estimated tract collective dose and estimated excess LCF are both zero for all natural event accident scenarios.

14.1.13 Environmental Justice

Any disproportionately high and adverse human health or environmental effects on minority or low-income populations that could result from the actions undertaken by the DOE are assessed for the 50-mile (80-kilometer) area surrounding LANL, as described in Chapter 3, Section 3.2.1.14.

14.2 No Action Alternative

14.2.1 Land Use

Under the No Action Alternative, there would be no anticipated changes in land use. The tract would continue to provide electricity and water to portions of LANL, and the Chamber of Commerce would

Table 14.1.12.3-1. MEI Doses for the White Rock Tract Resulting from Hypothetical Accidents at LANL Facilities

ACCIDENT SCENARIO	ACCIDENT LOCATION	FACILITY	FREQUENCY PER YEAR	MEI DOSE (mrem)	ACCIDENT DESCRIPTION
RAD-01	54-38	RANT	1.6×10^{-3}	53	Fire in the outdoor container storage area
RAD-02	03-29	CMR	1.5×10^{-6}	2,400	Natural gas pipeline failure
RAD-03	18-116	Kiva #3	4.3×10^{-6}	71	Power excursion at the Godiva-IV fast-burst reactor
RAD-05	21-209	TSTA	9.1×10^{-6}	0	Aircraft crash
RAD-07	50-69	WCRR	3.0×10^{-4}	35	Fire in the outdoor container storage area
RAD-08	54-230	TWISP	4.3×10^{-6}	1,500	Aircraft crash
RAD-09A	54-226	TWISP	4.9×10^{-1}	23	Puncture or drop of average-content drum of transuranic waste
RAD-09B	54-226	TWISP	4.9×10^{-3}	1,200	Puncture or drop of high-content drum of transuranic waste
RAD-12	16-411	--	1.5×10^{-6}	1,500	Seismic-initiated explosion of a plutonium-containing assembly
RAD-13	18-116	Kiva #3	1.6×10^{-5}	100	Plutonium release from irradiation experiment at the Skua reactor
RAD-15A	03-29	CMR	3.6×10^{-5}	11	Fire in single laboratory
RAD-15B	03-29	CMR	3.2×10^{-5}	210	Fire in entire building wing
RAD-16	03-29	CMR	3.5×10^{-6}	2	Aircraft crash

Notes: mrem = millirem; RANT = Radioactive Assay and Nondestructive Test; TSTA = Tritium Systems Test Assembly; WCRR Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project continue to staff and operate the Visitor Center. Similarly, there would be no changes in access to the tract.

14.2.1.1 Environmental Restoration

Characterization and cleanup of this tract would take place as described in DOE's *Accelerating Cleanup: Paths to Closure* (DOE 1998c) or similar plans. The plan focuses on completing work at as many contaminated sites as possible by the end of fiscal year 2006, although some LANL sites could take longer. The plan includes input from all major field sites, including LANL.

The DOE has developed preliminary information based on current knowledge of contamination at the White Rock Tract, as briefly discussed in the Affected Environment portion of this chapter, Section 14.1.1.1. Information includes estimates of sampling and cleanup costs, decommissioning costs, types and volumes of wastes that would be generated, and length of time required to effect the cleanup. An overview of this preliminary information is set forth in Appendix B of this CT EIS. All information has been extracted from the Environmental Restoration Report to Congress (DOE 1999b).

This information indicates no structures are likely to require decommissioning. Some removal of contaminated sediments may be required. This cleanup would last up to 16 months and result in approximately 940 cubic yards (720 cubic meters) of waste. Cost estimates for remedial action at this parcel range from about $954,000 to $3,374,000. These estimates are based on the information currently available for each PRS or structure, and are subject to change if significantly different information is discovered during the course of investigation or remediation. It should be noted that all PRSs, including those at which no remediation is ultimately required, must be characterized, and the results must be reported to the administrative authority. As a consequence, there are almost always costs and wastes associated with PRSs that do not require actual "cleanup." It is possible, however, that the administrative authority could require even more restoration, resulting in greater waste volumes, a longer cleanup duration, and higher costs. It also should be noted that environmental restoration actions and costs represent only a portion of the actions and total costs that may be required for conveyance and transfer of this parcel. These additional costs may be significant.

14.2.2 Transportation

The No Action Alternative would result in no significant changes in traffic volume on State Road 4 or Pajarito Road near the site. It is expected that the future operational performance of Pajarito Road and State Road 4 would remain similar to that of the existing performance, assuming that the future annual growth rate is 1.5 percent as predicted the U.S. Census Bureau.

14.2.3 Infrastructure

The No Action Alternative would result in no changes in the infrastructure or utilities of the White Rock Tract. Thus, implementing the No Action Alternative would have no new impacts to the utilities and infrastructure.

14.2.4 Noise

In the No Action Alternative, some increase in traffic would occur along State Road 4 due to an increase in overall LANL employment of about 21 percent. This traffic increase would only slightly modify noise levels in the White Rock Tract and would have no effect at all in parts of the tract that are removed from the highway. Noise levels would thus remain at 60 to 70 dBA along the highway and less than 40 dBA on other parts of the tract.

14.2.5 Visual Resources

Under the No Action Alternative, the visual resource of the tract would remain much as it is today. The forested areas that include some manmade modifications would not be expected to change with regard to the visual character.

14.2.6 Socioeconomics

Under the No Action Alternative, there would be no anticipated changes in land use or change in employment on the tract.

14.2.7 Ecological Resources

Under the No Action Alternative, there would be no changes in land use at White Rock Tract, as described in Section 14.1.1. Therefore, no impact to ecological resources would be anticipated under the CT EIS No Action Alternative.

14.2.8 Cultural Resources

Under the No Action Alternative, the White Rock Tract would remain the responsibility of the DOE, and the treatment of the cultural resources present would continue to be subject to Federal laws, regulations, guidelines, executive orders, and Pueblo Accords. Other positive impacts of the No Action Alternative would be the passive preservation of cultural resources due to lack of development.

Ongoing negative impacts from natural processes (such as erosion, fire, or seismic events) on the physical integrity of cultural resources would continue. Also, the potential for impacts from access by the public and the lack of security would continue. These impacts include unintentional destruction or damage of resources, vandalism, and unauthorized collection of materials and artifacts. These impacts would apply both to resources within the tract and to those located nearby but outside the tract boundary on LANL and San Ildefonso Pueblo lands.

14.2.9 Geology and Soils

No Action Alternative consequences would be limited to existing tract uses. The tract is already developed; no additional utilities, roadwork, or buildings are required. No soil disturbance or change in availability of resources would be anticipated.

14.2.10 Water Resources

Continuation of the current use of this tract by the DOE would be anticipated under this alternative. Consequences to water resources under the No Action Alternative would be no different than those already existing in the affected environment.

14.2.11 Air Resources

In the No Action Alternative, there would be no anticipated changes in land use. LANL activities at adjacent technical areas would increase, but air quality would be largely unchanged from that of today. Criteria pollutant concentrations would remain within NAAQS. Concentrations of hazardous and other chemical air pollutants would remain below health-based standards. Doses from radioactive pollutants would increase slightly. From the three nearest technical areas, estimated doses are 0.01, 0.72, and 0.02 millirem per year from TA 18, TA 36, and TA 54, respectively. (DOE 1999c, Appendix B). The combined dose would be less than 10 percent of the EPA standard of 10 millirem per year.

14.2.11.1 Global Climate Change

There would be no change in facilities or levels of activity in the No Action Alternative. Carbon dioxide emissions would continue at approximately 23 tons (21 metric tons) per year.

14.2.12 Human Health

There would be no identifiable consequences of implementing the No Action

Alternative for the White Rock Tract. No changes in cancer risk should be expected for this alternative.

14.2.12.1 Chemical Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reaches the White Rock Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract.

14.2.12.2 Radiological Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. MEI doses would be greater than 500 millirem for 4 of 13 scenarios postulated in the LANL SWEIS. The estimated tract collective dose and estimated excess LCF would both be zero.

14.2.12.3 Natural Event Accidents

Accident assessment would be the same as described in the Affected Environment section of this chapter. Neither the wildfire nor any of the earthquakes would have chemical consequences, even under adverse weather dispersion conditions. The MEI dose resulting from the postulated wildfire would be about 1 rem due to releases from TRU waste storage domes at Area G; the maximum dose from the most severe earthquake would be approximately 6 rem. Because there would be no residents and few public workers at the tract, estimated tract collective dose and estimated excess LCF would both be zero for all natural event accident scenarios.

14.2.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses indicate that air emissions and hazardous chemical and radiological releases from normal LANL operations, which would continue under the No Action Alternative, would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations.

The analyses also indicate that socioeconomic changes resulting from implementing the No Action Alternative would not lead to environmental justice impacts. Employment and expenditures would remain unchanged from the baseline.

14.3 Proposed Action Alternative

There are no DOE facilities or activities on this tract that would have to be relocated or otherwise affected by the proposed disposition of this tract, except for an environmental media monitoring station. No environmental effects would be associated with the relocation of the site's surface water monitoring station. Therefore, there would be no direct consequences of the transfer of ownership of the tract other than those associated with potential loss of Federal protection of cultural and ecological resources (see Sections 14.3.7 and 14.3.8, respectively).

Indirect consequences would be anticipated from the subsequent uses of the tract contemplated by the receiving party or parties. The contemplated uses and the associated consequences are discussed in the following sections. The potential relocation of or effects on currently existing non-DOE facilities or activities are considered indirect consequences and are discussed in the following sections as appropriate.

14.3.1 Land Use

14.3.1.1 Description of Contemplated Uses

Land use identified for the White Rock Tract includes commercial and residential development, and cultural preservation and commercial development (see Figure 14.3.1.1-1 and Figure 14.3.1.1-2). The following paragraphs provide a description of each of these scenarios.

Commercial and Residential Development Land Use Scenario

Land use proposed under this scenario would include both commercial and residential development areas. As proposed, residential areas would include approximately 5 acres (2 hectares) of medium-density residential areas based on a developed density of 12 dwelling units per acre, and approximately 35 acres (14 hectares) of high-density residential areas at a density of 20 dwelling units per acre. Residential development would assume an average population of approximately 2.5 people per household for a total of 1,900 new residents. Commercial development would include approximately 20 acres (8 hectares) for a recreational vehicle park, which would result in up to 400 temporary lodgers on the tract at any given time. Additionally, approximately 40 acres (18 hectares) surrounding and between the developed areas would be maintained as open space.

Cultural Preservation and Commercial Development Land Use Scenario

Land use under this scenario would be divided between ensuring preservation of portions of the tract and developing other parts of the tract for commercial purposes. Commercial development would likely be limited to lands adjacent to State Road 4, across from the White Rock commercial district development. Upslope portions of the tract would be held in preservation where access by the general public would be eliminated. The Visitor Center could be required to be relocated and the building may be razed. However, the lease of the land to the County would be expected to transfer to the new owner and the facility would be expected to remain operational at least for the duration of the current lease agreement.

Table 14.3.1.1-1 and Table 14.3.1.1-2 summarize the attributes of land use proposed for the White Rock Tract under each of these scenarios.

14.3.1.2 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

The increased density associated with the development of the White Rock Tract under the commercial and residential development land use scenario would result in a notable change in land use patterns in the White Rock community. High-density residential land use would increase by roughly 75 percent. A small, medium-density residential area also would be developed. Use of the recreational vehicle park on a portion of the tract likely would be of high use only on a seasonal basis. The 20 acres (8 hectares) would provide for an estimated 160 recreational vehicle spaces.

14.0 WHITE ROCK TRACT

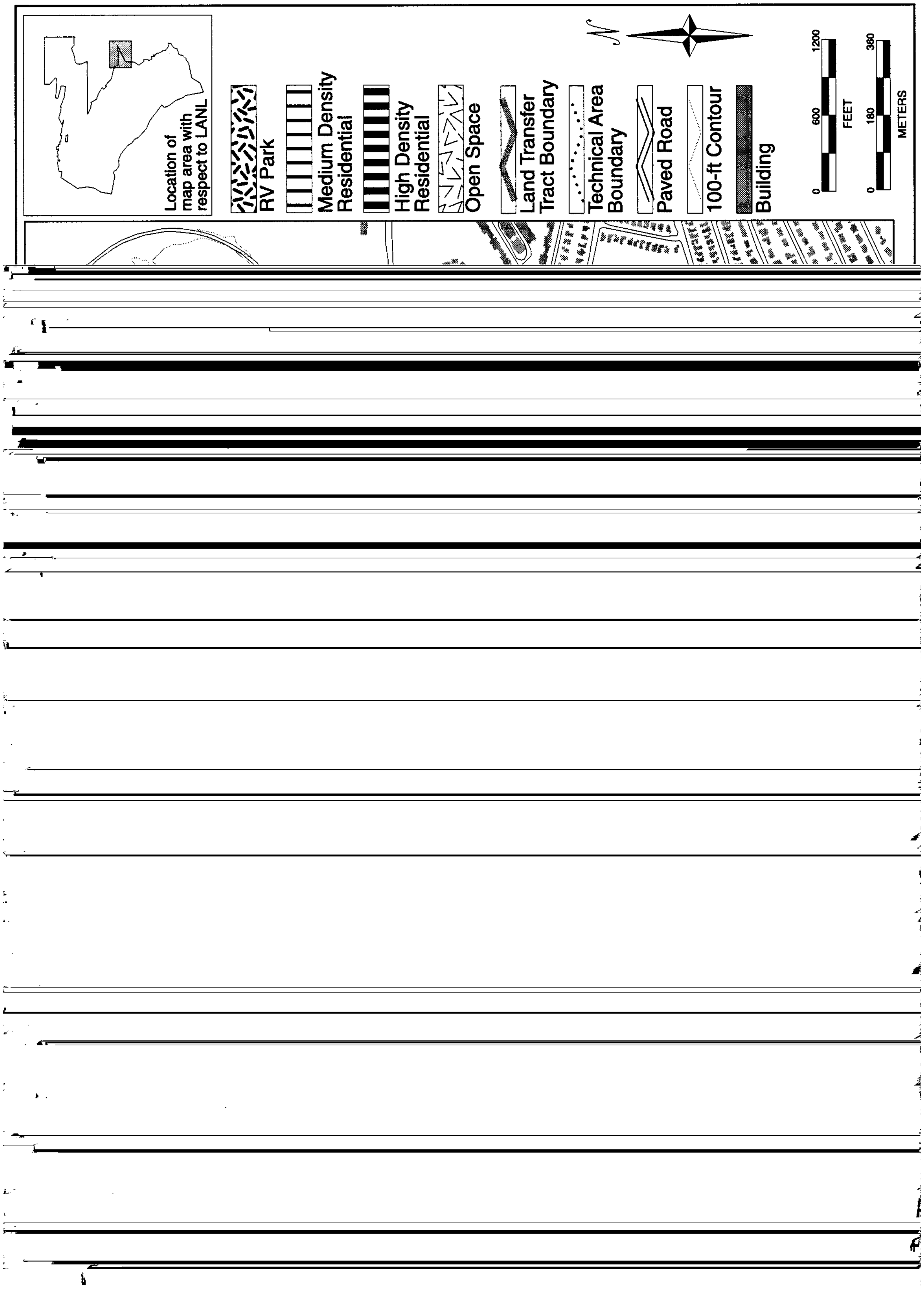

Figure 14.3.1.1-1. White Rock Tract Commercial and Residential Development Land Use Scenario.

14.0 WHITE ROCK TRACT

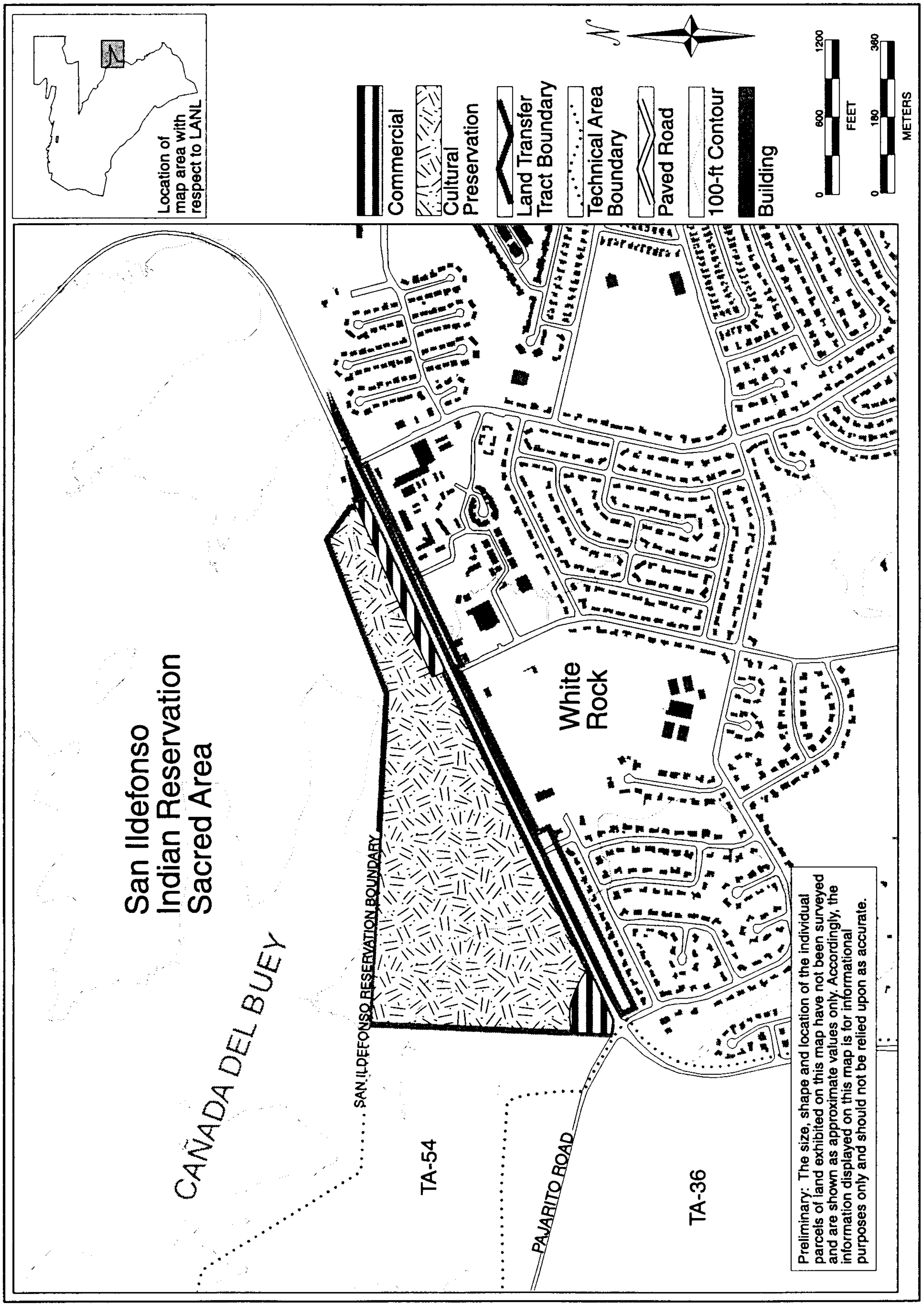

Figure 14.3.1.1-2. White Rock Tract Cultural Preservation and Commercial Development Land Use Scenario.

Table 14.3.1.1-1. Attributes of Future Residences Land Use for the White Rock Tract Under the Commercial and Residential Land Use Scenario

COMMERCIAL AND RESIDENTIAL DEVELOPMENT
• About 20 acres (8 hectares) would be developed as a recreational vehicle park with 160 spaces. • About 5 acres (2 hectares) would be developed as residences at a density of 12 dwelling units per acre. • About 35 acres (approximately 14 hectares) would be developed as residences at a density of 20 dwelling units per acre. • When fully developed, there would be 760 new dwelling units, 2,200 new residents, and 1,730 personal vehicles, including recreational vehicles and their occupants. • About 40 acres (18 hectares) surrounding and between the developed areas would remain as open space. • Visitor Center and water pumping station would remain.

Table 14.3.1.1-2. Attributes of Future Land Use for the White Rock Tract Under the Cultural Preservation and Commercial Land Use Scenario

CULTURAL PRESERVATION AND COMMERCIAL DEVELOPMENT
• Land use at the tract would be primarily cultural preservation with limited commercial development. • Commercial development along State Road 4 could include storage rental space and/or retail businesses on less than 10 acres (4 hectares) of land. • Upslope portions of the tract would be held in preservation where access by the general public would be eliminated. • Visitor Center and water pumping station would remain at least for the duration of the current lease agreement. • The developed portion of the tract would contain 4 businesses with 60 total employees and 2 commercial vehicles.

There is a critical shortage of affordable housing in the Los Alamos/White Rock area. Although the increased residential density associated with this development would likely result in some adverse secondary impacts, it also would serve to offset the shortage of affordable housing. The population of the community would increase by about one-third.

Cultural Preservation and Commercial Development Land Use Scenario

The commercial development proposed under this scenario would not be anticipated to result in the same degree of secondary effects identified in discussions on residential density. The use of less than 10 acres (4 hectares) of the tract for rental storage space or retail businesses would, for the most part, represent a continuation of existing and adjacent land use.

Preservation of portions of the tract would result in the elimination of access to the site by the general public. However, activities at the site are already limited by restrictions on access to the adjacent LANL land. As such, there would be no significant change in access to the portion of the tract proposed for cultural preservation.

14.3.1.3 Environmental Restoration

No additional environmental restoration actions would be required under the Proposed

Action Alternative because restoration activities must occur before the tract would be considered suitable for conveyance or transfer.

14.3.2 Transportation

14.3.2.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

The commercial and residential development land use scenario anticipates development of additional open space and residential and commercial facilities. The Institute of Transportation Engineers (ITE) land use codes were utilized to estimate the trips generated by these proposed developments. These ITE land uses represent the medium-density residential, high-density residential, and recreational vehicle park.

Table 14.3.2.1-1 shows the number of additional trips the ITE Trip Generation Manual (ITE 1997) estimates could be generated by this development.

As shown in the table, the proposed development would add 378 exiting trips to State Road 4 and State Road 502 in the weekday morning peak hour and an additional 374 entering trips in the weekday evening peak hour. This combination of land uses also could add up to 5,815 new trips on State Road 4. These additional trips would cause the LOS for the two-lane section of State Road 4 to degrade below LOS F (traffic jam conditions). In order to avoid these unacceptable operating conditions, widening State Road 4 to four lanes would be necessary

Table 14.3.2.1-1. Estimated Increase in Traffic for the Commercial and Residential Development Land Use Scenario

ITE ESTIMATED TRAFFIC VOLUMES FOR WHITE ROCK TRACT									
Land Use	ITE Land Use Code	24 Hour Two-Way Volume	Morning Peak Hour Trips		Evening Peak Hour Trips		Saturday Peak Hour Trips	
			Enter	Exit	Enter	Exit	Enter	Exit
Residential Condominium – 5 acres (2 hectares)	230	387	5	24	24	12	17	15
Apartments – 35 acres (14 hectares)	220	4,668	56	303	296	141	0	0
Recreational Vehicle Park – 20 acres (8 hectares)	240	760	11	51	54	32	39	37
Total		5,815	72	378	374	185	54	52

to accommodate the additional level of traffic volume. The section of State Road 4 that is currently four lanes would operate at LOS B (good operating conditions with stable traffic flow) with the additional trips. Pajarito Road would continue to operate at LOS E (maximum capacity) under this land use scenario.

Cultural Preservation and Commercial Development Land Use Scenario

In the event that the cultural preservation and commercial development land use is implemented, it is likely that transportation impacts would be similar to the No Action Alternative.

14.3.3 Infrastructure

14.3.3.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

Development of this nature would require enhancement of existing utilities. Water, electricity, gas, and sewage lines would need to be extended to service new structures. Additionally, utility usage would increase.

The indirect environmental impacts with regard to utilities and infrastructure resulting from this alternative fall into two categories: (1) increased utility usage and (2) ground disturbance resulting from construction of new facilities. Table 14.3.3.1-1 shows the estimated increase in power, electricity and gas and water usage, and wastewater and solid waste production. It is not anticipated that these increases would exceed the capacity for any utility in the region.

Installation of new utility facilities and upgrades to existing ones would require creation of trenches and access and maintenance roads. The construction of roads, parking areas and buildings, and extension of utility lines would cause soil disturbance. Refer to Section 14.3.9 of this chapter for detail on impacts resulting from ground disturbance from new construction.

Cultural Preservation and Commercial Development Land Use Scenario

Under this land use scenario, only a small portion would be developed for commercial use. It is anticipated that no more than four businesses would be developed on the tract and would be located adjacent to State Road 4 on soil that has already been disturbed. Because of the small number of anticipated business, there would be no need to upgrade the utility systems, but some extension of the existing utility lines could be required. The estimated utility usage increase brought about by the new businesses is shown in Table 14.3.3.1-2. It is not anticipated that these increases would exceed the capacity for any utility in the region.

14.3.4 Noise

14.3.4.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

One contemplated use would be commercial and residential development. Two apartment complexes would be constructed and a recreational vehicle park would be installed. Noise levels on the White Rock Tract would increase due to increased traffic and people. Noise levels along State Road 4 would likely remain in the range of 60 to 70 dBA, but significant increases would occur on the remaining parts of the tract. Consistent with residential use, noise levels on other parts of the tract would likely to increase from 40 to 50 dBA from existing levels of 20 to 30 dBA.

Cultural Preservation and Commercial Development Land Use Scenario

Another possible use for this tract would be cultural preservation and limited

Table 14.3.3.1-1. Estimated Increase in Utility Usage for Commercial and Residential Development Land Use Scenario for the White Rock Tract

	PEAKING POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (WHITE ROCK) mgy (mly)	MSW tpy (mty)
Estimated annual increase	0.9	5.2	99 (2,800)	81 (307)	41 (155)	730 (662)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	154 (583)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, MSW = municipal solid waste, tpy = tons per year, mty = metric tons per year, NA = not available

Table 14.3.3.1-2. Estimated Increase in Utility Usage for Cultural Preservation and Commercial Development Land Use Scenario for the White Rock Tract

	PEAK POWER mw	ELECTRICITY gwh	GAS mcf (mly)	WATER mgy (mly)	SEWAGE (WHITE ROCK) mgy (mly)	MSW tpy (mty)
Estimated annual increase	0.04	0.2	2 (57)	2 (8)	1 (4)	4 (3.5)
Available system capacity	5	277	5,040 (142,700)	297 (1,125)	154 (583)	NA

Notes: mw = megawatts, gwh = gigawatt-hours, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, MSW = municipal solid waste, tpy = tons per year, mty = metric tons per year, NA = not available

commercial development. Commercial development would be likely along State Road 4. Noise levels for this strip of land would continue to result primarily from highway traffic, and hence, should not change significantly from current noise levels and those of the No Action Alternative. Parts of the tract away from the highway would likely be used for cultural preservation, for which noise levels would remain unchanged from the No Action Alternative.

14.3.5 Visual Resources

14.3.5.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

One contemplated use is commercial and residential development. This development would impact the existing Scenic Class III, moderate public value visual resources, on the northwest side of State Road 4. Scenic

Class IV, low public value visual resources, would be maintained or improved.

Cultural Preservation and Commercial Development Land Use Scenario

Another possible use for this tract is cultural preservation with limited commercial development along the eastern part of the northwest side of State Road 4. This limited development would still impact the existing Scenic Class III landscape on the northwest side of State Road 4, but to a lesser degree than the commercial and residential development land use scenario. Scenic Class IV resources would be maintained or improved.

14.3.6 Socioeconomics

14.3.6.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

The contemplated uses for the White Rock Tract include commercial and residential development. The construction of new residential areas would temporarily increase employment in the ROI. This would, in turn, generate increases in area income. These changes would be temporary, lasting only the duration of the construction period. The majority of the jobs generated would be filled by the existing ROI labor force. Therefore, there would be no impact on area employment or increase in the need for housing in the area.

There would be short-term increases in area employment and income associated with the construction of commercial facilities, and long-term increases once the facilities are operational.

Cultural Preservation and Commercial Development Land Use Scenario

Another possible use for this tract is cultural preservation with limited commercial development along the eastern part of the northwest side of State Road 4. There would be short-term increases in area employment and income associated with the construction of the limited commercial development and long-term increases once the facilities are operational. These impacts would be greater than those for the commercial and residential development land use scenario.

Approximately 60 workers would be employed on the tract and a total of 100 jobs would be generated within the ROI, which would, in turn, increase ROI income. Because these jobs would be filled by the existing ROI labor force, there would be no impact on area population or increase in the demand for housing or public services in the ROI.

14.3.7 Ecological Resources

Direct impacts of the conveyance or transfer itself would be limited to the changes in responsibility for resource protection. Environmental review and protection processes for future activities would not be as rigorous as those which govern DOE activities.

14.3.7.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

The commercial and residential development land use scenario would include the development of approximately 60 acres (24 hectares) of pinyon-juniper woodland habitat that would be severely modified or lost. Highly mobile wildlife species, birds, or wildlife species with large home ranges (such as deer and coyotes), would be able to relocate to adjacent undeveloped areas. However, successful relocation may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development. Species relocation may result in additional pressure to lands already at or near carrying capacity. The impacts could include overgrazing, stress, and overwintering mortality. For less-mobile species (small mammals and reptiles), direct mortality could occur during the actual construction event or ultimately result from habitat alteration. Acreage used for the development also would be lost as potential hunting habitat for raptors and other predators.

In addition to the area to be disturbed, there would be a decrease in quality of the habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction. One little-addressed consequence of urban development is the influence of domestic animals upon wildlife populations. For example, free-roaming domestic cats may kill more than 100 animals each year. Studies have shown that approximately 60 percent of the wildlife cats kill are small mammals; 20 percent are birds (predation at bird feeders can be substantial; one Virginia study estimated 28 kills per urban cat per year); and 10 percent are amphibians, reptiles, and insects. Due to the presence of coyotes in the White Rock area, predation by cats would tend to be limited to within developed and closely adjacent natural areas (Goldsmith et al. 1991, Crooks 1997-98, and CSBC 1998). Free-ranging domestic dogs are known to harass and disrupt the activities of many wildlife species and are documented to have caused mortality in animals such as deer and foxes (Goldsmith et al. 1991).

Development in this tract could result in the direct loss of wetland vegetation and function. Even if construction and development does not occur in the wetland, indirect impact such as additional surface runoff from an increase of impermeable surface areas (pavement) could result in accelerated streambed erosion and increased downstream, and offsite sedimentation could occur. Subsequently, floodplain areas may undergo boundary changes.

The adjacent habitat also would experience a loss of quality from the reduction in size, segmentation of the habitat, and restrictions on mobility for some mammals. The loss of acreage due to development would result in a reduction of breeding and foraging habitat for wildlife currently utilizing the property. There are three species that are Federal-listed as threatened or endangered that may forage in the White Rock Tract: bald eagle, American peregrine falcon, and southwestern willow flycatcher. With respect to the bald eagle and southwestern willow flycatcher, this area has a low level of potential use for foraging. The American peregrine falcon is likely to use the area for foraging.

The watershed management approach to natural resource management requires the integration of natural resource management plans across several land management agencies. The current lack of a natural resources management plan by either the County of Los Alamos or the Pueblo of San Ildefonso would impede the development of an integrated, multiagency approach to short- and long-term natural resource management strategies.

Disposition of this tract would result in a much less rigorous environmental review and protection review process for future development or other activities. Neither the County of Los Alamos nor the Pueblo of San Ildefonso have regulations that would match the Federal review and protection process such as required under the NEPA implementing regulations (40 Code of Federal Regulations [CFR] 1500-1508).

Cultural Preservation and Commercial Development Land Use Scenario

Under the cultural preservation and commercial development scenario, the potential impacts to natural resources would be similar but less compared to the commercial and residential development scenario. Commercial development would be limited to less than 10 acres (4 hectares) near the highway. Lands maintained in cultural preservation status would not undergo construction, thus preserving the current vegetation and wildlife habitat. Additionally, due to recreation use restriction on cultural preservation lands, impacts to wildlife disturbance, both visual and auditory, from recreational use would be diminished. Consequently, habitat for most wildlife species would be augmented and improved.

14.3.8 Cultural Resources

Direct impacts of the conveyance and transfer itself would result from the transfer of known and unidentified cultural resources out of the responsibility and protection of the DOE.

First, under the Criteria of Adverse Effect (36 CFR 800.5(a)(1)), the transfer, lease, or sale of NRHP-eligible cultural resources out of Federal control is an adverse effect. Eligible cultural resources are present in the White Rock Tract and thus could be directly impacted by the Federal action.

Second, the conveyance and transfer of this tract could potentially impact the cultural resources by removing them from future consideration under the *National Historic Preservation Act*.

Third, the disposition of this tract may affect the protection and accessibility to Native American sacred sites and sites needed for the practice of any traditional religion by removing them from consideration under the *Religious Freedom Restoration Act*, *American Indian Religious Freedom Act*, and Executive Order 13007, "Indian Sacred Sites." Finally, the disposition of this tract would affect the treatment and disposition of any human remains, funerary objects, sacred objects, and objects of cultural patrimony that may be discovered on the tract. This impact would result from removing these items from consideration under the *Native American Graves Protection and Repatriation Act*, or from changing the way this act is applied to these remains and objects. Indirect consequences are discussed in the following sections.

14.3.8.1 Environmental Consequences of the Contemplated Uses

Indirect impacts would be anticipated from the land uses contemplated for the White Rock Tract by the receiving parties. The two land uses identified for the White Rock Tract include (1) commercial and residential development and (2) cultural preservation and commercial development. This analysis reflects the broad, planning-level impacts anticipated from each contemplated use.

Commercial and Residential Development Land Use Scenario

Under the commercial and residential development scenario, approximately 60 acres (24 hectares) would be directly disturbed by construction activities. Cultural resources are present in the tract and adjacent areas that would be impacted by the contemplated land use scenario.

Commercial and residential development would cause large-scale disturbance to any cultural resources present due to construction, grading, and trenching. These impacts would include the destruction of archaeological sites and TCP locations. Resources avoided by construction may become isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. The development of land may cause changes to the presence or integrity of, or access to natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

The introduction of additional full-time residents and transient users of the recreational vehicle park would increase access to cultural resources. Increased access could cause unintentional destruction and damage to resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies.

The construction of transportation infrastructure would have similar impacts on cultural resources as described for residential and commercial construction and also would increase access to cultural resources.

Cultural Preservation and Commercial Development Land Use Scenario

Under the cultural preservation and commercial development scenario, the level portions of the White Rock Tract would be used for commercial enterprises, and upslope areas would be dedicated to cultural preservation and cultural stewardship needs by the receiving party. Access to the cultural preservation lands by the general public would be restricted to protect culturally important resources. Cultural preservation uses and users will be defined by the receiving party.

Commercial development would be limited to less than 10 acres (4 hectares) adjacent to the highway. This development would cause large-scale disturbance to any cultural resources present due to construction, grading, and trenching. These impacts would include the destruction of archaeological sites and TCP locations. Resources avoided by construction may become isolated or have their setting disturbed by the introduction of elements out of character with the resource, such as visual and audible intrusions. The development of land may cause changes to the presence or integrity of, or access to natural resources utilized by traditional communities for subsistence, religious, or other cultural activities.

Dedicating portions of the tract to cultural preservation would be anticipated to have a beneficial impact on the cultural resources present. The restriction of access by the general public is anticipated to help protect the resources from vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Another positive impact would be the passive preservation of resources and continued access to TCPs afforded to traditional practitioners of the receiving party. There also may be potential impacts to some current traditional users if general access is precluded or restricted.

14.3.9 Geology and Soils

14.3.9.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

The commercial and residential land use identified for the White Rock Tract would result in a total of 60 acres (24 hectares) of disturbed land in this tract. Any structures constructed would be vulnerable to greater than magnitude 7 seismic events (as registered on the Richter scale) and wildfire episodes.

Cultural Preservation and Commercial Development Land Use Scenario

The cultural preservation and commercial development land use scenario would limit the commercial development to less than 10 acres (4 hectares), resulting in fewer ground disturbing impacts.

14.3.10 Water Resources

14.3.10.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Land Use Scenario

Commercial and residential development may potentially affect surface water quality and quantity within and downstream of the tract. Development would not affect groundwater quality or quantity beneath the tract but may contribute to the overall regional water level decline and possibly result in degradation of water quality within the aquifer.

Surface water quantity within the Cañada del Buey drainage may potentially increase as a result of stormwater runoff from paved roads and developed areas. The tract lies within the 100-year and 500-year floodplains. The potential for flooding would increase with the denudation of the area or the area upstream by either development of the tract or natural causes such as a wildfire.

Surface water quality could be impacted during construction and development of the tract as stormwater runoff may increase over areas that have been denuded and carry sediments and surface contaminants into the drainages.

Cultural Preservation and Commercial Development Land Use Scenario

Cultural preservation and limited commercial development would not affect surface water quality or quantity within or downstream of this tract. Limited commercial development would not affect groundwater quality or quantity beneath the tract, but may contribute slightly to the overall regional water level decline. Degradation of groundwater quality is not likely.

14.3.11 Air Resources

14.3.11.1 Environmental Consequences of the Contemplated Uses

Commercial and Residential Development Land Use Scenario

With this development scenario, air quality would be slightly deteriorated, but would remain high. Additional emissions of ozone generated from hydrocarbons and carbon monoxide would result from increased vehicle traffic and from residential heating needs. The region would remain an attainment area, however, and concentrations of criteria pollutants would remain within State and Federal standards for ambient air quality. LANL activities would remain the source of hazardous and other chemical pollutants. However, as discussed previously for the No Action Alternative, concentrations of chemical air pollutants would not exceed health-based standards. Finally, doses from radioactive air pollutants would be no different than estimated for the No Action Alternative (less than 1 millirem per year).

Cultural Preservation and Commercial Development Land Use Scenario

Another possible use for this tract would be cultural preservation and limited commercial development. Air quality would remain high as in the No Action Alternative. There would be no emissions of hazardous or radioactive air pollutants, and concentrations would remain below EPA and other health-based standards. There would be a slight increase in emissions of criteria pollutants as compared to the No Action Alternative; but concentrations would remain safely within State and Federal standards for ambient air quality.

14.3.11.2 Global Climate Change

Commercial and Residential Development Land Use Scenario

Residential use would include construction of about 760 apartments on 40 acres (16 hectares), resulting in an estimated 1,900 new residents and 1,600 personal vehicles. Sources of carbon dioxide include vehicular use and space and water heating. Commercial plans would include a 20-acre (8-hectare) recreational vehicle park, with assumed space for 160 recreational vehicles and up to 400 lodgers. Sources of carbon dioxide include vehicular use and heating. This development would lead to estimated emissions of about 14,000 tons (13,000 metric tons) of carbon dioxide per year, a large increase over emissions estimated for the No Action Alternative (23 tons [21 metric tons] per year).

Cultural Preservation and Commercial Development Land Use Scenario

For this scenario, development would be assumed to be limited to a strip of land along State Road 4, allowing for construction of only about four new businesses. The Visitor Center and LANL pumping station may be eliminated. These commercial heating needs would result in estimated emissions of about 150 tons (140 metric tons) of carbon dioxide annually. Other greenhouse gases are not likely.

14.3.12 Human Health

14.3.12.1 Environmental Consequences of the Contemplated Uses

Residential and commercial development would bring an estimated 2,200 new residents and visitors into closer proximity to LANL facilities, thereby increasing the number of members of the public exposed to radiological and chemical air pollutants emitted by LANL operations. Residential development also would introduce more sensitive receptors, such as children and pregnant females, to an area that currently hosts only LANL-related workers. While all doses would be within health-based standards established by other Federal agencies, the closer proximity would increase the radiation dose received by the collective population within a 50-mile (80-kilometer) radius of LANL. In addition, closer public proximity would result in greater public consequences from some hypothetical accidents at LANL facilities. For the other contemplated land use, cultural preservation with limited commercial development, these same human health consequences would result, but to a much smaller extent (an estimated 60 workers).

14.3.12.2 Chemical Accidents

Accident assessment would be the same as described in the No Action Alternative. For all postulated accidents, chemical concentrations in the air plume released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time any air plume reached the White Rock Tract, even under adverse weather dispersion conditions. Accordingly, chemical accidents would have no estimated public consequences at the tract).

14.3.12.3 Radiological Accidents

Regardless of land use subsequent to transfer of ownership, the MEI dose at this tract would be the same as described in the No Action Alternative. MEI doses would be greater than 500 millirem for 3 of 13 scenarios postulated in the LANL SWEIS: 2,400 millirem for RAD-02 (natural gas pipeline failure, explosion, and fire at the CMR Building), 1,500 millirem for RAD-12 (plutonium release from Dual Axis Radiographic Hydrodynamic Test [DARHT] Facility during an earthquake), and 1,200 millirem for RAD-09B (puncture, at

Area G, of the highest-content drum of TRU waste).

Subsequent to disposition, one possible land use is limited commercial development, with the majority of the tract set aside for cultural preservation. Under this scenario, there would be slight increases in collective tract dose and excess LCF (versus zero dose in the No Action Alternative). For example, the LANL SWEIS estimated a collective population dose of 120,000 person-rem for all people living within a 50-mile (80-kilometer) radius of LANL, resulting in an estimated 57 excess LCFs for hypothetical accident RAD-02. This would increase by 38 person-rem and one LCF if the White Rock Tract was set aside for cultural preservation with limited commercial development. Table 14.3.12.3-1 compares the estimated additional consequences of all hypothetical radiological.

Another contemplated land use for the White Rock Tract is a combination commercial and residential development. If this development were to occur, public exposures would be substantially greater than in the No Action Alternative. For example, there would be an estimated 2,500 person-rem incremental collective dose for accident RAD-02, versus 120,000 person-rem estimated in the LANL SWEIS. Table 14.3.12.3-1 compares the estimated additional consequences of all hypothetical radiological accidents for the two land use scenarios.

14.3.12.4 Natural Event Accidents

Natural event accidents would have no estimated chemical consequences at the White Rock Tract. For the postulated accidents (wildfire and four earthquake scenarios), chemical concentrations in any air plumes released by potential chemical accidents would be below both ERPG-3 (life-threatening) and ERPG-2 (serious health effects) by the time the air plumes reached the tract, even under adverse weather dispersion conditions.

MEI doses would be the same as in the No Action Alternative, regardless of land use subsequent to transfer of ownership. The MEI dose resulting from the postulated wildfire would be about 1 rem due to releases from TRU waste storage domes at Area G; the maximum dose from the most severe earthquake would be approximately 6 rem.

If the tract were used for limited commercial development subsequent to disposition, exposures would increase from the No Action Alternative (both zero). The estimated tract collective doses would approach 100 person-rem for the wildfire accident and 500 person-rem for the most severe earthquake. Associated cancer fatalities would be less than one for either accident.

Another possible land use for the White Rock Tract is a combination residential development (approximately 40 acres [16 hectares], 760 dwelling units) and commercial development (a 20-acre [8-hectare] recreational vehicle park). If this development were to occur, public exposures would be significantly greater than in the No Action Alternative. The estimated tract collective doses would approach 1,000 person-rem for the wildfire accident and 7,500 person-rem for the most severe earthquake. Associated cancer fatalities would be less than one for the wildfire and approximately four for the most severe earthquake. These exposures would be in addition to those estimated in the LANL SWEIS (340,000 person-rem and 230 excess LCFs for RAD-03B).

Table 14.3.12.3-1. Additional Accident Consequences Associated with the Contemplated Land Uses on the White Rock Tract

				CULTURAL PRESERVATION AND COMMERCIAL SCENARIO[a]		COMMERCIAL AND RESIDENTIAL SCENARIO[a]		SWEIS ESTIMATES[b]	
Accident Scenario	**Accident Location**	**Facility**	**Frequency per Year**	**Collective Dose[c]**	**Excess LCF**	**Collective Dose[c]**	**Excess LCF**	**Collective Dose[c]**	**Excess LCF**
RAD-01	54-38	RANT	1.6×10^{-3}	4	0.002	58	0.029	72	0.04
RAD-02	03-29	CMR	1.5×10^{-6}	170	0.083	2,500	1.250	120,000	57
RAD-03	18-116	Kiva #3	4.3×10^{-6}	5	0.002	68	0.034	100	0.06
RAD-05	21-209	TSTA	9.1×10^{-6}	0	0	0	0	24	0.01
RAD-07	50-69	WCRR	3.0×10^{-4}	3	0.001	41	0.021	1,300	0.69
RAD-08	54-230	TWISP	4.3×10^{-6}	73	0.037	1,100	0.55	400	0.2
RAD-09A	54-226	TWISP	4.9×10^{-1}	1	0.001	16	0.008	4	0
RAD-09B	54-226	TWISP	4.9×10^{-3}	56	0.028	840	0.420	230	0.12
RAD-12	16-411	--	1.5×10^{-6}	87	0.043	1,300	0.650	35,800	18
RAD-13	18-116	Kiva #3	1.6×10^{-5}	7	0.003	99	0.050	160	0.08
RAD-15A	03-29	CMR	3.6×10^{-5}	1	0	11	0.006	175	0.09
RAD-15B	03-29	CMR	3.2×10^{-5}	14	0.007	210	0.105	3,400	1.7
RAD-16	03-29	CMR	3.5×10^{-6}	0	0	2	0.001	56	0.03

Notes: RANT = Radioactive Assay and Nondestructive Test; TSTA = Tritium Systems Test Assembly; WCRR = Waste Characterization, Reduction, and Repackaging; TWISP = Transuranic Waste Inspectable Storage Project

[a] In addition to doses estimated in the LANL SWEIS.

[b] For the entire population within a 50-mile (80-kilometer) radius of LANL.

[c] Person-rem

14.3.13 Environmental Justice

For environmental justice impacts to occur, there must be high and adverse human health or environmental impacts that disproportionately affect minority or low-income populations. The human health analyses for the contemplated land uses estimate that air emissions and hazardous chemical and radiological releases from LANL operations would be expected to be within regulatory limits and that no excess LCFs would likely result. The human health analyses also indicate that radiological releases from accidents would not result in disproportionate adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations with regard to implementing the contemplated land uses on this tract.

The analyses also indicate that socioeconomic changes resulting from implementing any of the proposed alternatives would not lead to environmental justice impacts. Modest economic benefits would arise from the additional jobs created during construction and operation of the new facility. Secondary effects would include small increases in business activity and would likely increase revenues to local governments. Each of these impacts would be positive and would not disproportionately affect low-income or minority populations.

The analysis of impacts to cultural resources indicates that TCPs could be present on the tract or in adjacent areas. If present, TCPs could be impacted by the conveyance or transfer or by subsequent land uses. Consultations to determine the presence of these resources have not been completed, and the degree to which these resources may be impacted has not been ascertained. Impacts to TCPs potentially may cause disproportionately high or adverse effects on minority or low-income communities, but these effects cannot be determined at this point in the consultation process. Legal counsel for the Pueblo of San Ildefonso has expressed the opinion that conveyance and use of this tract would result in an environmental justice impact for the Pueblo's population.

14.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the White Rock Tract would not immediately cause any irreversible or irretrievable commitments of resources. Nor would cultural preservation with limited commercial development along State Road 4, one of the two contemplated land uses subsequent to transfer of ownership. Commercial and residential development would, however, cause irreversible commitments of ecological habitat and cultural resources within the tract and in adjacent areas (where human activity levels would increase due to the presence of about 2,200 new residents and lodgers).

New development also would cause the irretrievable commitment of resources during construction and subsequent use of 760 new dwelling units. Energy would be expended in the form of natural gas and electricity. Additional water would be consumed also. Construction of these buildings would require the irretrievable commitment of standard building materials such as lumber and roofing materials.

14.3.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the White Rock Tract could result in the loss of certain Federal protections for cultural resources on the tract. Loss of these protections could be considered an unavoidable adverse impact to these resources because development of previously undisturbed areas could result in physical destruction, damage, or alteration of cultural resources on the subject land tract and in adjacent areas. The conveyance or transfer of the tract also could result in the loss of certain Federal protections for ecological resources and consideration of these resources in planning future activities on the tract.

Subsequent use of the tract for cultural preservation with limited commercial development along State Road 4 would have few adverse environmental impacts. Subsequent commercial and residential development, however, would cause unavoidable adverse impacts in several resource areas.

One such impact would be substantial loss of ecological habitat within the tract itself. There also could be more frequent human intrusion into adjacent habitat areas of San Ildefonso Pueblo. There also is potential for adverse impacts caused by introduction of land uses that are incompatible with adjacent resource protection efforts.

Commercial and residential development also would result in increased demands for utilities (electricity, natural gas, water, solid waste, and sewage services). Increased demand for three of these services (water, solid waste, and sewage), would have adverse effects in the immediate Los Alamos region by lowering the aquifer level more quickly, shortening the remaining lifetime of the County landfill, and increasing both the quantities of sewage that require treatment and the quantities of treated sewage discharged to the environment. The environmental effects of increased demand for electricity and natural gas would be felt elsewhere (in the Four Corners region, for example), in the form of increased emissions of air pollutants in order to generate electricity. Increased consumption of natural gas adds to global climate change through increased emissions of carbon dioxide.

Development also would lead to an estimated 10 percent increase in personal vehicles in Los Alamos County and a one-third increase in the White Rock townsite, with attendant increases in congestion, road deterioration, and traffic noises. Noise levels would especially be impacted within and immediately adjacent to the tract itself, with noises increasing in magnitude, frequency of occurrence, and duration (into the night). The visual environment would deteriorate, both within the tract and from adjacent areas of the townsite.

Finally, residential development would increase the potential for degradation of surface water quality. Standard mitigation measures, however, can limit both short- and long-term impacts to surface water and groundwater quality.

14.3.16 Relationship Between Local Short-Term Use of the Environment and the Maintenance of Long-Term Productivity

The actual conveyance or transfer of the White Rock Tract would not immediately cause any specific impacts on short-term uses of the environment. Subsequent use of the tract for cultural preservation with limited commercial development along State Road 4 would be compatible with the long-term land uses of both cultural preservation on adjacent San Ildefonso lands and with commercial uses of the business district of the White Rock Tract.

Subsequent commercial and residential development of the tract, however, may be incompatible with the long-term land uses of adjacent San Ildefonso lands and with nearby Bandelier National Monument (Tsankawi ruins). Development would also lead to disruption and loss of ecological habitat and cultural resources in this largely undisturbed tract of land. The development would reduce the ecological productivity of the tract and would preclude future use of the land for ecological habitat or for cultural resource protection.

15.0 CUMULATIVE IMPACTS

This chapter describes the potential cumulative impacts of the Proposed Action Alternative together with the incremental impacts of the Alternative Action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The chapter includes the methods of analysis and a summary of the cumulative impacts by resource area.

15.1 Introduction

The Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of the NEPA define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 Code of Federal Regulations [CFR] Part 1508.7). The regulations further explain that "cumulative effects can result from individually minor but collectively significant actions taking place over a period of time." The cumulative effects analysis presented in this CT EIS is based on the potential effects of land conveyance and transfer when added to common issues and their effects in the regions of influence (ROIs) for each resource resulting from past, present, and reasonably foreseeable future actions.

Based on examination of the potential direct and indirect environmental impacts of the conveyance and transfer, the potential impacts of other DOE and LANL actions, and the potential impacts of other actions in the region; the DOE has examined each of the following resource areas for cumulative effects: land use, transportation, infrastructure, noise, visual resources, socioeconomics, ecological resources, cultural resources, geology and soils, water resources, air resources and global climate change, human health, and environmental justice. Critical cumulative issues related to utility supply and infrastructure are outlined in greater depth. This chapter provides a brief summary description of cumulative impacts resulting from the conveyance or transfer of the subject 10 land tracts included in the impact analysis presented in Chapter 5 through Chapter 14, a brief overview of other DOE activities at LANL, and other regional activities.

15.2 Methods of Analysis

The DOE assessed cumulative effects by combining three elements: anticipated LANL activities, anticipated development activities (primarily in Los Alamos County), and projected development subsequent to disposition of the 10 land tracts.

Anticipated LANL activities are those presented in the LANL SWEIS (DOE 1999c) for the Preferred Alternative. The SWEIS Preferred Alternative provides a reasonable upper limit of impacts from LANL operations, and has been selected as the level of LANL operations assumed for both the CT EIS No Action Alternative and the CT EIS Proposed Action Alternative. (Slight adjustments were made for a reduced scale for the low energy demonstration accelerator [LEDA] at the Los Alamos Neutron Science Center [LANSCE].) For the CT EIS, it has been assumed that the adjusted SWEIS Preferred Alternative has already been fully implemented.

15.0 CUMULATIVE IMPACTS

The impacts of anticipated regional development activities also have been included in the cumulative impacts analysis. In Los Alamos County, there are 10 residential development projects in various stages of planning or construction. These include Ponderosa Estates, Los Pueblos Road, North Mesa, Quezemon, Arrowhead Subdivision, 2500 Central Avenue, the Middle School Site, the Canyon Rim Site, and Dormitory Housing in the Los Alamos townsite and environs, and the White Rock School Site. Upon completion, these residential developments would result in approximately 1,300 new dwelling units and an estimated 3,300 new residents. There also are plans for development of a Research Park on about 60 acres (24 hectares) of land leased from the DOE; the park would employ 1,500 people. For the cumulative impacts analysis, it has been assumed that all of these developments, both residential and commercial, have been fully implemented.

The third element included in this cumulative impacts assessment is the projected development subsequent to disposition of the 10 land tracts. Four of the land tracts (Miscellaneous Site 22, Miscellaneous Manhattan Monument, Technical Area [TA] 74, and White Rock Y Tracts) have no development plans, regardless of whether the County or San Ildefonso Pueblo were to receive the tract. A single contemplated land use has been identified for two others tracts, the TA 21 and Airport Tracts. Two potential land uses have been identified for the remaining tracts. For tracts with two possible land uses, each resource area assumed the development scenario that would have the most consequences. For example, both residential and commercial development land uses are possible for the DOE LAAO Tract. Residential development of the DOE LAAO Tract would result in more demand for utilities, more traffic, and more carbon dioxide emissions than would the commercial development scenario of continued use of the existing office building by others than the DOE. Accordingly, residential development of the DOE LAAO Tract was assumed when examining the cumulative impacts for utilities, transportation, and global climate change.

For each resource area, the analysis begins with a description of the potential impacts on the resource that may occur from past, present, and reasonably foreseeable regional projects, activities, and agency plans. This analysis is followed a description of the potential impacts for the conveyance or transfer scenario that represents the maximum level of potential impacts for that resource. **This methodology results in a conservative analysis that overstates potential impacts that may occur in the next 10 years** (see Section 4.1 in Chapter 4). Potential cumulative impacts are defined with an assessment of the context and intensity of the impacts and the incremental contribution of the conveyance or transfer to regional cumulative effects.

15.3 Cumulative Impacts by Resource Area

The following sections present descriptions of cumulative impacts by resource area. For comparison purposes Table 15.3-1 is provided, summarizing cumulative impacts for each resource area.

15.3.1 Land Use

Cumulative impacts to land use are assessed by comparing the compatibility of anticipated changes in land use to existing adjacent land uses, management plans, policies, and practices. Cumulative impacts to land use occur when the net effect of incremental impacts would conflict with established land uses in the region, disrupt or divide established land use configurations, represent a substantial change in land use

Table 15.3-1. Summary of Cumulative Effects Within the Region of Influence

RESOURCE AREA	CT EIS PROPOSED ACTION ALTERNATIVE	LANL ACTIVITIES	OTHER REGIONAL ACTIVITIES	TOTAL POTENTIAL IMPACT
Land Use	Maximum of 826 acres (335 hectares) would be developed or redeveloped. Potential for introduction of land uses incompatible with adjacent resource protection efforts. Loss of recreational opportunities under some scenarios.	No changes outside LANL boundaries. Within LANL, environmental restoration activities may change land use.	Land use would change in several locations in the Los Alamos/White Rock area where residential developments are currently in various stages of planning or construction. Other commercial, industrial, and residential development projects would be anticipated in Los Alamos, Rio Arriba, and Santa Fe Counties. In addition, a research park covering about 60 acres (24 hectares) of land leased from the DOE also is being planned.	Development or alteration of over 826 acres (335 hectares) would change the land uses from primarily forest or woodlands to residential, commercial, or industrial uses.
Transportation	Peak hour traffic entering or exiting all 10 tracts could increase by a range of approximately 751 to 3,775 trips in ROI commuter traffic.	Potential increase in local traffic from increase of up to 1,400 full-time employees.	New residential development could cause increases in local traffic.	Increases in local traffic could be substantial and could overload existing roads, thus requiring road improvements.
Infrastructure	Cumulative usage increases would be • Electricity use: 32 gwh • Peak power: 6 mw • Natural gas: 459 mcf (13,000 mly) • Water: 382 mgy (1,446 mly) • Solid waste: 2,385 tpy (2,163 mty) Increases in discharges to wastewater treatment plants could be 132 mgy (500 mly) for the Bayo Wastewater Treatment Plant and 41 mgy (155 mly) for the White Rock Wastewater Treatment Facility.	Maximum cumulative uses are • Electricity use: 693 gwh • Peak power: 100 mw • Natural gas: 2,020 mcf (57,200 mly) • Water: 740 mgy (2,802 mly) • Solid waste: 3,160 tpy (2,867 mty) Potential cumulative wastewater discharge to the SWSC is 187 mgy (708 mly).	Estimated maximum cumulative uses, including increases from current developments and the research park would be • Electricity use: 106 gwh • Peak power: 16 mw • Natural gas: 1,253 mcf (35,530 mly) • Water: 1,111 mgy (4,214 mly) • Solid waste: 17,821 tpy (16,161 mty) Potential wastewater discharges to the SWSC and, Bayo and White Rock wastewater treatment plants are 199, 425, and 151 mgy (753, 1,609, and 572 mly), respectively.	Total anticipated uses would exceed the capacity for peak power supply, water rights, and the Bayo Wastewater Treatment Plant. Estimated local landfill life would be reduced to 5.5 years. The Bayo Wastewater Treatment Plant's capacity would be exceeded by 57 mgy (216 mly).

Table 15.3-1. Summary of Cumulative Effects Within the ROI (Continued)

RESOURCE AREA	CT EIS PROPOSED ACTION ALTERNATIVE	LANL ACTIVITIES	OTHER REGIONAL ACTIVITIES	TOTAL POTENTIAL IMPACT
Noise	Ambient noise levels would increase above current levels for most of the contemplated land uses. Ambient noise levels associated with cultural preservation, natural areas, and current transportation and utility corridors would remain about the same. Demolition and construction activities temporarily would elevate noise levels to a range of 74 to 95 dBA. Residential uses typically would result in ambient noise levels between 50 and 70 dBA, and commercial and industrial land uses typically would result in 60 to 70 dBA. Noise would be present during a greater part of the day on developed tracts, and overall noise from vehicular traffic would increase.	Temporary and minor noise is associated with construction on LANL property. Impacts from noise and vibration associated with explosives testing would be similar to those currently experienced.	Noise effects would be similar to those described for the CT EIS Proposed Action Alternative.	Ambient noise would increase in local areas due to construction and increased motor traffic, but would not add appreciably to overall noise levels. In most tracts, noise would occur more often than at present.
Visual Resources	The objectives of the scenic classes associated with the tracts would be met. Generally, the existing visual values would be maintained.	No changes except for new lighting associated with a new transportation corridor on LANL property.	Effects to visual resources would be similar to those described for the CT EIS Proposed Action Alternative.	Impacts to visual resources would be minimal.

Table 15.3-1. Summary of Cumulative Effects Within the ROI (Continued)

RESOURCE AREA	CT EIS PROPOSED ACTION ALTERNATIVE	LANL ACTIVITIES	OTHER REGIONAL ACTIVITIES	TOTAL POTENTIAL IMPACT
Socioeconomic	Short-term economic gains from construction activities. Long-term gains depend on the intensity of development.	Increase of up to 4,230 people in the Tri-County area from increase in LANL employees under the SWEIS Preferred Alternative. Associated increase of $172 million in personal income.	Socioeconomic effects would be similar to those described for the CT EIS Proposed Action Alternative.	Both short-term and long-term beneficial economic effects would be expected from increased development. Overall impacts to employment, income, population and housing would be minor within the ROI, but would be concentrated in the Los Alamos area. Improvements would be expected in the regional tax base but, according to the County of Los Alamos, would probably not offset the loss of assistance payments.
Ecological Resources	Development footprints for the 10 tracts include approximately 770 acres (312 hectares) of relatively undisturbed habitat, primarily ponderosa pine forest and pinyon-juniper woodland. Contemplated uses would be expected to degrade large amounts adjacent habitat, including preferred habitat for the American peregrine falcon and the Mexican spotted owl.	Removal of up to 41 acres (17 hectares) of pinyon-juniper woodland habitat and 7 acres (3 hectares) of ponderosa pine-Gambel oak on LANL property. No significant ecological effects would be expected.	Development of previously undisturbed areas would cause habitat destruction.	Development of more than 818 acres (331 hectares) would degrade large amounts of wildlife habitat and would cause adverse impacts to ecological resources and could result in further fragmentation of habitat and disruption of wildlife migration corridors.
Cultural Resources	Development of 826 acres (335 hectares) and use of tracts for natural areas could result in physical destruction, damage, or alteration of cultural resources on the subject tracts and in adjacent areas. Potential loss of certain Federal protections for cultural resources on subject tracts could result.	Potential exists for effects to some prehistoric resources due to shrapnel or vibrations from explosives testing. Also, 15 sites potentially eligible for the National Register of Historic Places could be affected by the expansion of Area G.	Development of previously undisturbed areas could result in physical destruction, damage, or alteration of cultural resources.	Development of 826 acres (335 hectares) and use of conveyed or transferred tracts for natural areas could result in physical destruction, damage, or alteration of cultural resources. Potential loss of certain Federal protections for cultural resources on conveyed or transferred tracts could result.

Table 15.3-1. Summary of Cumulative Effects Within the ROI (Continued)

RESOURCE AREA	CT EIS PROPOSED ACTION ALTERNATIVE	LANL ACTIVITIES	OTHER REGIONAL ACTIVITIES	TOTAL POTENTIAL IMPACT
Geology and Soils	Development would disturb soils and increase runoff. No other impacts to geologic resources would be expected.	No impacts to geologic resources expected, except for minimal deposition of contaminants to soils.	Development of previously undisturbed areas would result in soil disturbance; but, no other impacts to geologic resources would be expected.	Cumulative impacts to geologic resources are not considered to be substantial.
Water Resources	An additional 382 mgy (1,446 mly) of groundwater could be used. Potential exists for degradation of surface water quality from construction activity and increased pollutant loads and surface runoff volumes from increase in impermeable areas. Placement and operation of new water wells to address increased demand could impact groundwater quality.	Potential cumulative groundwater usage is 740 mgy (2,800 mly). Surface water quality within LANL is not expected to change substantially.	Groundwater use estimations for Los Alamos County, including the current developments and the research park are 1,111 mgy (4,214 mly). Potential exists for degradation of surface water quality from construction activity and increased pollutant loads and surface runoff volumes from increase in impermeable areas.	Total anticipated uses would exceed the capacity for water rights by 533 mgy (2,020 mly). The additional water withdrawal would accelerate drawdown of the main aquifer and could seriously impact the amount of cheaply treatable water available. Potential for degradation of surface water quality during construction activities.
Air Resources	Increases expected in criteria pollutants from mobile sources and homes using natural gas or propane. Slight increase expected in emissions of hazardous air pollutants from industrial facilities. Contributions to global climate change would increase more than 25-fold due to motor vehicle traffic and residential use of fossil fuels.	Criteria and toxic pollutant emissions are not expected to exceed applicable standards or approach levels that could affect human health. Increases in criteria pollutants would be expected from additional mobile sources associated with increased employment.	Increases would be expected in criteria pollutants from mobile sources and homes using natural gas or propane. Slight increase would be expected in emissions of hazardous air pollutants from industrial facilities. Contributions to global climate change would increase due to motor vehicle traffic and residential use of fossil fuels.	Increases in criteria and toxic pollutant emissions would occur. The cumulative effect from these increases would not be expected to be major. Increased development would lead to additional artificial light and impacts to visibility of the night sky. Increased carbon dioxide and greenhouse gases are expected locally. These would represent a shift of impacts from other areas and would not be an important contributor to global climate change.

Table 15.3-1. Summary of Cumulative Effects Within the ROI (Continued)

RESOURCE AREA	CT EIS PROPOSED ACTION ALTERNATIVE	LANL ACTIVITIES	OTHER REGIONAL ACTIVITIES	TOTAL POTENTIAL IMPACT
Human Health	As many as 900 new residents could be brought into closer proximity to LANL facilities at the DOE LAAO and DP Road Tracts and another 2,200 residents and lodgers at the White Rock Tract. Commercial development could bring as many as 6,000 private-sector employees into existing radiation buffer zones at the DP Road, TA 21, and Airport Tracts. These developments would mean increased public exposure to radiological and chemical emissions from LANL normal operations and hypothetical accidents. A substantial increase in the public collective radiation dose and LCFs would result.	Fifty-seven excess latent cancer fatalities for the public are estimated to result from hypothetical accidents.	No substantial impacts to human health would be expected.	No substantial impacts to human health would be expected for normal operations. The latent cancer fatalities from hypothetical accidents would increase from about 57 excess latent cancer fatalities to approximately 98 excess latent cancer fatalities from LANL operations because of increased populations close to LANL facilities.
Environmental Justice	No direct adverse effects on minority or low-income populations. Indirect impacts could include disruption of traditional wood gathering activities or loss of traditional cultural properties, which may lead to environmental justice impacts.	No direct or indirect adverse effects on minority or low-income populations.	Because no other applicable Federal activities have been identified by the cumulative analysis, environmental justice issues do not arise.	No cumulative adverse effects on minority or low-income populations would be expected.

Notes: gwh = gigawatt-hours, mw = megawatt, mcf = million cubic feet, mly = million liters per year, mgy = million gallons per year, tpy = tons per year, mty = metric tons per year, SWSC = Sanitary Wastewater Systems Consolidation, dBA = A-weighted decibels configurations, or would be inconsistent with adopted land use plans.

Past and present land use in the region is described in Chapter 3, Affected Environment. No specific changes in land use or impacts are anticipated for upcoming LANL activities, but completion of environmental restoration actions may allow the possibility of changes in future land use. These ongoing environmental restoration actions will require the treatment and/or removal of large quantities of various waste materials from LANL during the next 10 years. Treatment methods and disposition of these wastes will be addressed by separate NEPA review. In general, these actions are proceeding independently of the conveyance or transfer process; but the conveyance and transfer scenarios may influence decisions on the timing, cleanup levels, and the inclusion of certain buildings in environmental restoration activities. Table 15.3.1-1 summarizes the estimated waste volumes associated with environmental restoration activities for the 10 subject tracts, based on very preliminary site characterization. It should be emphasized that environmental restoration actions would proceed under the No Action Alternative. Other anticipated regional changes in land use include the development of forest, grazing, and open-space land for residential and commercial uses. Under the various conveyance and transfer scenarios, future land use patterns could change on several tracts, as described in Chapter 5 through Chapter 14.

Potentially important cumulative impacts of these changes in land use would include the loss of trail access and other recreational opportunities; the introduction of land uses that are incompatible with adjacent National Park Service (NPS), U.S. Forest Service (USFS), and LANL resource protection missions and plans; increased activity in proximity to protected wildlife habitat and cultural resources; and the net loss and further fragmentation of ecosystems, which would reduce the amount and quality of plant and animal habitat in the region. Population increases also would increase visitation at Bandelier National Monument (BNM) and require the expenditure of scarce financial resources to provide for more visitors' services and security.

While cumulative impacts to land use would affect only a small percentage of the total region, many of the anticipated impacts from actions would be concentrated in the vicinity of Los Alamos, LANL, and White Rock. Implementation of the various conveyance and transfer scenarios, especially those contemplated for the Rendija Canyon and the White Rock Tracts could be important contributors to cumulative impacts in this area.

15.3.2 Transportation

Cumulative impacts to transportation are assessed by combining the number of trips anticipated to be generated by the contemplated land uses and the infrastructure improvements required to accommodate increased traffic levels with the transportation impacts of other existing and planned developments.

The regional transportation infrastructure and capacities are described in Chapter 3, Affected Environment. Peak hourly traffic in the vicinity of LANL ranges from 114 (State Road [SR] 4) to 5,285 vehicles (SR 501) for onsite routes and ranges from 380 (SR 4) to 7,069 vehicles (U.S. 84/285) for regional routes. Some minor increases in worker trips and increased truck transport of hazardous chemical and radioactive materials are expected as a result of future LANL activities and increases in employment. Workers from the planned Research Park development and residents from the various residential developments would cause increases in the number of trips anticipated regionally. Under

Table 15.3.1-1. Estimated Environmental Restoration Waste Volumes

TRACT	CONTEMPLATED LAND USE	CLEANUP OF PRSs	D&D OF STRUCTURES	REMEDIATION OF CANYONS	MAJOR WASTE TYPE
Rendija Canyon	Cultural Preservation	7,500 (5,700)	--	0	Hazardous wastes from munitions
Rendija Canyon	Residential Development	7,500 (5,700)	--	0	Hazardous wastes from munitions
DOE LAAO	Commercial Development	90 (70)	300 (230)	--	Construction debris
DOE LAAO	Residential Development	230 (176)	3,190 (2,440)	--	Construction debris
Miscellaneous Site 22	Commercial Development	10 (8)	--	--	Construction debris
Miscellaneous Manhattan Monument	Cultural Preservation	--	--	--	No cleanup required
DP Road	Commercial/Industrial Development	810 (620)	2,220 (1,690)	0	RCRA hazardous wastes
DP Road	Residential/Commercial Development	750 (570)	2,220 (1,690)	0	RCRA hazardous wastes
TA 21	Commercial/Industrial Development	9,290 (7,090)	56,560 (43,220)	0	Construction debris
Airport	Commercial/Industrial Development	24,460 (18,690)	0	--	Solid waste from former landfill
White Rock Y	Cultural Preservation	--	0	3,770 (2,880)	Low-level radioactive canyon sediments
TA 74	Cultural Preservation	0	0	98,880 (74,910)	Low-level radioactive canyon sediments
White Rock	Cultural Preservation/ Commercial Development	--	0	0	No cleanup required
White Rock	Residential/Commercial Development	--		940 (720)	Low-level radioactive canyon sediments

Notes:

All volumes are cubic yards (followed by cubic meters).
PRSs = potential release sites
D&D = decontamination and decommissioning

Dash (--) indicates there are no PRSs, structures, or canyons.
Zero indicates that no wastes are expected to be generated.
RCRA = Resource Conservation and Recovery Act

the various conveyance or transfer scenarios, commercial, industrial, and residential developments would greatly increase the number of trips generated.

Potentially important cumulative impacts to regional transportation would include increases in overall regional and local traffic. Traffic increases may require improvements to the transportation infrastructure such as traffic controls, new roads, road widening, and bridges. Traffic increases also may degrade local air quality.

The expected impacts to transportation would be expected to be concentrated in the areas near the Los Alamos townsite and LANL area rather than be distributed throughout the region. Implementation of the various conveyance or transfer scenarios would be an important contributor to cumulative impacts in this area. An increase in local traffic would be expected for land tracts undergoing development. Peak hourly traffic would likely increase in 6 of the 10 parcels by 751 to 3,775 vehicles. The largest increases would be associated with further development of the Airport Tract from approximately 278 to 1,554 vehicles during the peak traffic period. Areas transferred for cultural preservation would expect a decrease in local traffic due to increased access restrictions.

15.3.3 Infrastructure

Cumulative impacts to infrastructure and utilities are assessed by comparing the current capacities of utility systems and infrastructure with utility demand and infrastructure requirements of reasonably foreseeable future regional projects and activities. Important cumulative impacts occur when the net effect of incremental impacts of the proposed action, added to those of other past, present, and reasonably foreseeable future actions, would create demand in excess of utility capacities and would require extensive expansion of infrastructure.

Potentially important cumulative impacts to regional utilities and infrastructure have been identified. The increase in peaking demand for electricity would be expected to exceed the capacity of the electrical power system. Water usage would be projected to exceed water rights. Delivery systems for gas may need to be upgraded to handle increased demand. The capacity of the Bayo Wastewater Treatment Plant would be expected to be exceeded. Solid waste production would be expected to reduce the expected life of the regional landfill.

A description of utility infrastructure is presented in Chapter 3, Affected Environment. System capacities, current and anticipated utility use, and waste generation associated with LANL, other regional developments, and the conveyance and transfer scenarios are included in Table 15.3.3-1.

The system capacities for the various utilities are reiterated here for comparison. Note that many of the numbers are "bounding" numbers; in other words, they are the highest usage that could realistically be expected. The cumulative usage on the transferred tracts represents the maximum utility usage associated with the contemplated land uses for each tract. Note also that the disposition of the tracts and any subsequent development would occur over the course of 10 years, so impacts to utility systems would not be immediate.

The contemplated developments on these lands would increase the electricity peaking power demand by 6 megawatts and the electrical energy usage by 32 gigawatt-hours. Other developments in the County would increase the peaking power demand by 2 megawatts to a total of 16 megawatts and increase electricity usage by 12 gigawatts to a total of 106 gigawatts. Projected LANL developments would create an additional power demand of 5 megawatts and energy usage of 65 gigawatts. The total increase in

Table 15.3.3-1. Cumulative Utility Usage Projections versus Existing Capacity

	POWER mw	ELEC. gwh	GAS mcf (mly)	WATER mgy (mly)		SEWAGE mgy (mly)			SOLID WASTE tpy (mty)[a]
				COUNTY	LANL	SWSC	BAYO	WHITE ROCK	
System Capacity	107	860	8,100 (229,400)	1,260 (4,770)	540 (2,044)	220 (833)	500 (1,893)	300 (1,136)	
Current Usage[b]									
LANL[c]	95	628	2,020 (57,200)	---	693 (2,624)	187 (708)	---	---	2,700 (2,600)
County + BNM	14	94	1,040 (29,500)	963 (3,645)	---	---	365 (1,382)	146 (553)	15,990 (14,500) [c]
SUM	109	722	3,060 (86,700)	963 (3,645)	693 (2,624)	187 (708)	365 (1,382)	146 (553)	18,690 (17,100)
Remaining Capacity[e]	-2	215	5,040 (142,700)	297 (1,125)	-153 (-579)	33 (125)	135 (511)	154 (583)	7 years
LANL Developments									
Expanded Operations[b]	5	65	0 (0)	---	47 (178)	0 (0)	0 (0)	0 (0)	300 (272)
Remaining Capacity[e]	-7	150	5,040 (142,700)	297 (1,125)	-200 (-758)	33 (125)	135 (511)	154 (583)	6.8 years
County Developments									
Transferred Land	6	32	459 (13,000)	382 (1,446)	---	0 (0)	132 (500)	41 (155)	2,385 (2,163)
Current developments	1	8	170 (4,810)	131 (496)	---	0 (0)	60 (227)	5 (19)	1,176 (1,067)
Research Park	1	4	43 (1,220)	17 (64)	---	12 (45)	0 (0)	0 (0)	200 (181)
Española growth[f]									455 (413)
SUM	8	45	672 (19,030)	530 (2,006)	---	12 (45)	192 (727)	46 (174)	4,216 (3,824)
Remaining Capacity[e]	-15	105	4,368 (123,670)	-233 (-881)	-200 (-758)	21 (80)	-57 (-216)	108 (409)	5.5 years

Notes: mw = megawatts, gwh = megawatt-hours, mcf = million cubic feet, mly = million liter per year, mgy = million gallons per year, tpy = tons per year, mty = metric tons per year

[a] Remaining capacity of landfill estimated at 7 years (130,000 tons [120,000 metric tons] at current disposal rates).

[b] Includes 20 mgy at the Strategic Computing Complex (SCC), which is not reflected in the SWEIS. The SWEIS assumes 100% of SCC water needs are met with treated wastewater. In the CT EIS a more conservative assumption is used. It is assumed that only two-thirds of the SCC water needs are met by recycled wastewater with the remaining third met by fresh water.

[c] No Action Alternative from the SWEIS. Figures reflect a decrease in anticipated peak power at the LEDA Facility.

[d] Includes solid wastes from Los Alamos County, Española, and Santa Clara Pueblo.

[e] Difference from contract limits or physical capacity.

[f] Based on growth of Rio Arriba County in the LANL SWEIS.

peaking demand from all future developments would be expected to exceed the peaking power capacity of the electrical system by 15 megawatts.

The increase in natural gas usage for developments in the County and at LANL is shown in Table 15.3.3-1. It is not anticipated that these developments would exceed the capacity of the regional delivery system. However, some segments of the local delivery system may need to be upgraded to handle the increased demand.

As shown in Table 15.3.3-1, Los Alamos County water use resulting from contemplated developments on dispositioned land would be expected to increase by 382 million gallons (1,446 million liters) per year. Other County developments would increase water usage by an additional 148 million gallons (560 million liters) per year, bringing the total County increase to 530 million gallons (2,006 million liters) per year. Under the proposed 70/30 split of water rights between the County and the DOE, these developments would cause the County to exceed their water rights by an estimated 233 million gallons (882 million liters) per year. The projected increase in water usage for LANL is 47 million gallons (178 million liters) per year. Based on these projections, the DOE (LANL) would exceed its share of the water rights by 200 million gallons (757 million liters) per year. If the County were to address this increased demand by the installation of new water supply wells, then the placement and operation of these wells could impact water quality.

Wastewater treatment at the Bayo Wastewater Treatment Plant would increase by 132 million gallons (500 million liters) per year from developments on dispositioned lands (not including developments on the White Rock Tract, which would pipe sewage to the White Rock Wastewater Treatment Facility). Proposed and ongoing developments in the County would produce an additional 60 million gallons (227 million liters) of effluent annually to be treated at the Bayo Wastewater Treatment Plant. The total estimated increase would be 192 million gallons (727 million liters) per year, which would cause the capacity of the Bayo Wastewater Treatment Plant to be exceeded by 57 million gallons (216 million liters) per year. Increases in wastewater to the LANL Sanitary Waste Systems Consolidation (SWSC) Plant and the White Rock Wastewater Treatment Facility would not be expected to exceed the rated capacities.

Solid waste production would increase by 2,385 tons (2,163 metric tons) per year as a result of developments on transferred lands, as shown in Table 15.3.3-1. An additional 1,376 tons (1,248 metric tons) per year would be generated from other developments in the County, and another 455 tons (413 metric tons) per year would be expected from growth in Española. LANL solid waste production is expected to increase by 300 tons (272 metric tons) per year from the SWEIS Expanded Operation Alternative and development of the Strategic Computing Complex (SCC). LANL solid waste projections do not include wastes generated by planned environmental restoration activities. The disposition of environmental restoration wastes is not known at this time. However, all wastes would be managed according to applicable regulations and permits and according to the decisions made based on the DOE’s WM PEIS. The total increase in solid waste production of 4,516 tons (4,098 metric tons) per year would reduce the life of the landfill from 7 to 5.5 years. The County has decided to close the current landfill and is planning the development of a new regional solid waste facility (PC 1999c). Increases in solid waste production may require accelerating the development of the new facility.

15.3.4 Noise

Cumulative noise impacts are assessed by determining the increases in levels of noise anticipated to be generated by the contemplated land uses and from construction related to the development of the tracts. Important cumulative impacts occur when the net effect of regional projects or activities would cause a noticeable and adverse increase in ambient noise levels or if construction causes excessive noise and vibrations.

Past and present noise sources and levels are described in Chapter 3, Affected Environment. Noise and vibration from LANL activities are expected to increase slightly during construction and operation of new facilities and due to increased frequency of high explosives testing. Other anticipated noise sources would include construction noise associated with housing, commercial and industrial projects, and increases in ambient noise associated with use of these facilities and residences and vehicle traffic. Similar potential changes would occur under the conveyance or transfer scenarios.

Cumulatively, ambient noise would increase in local areas, especially during construction, but would not add appreciably to overall noise levels. In most tracts, noise would occur more often than at present. Areas designated for cultural preservation and natural areas would experience similar levels of noise or slight decreases in ambient noise levels.

15.3.5 Visual Resources

Important cumulative impacts occur when the net effect of regional projects or activities would adversely affect scenic quality from a regional perspective.

Regional visual resources are described in Chapter 3, Affected Environment. Visual resources are not expected to change due to future LANL activities except for increases in lighting associated with a transportation corridor. Residential, commercial, and industrial development in undisturbed areas could degrade views and would increase ambient light visible in the night sky in the region. Similar visual changes could occur under the various conveyance or transfer scenarios.

As more undisturbed lands are developed, there would be some cumulative impact on visual resources, especially in the vicinity of LANL, Los Alamos, and White Rock. This reduction in visual quality would probably not be substantial on a regional scale; but, diminished viewsheds could impact resources important to maintaining a positive visitor experience on adjacent NPS lands. The maintenance of viewsheds from BNM have been identified as critical to the management mission of BNM. The negative effects on viewsheds of regional development and increased lighting of the night sky would be considered to be very important regional impacts. Implementation of conveyance or transfer scenarios in currently undeveloped areas would be an important component of the intensity of these potential impacts. Conveyance and transfer scenarios in previously developed areas on several tracts could positively impact visual resources by replacing less visually appealing structures with more visually compatible industrial and commercial structures. Areas designated for cultural preservation and natural areas would experience similar levels of visual resources as currently enjoyed or slight improvement.

15.3.6 Socioeconomics

Cumulative socioeconomic impacts are assessed by comparing baseline conditions with anticipated regional changes in population, employment, and expenditures expected as a result of reasonably foreseeable projects and activities. Important cumulative socioeconomic impacts occur when the net effect of regional projects or activities would substantially alter the location and distribution of regional populations, substantially raise the unemployment rate, substantially affect the local housing market, or result in the need for new school services.

Because of its unique history, Los Alamos County has long been economically dependent on transfer payments from the DOE. These payments have ended. The DOE is transferring municipal facilities, functions, and lands to contribute to the economic self-sufficiency of the County.

Past and present socioeconomic conditions are described in Chapter 3, Affected Environment. LANL activities account for an estimated one third of employment, wage and salary, and business activity in the Los Alamos, Rio Arriba, and Santa Fe Counties. LANL is expected to increase employment of full-time equivalent employees by 2,186 over 1995 and area population would likely increase by 4,230 people. Other regional developments such as the Research Park, which is expected to employ 1,600 people, and other commercial and industrial developments would increase local employment and wage levels. Residential construction also would be expected to increase temporary construction employment and provide housing for anticipated population increases.

Under the various conveyance or transfer scenarios, similar developments are planned and would be expected to increase employment and wage levels and to contribute to population growth regionally. Depending on the scenarios implemented, 320 businesses could be developed on the tracts, employing up to 6,080 workers and generating a total of 8,957 jobs within the ROI. As many as 2,360 residences could be placed on the tracts, increasing White Rock and Los Alamos population by 6,620 residents.

Expected cumulative impacts to regional socioeconomics would include positive population, employment, and economic growth within the ROI. The contribution of the conveyance or transfer of the subject tracts to regional socioeconomic impacts would be likely be short-term economic gains from construction. Long-term gains would include increased levels of employment and wages and an increase in locally available housing to match projected population growth. Regional development would contribute to economic self-sufficiency but would not be expected to replace the loss of transfer payment funds, according to information provided by the County (see Chapter 18, Section 18.1).

15.3.7 Ecological Resources

Cumulative impacts to ecological resources are assessed by comparing the impacts on watersheds, vegetation, fauna, and habitat used by threatened and endangered species anticipated by the conveyance and the contemplated land uses with impacts associated with other regional projects and activities. Important cumulative impacts could occur when the net effect of regional projects or activities result in harm, harassment, or destruction of protected species; the fragmentation, or loss of sensitive habitat and breeding areas; and the loss of substantial numbers of individuals of native plant or animal species.

Regional ecological resources are described in Chapter 3, Affected Environment. Projected LANL activities would include the removal of up to 41 acres (17 hectares) of pinyon-juniper habitat and 7 acres (3 hectares) of ponderosa pine-Gambel oak habitat. Regional projects include the development of an undetermined amount of previously undisturbed plant and animal habitat. Under the conveyance or transfer development scenarios, approximately 826 acres (335 hectares) would be developed or redeveloped, resulting in the direct loss of approximately 770 acres (312 hectares) of ponderosa pine forest and pinyon-juniper woodland. Development would be expected to degrade large amounts of adjacent habitat near the developed portions of the tract.

Potentially important cumulative impacts to regional ecological resources include a net loss and fragmentation of existing watersheds, migration routes, and habitat from development, which would also contribute to the deterioration of adjacent habitat. Development projects in the region would be expected to cause the direct mortality of less-mobile species during construction and through habitat loss and force the relocation of mobile species into areas with limited carrying capacities. Increased human use of habitat areas in the region due to better access, residential development, and sanctioning of recreational uses could disturb breeding and nesting areas and increase the damaging impacts of domestic pets. The additional fragmentation of land ownership would hinder efforts for regional resource planning by watershed or ecosystems. The loss of habitat and alteration of travel routes could result in an increase in automobile accidents involving vehicles and animals and property damage caused by animals.

While cumulative impacts to ecological resources would affect only a small percentage of the total region, many of the anticipated impacts from actions would be concentrated in the vicinity of Los Alamos, LANL, and White Rock. Implementation of the conveyance or transfer scenarios, especially those contemplated for the Rendija Canyon Tract, could be important contributors to cumulative impacts in this area. The largest loss would be associated with development in the Rendija Canyon Tract of approximately 570 acres (359 hectares). For the American peregrine falcon and Mexican spotted owl, approximately 4 percent of available preferred habitat from current DOE lands would be lost.

15.3.8 Cultural Resources

Cumulative impacts to cultural resources are assessed by weighing the anticipated impacts on prehistoric, historic, and traditional cultural properties (TCPs) resources related to the conveyance and transfer of the tracts and the contemplated land uses with impacts associated with other regional projects and activities. Important cumulative impacts occur when the net effect of regional projects or activities would result in the destruction, alteration, isolation, neglect, loss of protection, or the introduction of visible, audible, or atmospheric elements out of character with the resource. Because cultural resources are considered nonrenewable, each loss contributes to a decrease in the existing regional resource base, or, in the case of TCPs, a loss of a part of the cultural or spiritual heritage of a group or individual.

An overview of the cultural resources in the region is described in Chapter 3, Affected Environment. Planned LANL construction activities and explosives testing may affect up to 15 archaeological sites and other properties eligible for the National Register of Historic Places, but these impacts will be addressed by the *National Historic Preservation Act* Section 106 consultation process. Other regional development projects would involve ground disturbing activities; but, it is not known whether cultural resources would be or have been affected by these projects. Conveyance or transfer could remove over 4,800 acres (1,994 hectares) of land from certain Federal cultural resource protections. Development of approximately 826 acres (335 hectares) could result in adverse effects to cultural resources on the tracts and in adjacent areas.

It is possible that implementation of these projects could result in additional important cumulative impacts to the regional resource base and/or disruption of Native American or other cultural practices. Potential cumulative impacts would include destruction, alteration, or isolation of prehistoric, historic, or TCP resources or the introduction of elements out of character with their setting. Residential development and increased access by the public could cause possible destruction or damage of resources, vandalism, unauthorized collection of materials and artifacts, and disturbance of traditional practices and ceremonies. Negative impacts to very important cultural resources on adjacent NPS and USFS lands would be likely due to increased access opportunities. Adjacent development and subsequent increased access and visitation to BNM and the Santa Fe National Forest would likely seriously impact the ability of these land-managing agencies to provide for the protection and interpretation of important cultural resource sites.

Because the extent of cultural resources affected by other regional projects is unknown and resources present would be subject to less protection when the tracts are conveyed or transferred, it is difficult to assess the contribution to overall cumulative impacts. Conveyance or transfer scenarios would potentially impact a large number of cultural resources in the immediate vicinity of LANL but not in the overall region.

15.3.9 Geology and Soils

Cumulative impacts to geology and soils are assessed by comparing the impacts on slope stability, soils, mineral resources, seismic risk, and the release of soil-borne contaminants based on the contemplated land uses with impacts associated with other regional projects and activities. Important cumulative impacts occur when the net effect of regional projects or activities would result in large-scale slope instability, erosion, or loss of prime agricultural or mineral resources.

The geology and soils of the region are described in Chapter 3, Affected Environment. No specific changes to soils or impacts would be anticipated for upcoming LANL activities. Other anticipated regional changes would include some soil disturbance due to construction in previously undisturbed areas. Under the conveyance or transfer scenarios, over 826 acres (335 hectares) of soil could be disturbed due to development, as described in Chapter 5 through Chapter 14.

Cumulative effects to geology and soils would be minor on a regional basis. Implementation of the conveyance or transfer scenarios would contribute to ground disturbance and potentially increase soil erosion.

15.3.10 Water Resources

Cumulative impacts to water resources are assessed by comparing the impacts on surface water and groundwater quantity and quality associated with the contemplated land uses and the impacts of reasonably foreseeable regional projects and activities. Important cumulative impacts occur when the net effect of regional incremental impacts would increase flood potential or could affect surface water or groundwater quality or quantity. Important cumulative impacts also would occur if Federal, State, or local regulatory requirements were violated by the combined impacts of regional projects or activities.

The water resources of the region are described in Chapter 3, Affected Environment. Current and projected water use is described in Table 15.3.3-1. No specific future LANL activities are expected to change surface water quality; but, water use is expected to increase. Other anticipated regional developments would be expected to increase groundwater demand and increase impermeable surfaces (such as parking lots and paved roads), affecting both the amount of runoff and the transport of contaminants. Full implementation of the conveyance or transfer development scenarios also would increase water demand and impermeable surfaces.

15.3.10.1 Water Quantity

Cumulative impacts to surface water quantity from the increased developed areas would be expected to be inconsequential. Cumulative impacts to groundwater quantity and quality from the increased developed areas could be substantial. Currently, water levels in the regional aquifer are declining. Development of tracts under the contemplated land uses would increase the potential number of residents by about 30 percent. The additional water withdrawal associated with these development scenarios, coupled with the LANL SWEIS Preferred Alternative of a 30 percent increase in water withdrawal from the main aquifer, could seriously impact the amount of available, cheaply treatable water for both Los Alamos County and LANL.

15.3.10.2 Water Quality

Cumulative impacts to surface water quality from the increase in developed areas would be expected to be relatively minor in relation to the current size of the Los Alamos and White Rock townsites and the variety of commercial and industrial businesses historically operated in the area. Surface water quality within or near tracts may be affected temporarily where proposed construction and development is to take place. Surface water quality may be affected on a long-term basis by the introduction of contaminants via stormwater runoff from the additional developed commercial, industrial, and parking areas.

Cumulative impacts to groundwater quality could result from the placement and operation of new water supply wells that could be installed in order to address increased demand. Decreases in groundwater quality could result in impacts to human health.

15.3.11 Air Resources

Cumulative impacts are assessed by weighing the air quality impacts associated with the conveyance and transfer of the tracts and the contemplated uses by the receiving parties with any air quality impacts expected from other regional projects and activities. Important air quality impacts occur when the net effect of regional projects or activities would have the potential to increase regional criteria, hazardous, and radioactive air pollutant concentrations in excess of Federal air quality and other standards. Emissions also may contribute to global climate change.

The air resources of the region are described in Chapter 3, Affected Environment. Planned LANL activities would not be expected to exceed or approach applicable health-based standards for criteria or toxic air pollutants; but, there may be increases in mobile sources due to increased employment. Increased automobile, heating, and industrial emissions would be expected with new regional development, which could contribute to global climate change. Implementation of the conveyance or transfer scenarios would generate similar kinds of emissions.

The EPA has identified seven criteria pollutants, and New Mexico three more. New Mexico Air Quality Region 3, consisting of Los Alamos and other counties, currently meets all standards for criteria pollutants. Transfer of the 10 tracts, and subsequent development of some of them, would result in slight increases in criteria pollutants from mobile sources and the heating of homes and commercial and industrial buildings. These additional emissions, however, would not have a significant impact on the air quality of the region, and Region 3 would continue to meet national and State air quality standards for criteria pollutants.

Hazardous and toxic chemical air pollutants are currently emitted in small quantities as a result of LANL research and other activities. Concentrations of these pollutants, however, do not exceed health-based standards for any point beyond LANL boundaries (DOE 1999c), and no adverse health effects are expected. Transfer of the 10 tracts, and subsequent development of some of them, would not be expected to result in additional emissions of such pollutants, but would bring members of the public closer to some LANL emission sources. However, concentrations would still not exceed health-based standards, and thus, no cumulative impacts would be expected.

Radioactive air pollutants in the region come from LANL operations, mostly from research and production activities at the LANSCE facility at TA 53. Emissions are within health limits imposed by the EPA and would be expected to remain so (DOE 1999c). Transfer of the 10 tracts and subsequent development of some of them would not result in any additional emissions of radioactive air pollutants, but would bring members of the public closer to LANL emission sources. This would slightly increase the collective radiation dose received by members of the public but would not change the maximum dose received by any single individual.

Visibility in the Los Alamos region is excellent. However, transfer of the 10 tracts and subsequent development of some of them would increase County population by as much as 30 percent. As discussed in Section 15.3.5, this development would result in increased lighting that would have a negative cumulative impact to views of the night sky, and could affect views in BNM.

Finally, development subsequent to the disposition of the 10 tracts would significantly increase regional emissions of greenhouse gases, which contribute to global climate change. Increased emissions, an estimated 40,000 tons [36,300 metric tons] of carbon dioxide annually, would result from additional personal and commercial vehicles and from the heating of new homes and commercial and industrial buildings. However, while this is significant from a regional perspective, contributions would be less than 0.001 percent of global emissions of these pollutants.

15.3.12 Human Health

Cumulative human impacts are assessed by weighing the human health and accident risks associated with the conveyance and transfer of the tracts and the contemplated uses by the receiving parties with any human health impacts expected from other regional projects and activities. Important human health impacts occur when the net effect of regional projects or activities would have the potential to affect regional human health by increasing the exposure to radiological or hazardous materials or increasing the risk of accidents or the danger of natural phenomenon such as fires, floods, or earthquakes.

Excluding the impacts of naturally occurring events, cumulative health impacts result primarily from LANL operations. Development of the subject land tracts would not be expected to contribute substantially to human health impacts in the region. As shown in Figure 5.3.4.2-1 in Chapter 5 of the LANL SWEIS (DOE 1999c), the estimated maximum dose resulting from expanded LANL operations is estimated to be 5.4 millirem per year; the estimated maximum dose to a resident of the Royal Crest Trailer Park is estimated to be 4 millirem; the dose to Los Alamos townsite residents range from 1 to 2 millirem; and a White Rock resident is estimated to receive less than 1 millirem. These exposures correlate to risks of excess latent cancer fatalities (LCFs) of 2.7×10^{-6}, 2×10^{-6}, 0.5 to 1.0×10^{-6}, and less than 0.5×10^{-6} per year of operation, respectively, under normal operation conditions.

The human health impacts resulting from hypothetical accidents and naturally occurring events would increase due to the potential increase in residents and workers closer to LANL operations. While it is understood that not all tracts will be fully developed, it was assumed that each tract would be populated to the maximum extent associated with the identified land uses. Should all of the tracts be developed with the maximum populations identified, the population dose and LCFs due to hypothetical accidents would increase approximately 70 percent over the 120,000 person-rem and 57 excess LCFs estimated in the LANL SWEIS. Similarly, the population dose and LCFs due to naturally occurring events would increase approximately 60 percent over the 340,000 person-rem and 230 excess LCFs estimated in the LANL SWEIS.

15.3.13 Environmental Justice

Cumulative environmental justice impacts are assessed by weighing the impacts associated with the conveyance and transfer of the tracts and the contemplated uses by the receiving parties with any environmental justice impacts expected from other regional projects and activities. Environmental justice impacts occur when the net effect of regional projects or activities would result in disproportionately high adverse human and environmental effects to minority or low-income populations.

Environmental justice issues are discussed in Chapter 3, Affected Environment. No environmental justice issues are anticipated for upcoming LANL activities, and no other regional activities are applicable. Under the conveyance or transfer scenarios, there would be potential cumulative impacts to minority or low-income populations based on impacts to TCPs. Consultations to determine the presence of these resources, the degree to which these resources may be impacted, and the possible effects on minority or low-income populations have not been completed. There also may be some tract-specific indirect effects on traditional wood gathering. Legal counsel for the Pueblo of San Ildefonso has expressed the opinion that there would be environmental justice impacts associated with the conveyance and contemplated uses of four of the subject tracts: Rendija Canyon, White Rock Y, TA 74, and the White Rock Tracts.

No cumulative impacts on minority or low-income populations would be expected. No adverse human health impacts would be associated with the conveyance and transfer or contemplated uses that would contribute to disproportionate impacts to minority or low-income populations.

15.3.14 Irreversible and Irretrievable Commitment of Resources

This section describes the major irreversible and irretrievable commitments of resources that can be identified at the level of analysis conducted for this CT EIS. A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The actual conveyance or transfer of the subject land tracts would not immediately cause any irreversible or irretrievable commitments of resources. The proposed land use scenarios would, however, cause irreversible commitments of ecological habitat, and potentially cultural resources, in land tracts where new development would occur.

Development of previously undeveloped areas also would cause the irretrievable commitment of resources during construction and operation of the residential, commercial, or industrial facilities. Energy would be expended in the form of natural gas and electricity. Additional water also would be consumed. Construction of these facilities would require the irretrievable commitment of standard building materials such as roofing materials and concrete.

15.3.15 Unavoidable Adverse Environmental Impacts

The actual conveyance or transfer of the subject land tracts would not immediately cause any adverse environmental impacts. The proposed land use scenarios would, however, cause unavoidable adverse impacts to ecological habitat, and potentially cultural resources, in land tracts where new development would occur. The ecological impacts could include loss of habitat, fragmentation of habitat, and potential disruption of wildlife migration corridors. There also is potential for adverse impacts caused by introduction of land uses that are incompatible with adjacent resource protection efforts. The actual impact would be dependent on the specific resource in the adjacent area.

Conveying or transferring land tracts also could result in the loss of certain Federal protections for cultural resources on these tracts. Loss of these protections could be considered an unavoidable adverse impact to these resources, as this could lead to development of previously undisturbed areas. This development could result in physical destruction, damage, or alteration of cultural resources on the subject land tracts and in adjacent areas.

15.3.16 Relationship Between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The actual conveyance or transfer of the subject land tracts would not immediately cause any specific impacts or short-term uses of the environment. The proposed land use scenarios would, however, require short-term use of resources (for example, water, fuel, electricity, etc.) during construction and also cause permanent loss of ecological habitat and potential loss of cultural resources. An increase in residential, commercial, and limited industrial development would cause overall enhancements of the long-term productivity of the area. The environmental restoration activities at the subject tracts, while causing some short-term disruption and use of resources, provide for long-term improvement.

16.0 MITIGATION MEASURES

This chapter discusses potential measures to mitigate impacts identified in the CT EIS analysis. Potential mitigation measures are described in three groups: those which will be taken by the DOE prior to conveyance or transfer, recommended mitigations, and resource-specific mitigations.

16.1 Introduction

The regulations promulgated by the Council on Environmental Quality (CEQ) to implement the procedural provisions of the NEPA (40 Code of Federal Regulations [CFR] 1500-1508) require that an EIS include a discussion of appropriate mitigation measures (40 CFR Part 1502.14[f], 40 CFR Part 1502.16[h]). The term "mitigation" includes the following:

- Avoiding an impact by not taking an action or parts of an action
- Minimizing impacts by limiting the degree or magnitude of an action and its implementation
- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating the impact by preservation and maintenance operations during the life of the action
- Compensating for the impact by replacing or providing substitute resources or environments (40 CFR Part 1508.20)

This chapter describes potential mitigation measures in three categories: (1) mitigations prior to conveyance or transfer, (2) recommended mitigations, and (3) also potential resource-specific mitigations. These mitigation measures address the range of potential impacts of transferring tracts for natural areas; cultural preservation; and commercial, residential, and industrial development scenarios. Tract activities include existing efforts and controls such as regulations, policies, contractual requirements, and administrative procedures to mitigate impacts. The existing programs and controls are too numerous to list completely. Examples include the Fire Protection Program, Pollution Prevention and Waste Minimization Programs, Water and Energy Conservation Programs, and the Threatened and Endangered Species Habitat Management Plan. These are discussed in detail in the LANL SWEIS (DOE 1999c).

Any new or additional mitigation measures that could further reduce the impacts identified in Chapter 5 though Chapter 14 are discussed in the following sections. The description of these measures does not constitute a commitment by the DOE or the land recipient to undertake any of them. Any such commitments would be reflected in any Records of Decision (RODs) following the publication of the Final CT EIS, with a more detailed description and implementation plan in one or more mitigation action plans to be published following the ROD(s).

16.2 Mitigations Prior to Conveyance or Transfer

Prior to conveyance or transfer of any of the land tracts, the DOE will take the following actions:

- Initiate cultural resource consultations with the affected Pueblos and Tribal Nations and the State Historic Preservation Office(r), and complete consultations regarding threatened or endangered species and their habitats with U.S. Fish and Wildlife Service (USFWS).

- Consistent with the provisions of Public Law (PL) 105-119, in the case of conveyance of land tracts to the County, the DOE may include deed restrictions precluding any development within the 100-year floodplains[1] or wetlands[2]. The DOE also may include other deed restrictions, notices, and similar land use controls as deemed appropriate and necessary that are protective of human health and safety.
- Relocate any environmental monitoring stations after consultation with State regulators, as appropriate.

The DOE will consider inclusion of additional land use controls within the deed mechanism at the time of conveyance of tracts that would be protective of sensitive resources in a manner consistent with the DOE's consultation results.

16.3 Recommended Mitigations

This section describes recommended mitigations involving DOE discussions, consultations, and similar planning activities with other organizations and land recipients.

The DOE should coordinate consultations with the New Mexico State Historic Preservation Office(r), the Advisory Council on Historic Preservation, the receiving parties, and other interested agencies and parties to ensure adequate consideration of impacts on cultural resources resulting from the conveyance and transfer of the subject tracts from the responsibility and protection of the DOE. The goal of these consultations would be a formal Memorandum of Agreement (MOA) addressing the impacts of the potential loss of certain cultural resource protections and DOE responsibilities on the subject tracts and defining specific procedures and responsibilities for managing cultural resource concerns upon transfer to the receiving parties. These could include covenants to be developed for the protection of various cultural resources.

Specific issues to be discussed would include, but would not be limited to the following:

- Minimize impacts to cultural resources in and adjacent to the subject tracts from the loss of responsibility and protection of the DOE by delegating cultural resource preservation responsibilities and developing a process that parallels existing protections and procedures.
- Minimize the adverse effect of the transfer or conveyance of National Register of Historic Places (NRHP)-eligible properties out of the responsibility and protection of the DOE by including adequate restrictions or conditions to ensure preservation of the properties' significant historic features.
- Minimize potential impacts to historic buildings from the loss of DOE responsibility and protection by completing the identification and evaluation effort for all buildings in the subject tracts; ensuring that

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[1] Executive Order 11988, "Floodplain Management," states that (under section 3(d)):

"When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal Agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State, or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance."

[2] Executive Order 11990, "Protection of Wetlands," states that (under Section 4):

"When federally-owned wetlands or portions of wetlands are proposed for lease…or disposal to non-Federal public or private parties, the Federal agency shall:
(a) reference in the conveyance those uses that are restricted under Federal, State, or local wetlands regulations; and
(b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or (c) withhold the properties from disposal."

NRHP-eligible buildings continue to be used (to the maximum extent feasible) and maintained in a manner that preserves their historical value; and exploring the reuse of other NRHP-eligible buildings for activities that must be relocated.

- Minimize potential impacts to traditional cultural properties (TCPs) by completing consultations to identify the presence and importance of these resources within the subject tracts, identifying any potential impacts of conveyance or transfer on access to TCPs in adjacent areas, and exploring methods to avoid disturbance of TCPs and traditional users.
- Minimize potential impacts from the loss of DOE protections and guarantees regarding the preservation of Native American sacred sites and the rights of Native Americans to practice traditional religions on the subject tracts under the *American Indian Religious Freedom Act* and Executive Order 13007, "Indian Sacred Sites," by allowing for the continuation of any traditional religious practices.
- Minimize the potential impacts from the loss of DOE protection for archaeological resources on these lands under the *Archaeological Resource Protection Act* by providing for similar requirements for permitting prior to excavation of archaeological sites, the disposition of archaeological materials and penalties for unauthorized excavation, vandalism, and trafficking of archaeological materials.
- Minimize the potential impacts from the loss of DOE responsibility for the protection and disposition of Native American sacred objects, objects of cultural patrimony, and funerary objects under *the Native American Graves Protection and Repatriation Act* by establishing agreements outlining similar procedures for addressing the inadvertent discovery of Native American human remains or funerary objects and their disposition.
- Provide for the loss of DOE responsibility for the curation of archaeological and cultural resource collections from these tracts under 36 CFR 79 by assigning these responsibilities and contracting for curation services.
- Develop a natural resources management plan that is integrated and developed with the natural resource management plans of other adjacent land management agencies.
- Continue involvement in the roles and responsibilities that have been established with the townsite of Los Alamos, County of Los Alamos, State of New Mexico, U.S. Department of Agriculture, and U.S. Forest Service (USFS) for emergency response. This includes the notification processes for each of the response groups and mutual aid in the event of an emergency.
- Explore the establishment of a proactive means toward developing future use options for transferred properties, in accordance with State law and the County Charter. Participation in a Future Use Options Logistics and Support Working Group with the USFS, the New Mexico Environment Department (NMED), Bureau of Land Management (BLM), Pueblos, and local citizen groups would be encouraged. Public involvement is encouraged through the Citizens Advisory Board and would be instrumental in providing interim recommendations on future land use options.

- Coordinate with local jurisdictions, Native Americans, and State officials to explore methods to maintain a rigorous environmental review and protection review process for future development or other activities.

16.4 Potential Resource-Specific Mitigations

Resource-specific mitigation issues are discussed in the following sections. Unless otherwise noted, the analyses in Chapter 5 through Chapter 14 assume that these measures would not be implemented by the recipients. The following potential mitigations are recommendations for action by the recipients and the DOE.

16.4.1 Land Use

The following potential mitigation measures for land use impacts were identified.

- Explore means to compensate for the loss of recreational use on tracts transferred for cultural preservation and development.
- Explore solutions to overcome impacts to access routes to adjacent lands, access routes needed for fire and emergency vehicles, and access routes for emergency egress for Los Alamos residents.
- Explore the necessary means to reduce wildfire and seismic hazards.
- Explore coordinating closely with local groups to have incompatible uses and developments controlled.
- Explore limiting commercial and industrial development by limiting operations to those with a low level of risk consistent with surrounding neighborhoods.
- Establish a regional program to promote conservation, pollution prevention, and waste avoidance efforts.
- Explore methods of providing for additional municipal services including working with site developers.

16.4.1.1 Environmental Restoration

No potential impacts requiring mitigation were identified for environmental restoration.

16.4.2 Transportation

The potential mitigation measure to transportation impacts was to explore the installation of traffic signals and minor lane changes (restriping) to better manage increases in traffic volumes. Also consideration of new roads, road widening, and bridges would be included. The particular improvements and their locations would be identified upon implementation of specific land use scenarios at each land tract.

16.4.3 Infrastructure

The following potential mitigation measures for infrastructure and utilities impacts were identified.

- The predicted shortfalls in electrical power supply, water supply, and wastewater treatment capability should be addressed in two parallel efforts: (1) seek additional resources; and (2) establish conservation programs to avoid waste and encourage recycling.
- The County and the DOE should explore a means to obtain additional water rights to compensate for the anticipated shortage. In the meantime, both the County and the DOE should consider establishment of water conservation programs. These programs could include incentives to encourage installation of low-flow showers and toilets and using native

and drought-resistant plants in landscaping. LANL might evaluate industrial processes to determine where water conservation measures could be implemented.

- Explore implementation of a water resource best management practices project for current and future water systems, covering distribution system water audits, leak detection, and repair.
- Explore means to identify where new production wells and delivery infrastructure would be required to meet demand associated with residential, industrial, and commercial development scenarios. Also include wells and services that would be reduced as a result of transferring land uses to cultural preservation scenarios. Also conduct a detailed study on the regional groundwater quality and quantity.
- The DOE should consider proceeding with the installation of the proposed new 115-kilovolt power line to enhance the reliability of the electrical transmission to the Los Alamos power supply pool. At present, the regional power system (northern and northeastern New Mexico) is at full use capacity, and additional power would not be delivered to the local system even if the new 115-kilovolt line were installed. The DOE and the County should consider other options for electrical power, such as local generation. Both the DOE and the County should consider implementing further energy conservation measures. These measures might include installation of "intelligent" heating ventilation and air conditioning control systems, use of energy-efficient light bulbs, and reduction in power use by shutting off appliances, computers, and lights not in use.
- The predicted shortage of wastewater treatment capacity at the Bayo Wastewater Treatment Plant may be addressed with the proposed new treatment plant. The new plant would be built near the Bayo Wastewater Treatment Plant and would have a higher capacity and chemical treatment capability. It is not expected that the anticipated developments would achieve full buildout before the new plant is in operation. However, water conservation efforts implemented by the County should decrease the production of wastewater sent to the existing plant.
- Los Alamos County is in the process of establishing a new landfill. A site has been selected near Ojo Caliente, and the landfill is expected to be in operation within 3 to 5 years. The minimum predicted life of the existing landfill is 5.6 years if the anticipated growth of the County and LANL is realized. Should the new landfill's construction schedule slip, the existing landfill may reach capacity before the new landfill is completed. To avoid this, the possibility of diverting more solid waste to various recycling organizations should be explored. For example, diversion of construction rubble could increase the life of the landfill by several years.

16.4.4 Noise

The following potential mitigation measures to noise and vibration impacts were identified:

- Explore means to control construction noises including restricting most construction activities to normal daytime periods. Other means involve phasing demolition, construction, and remodeling activities.

- Explore means to control traffic noises through the use of berms/sound walls, vegetation buffer areas, building configurations, and other site planning tools.

16.4.5 Visual Resources

The potential mitigation measures to visual resources impacts were that local jurisdictions could explore improving the visual quality of tracts through incorporating regional based design guidelines. These guidelines would contain a set of principles and detailed design guidance for the physical development and redevelopment of sites. The guidance could include specifics such as building massing, facades, color palettes, and building orientation and entries. Where decommissioning, demolition, or environmental restoration is planned, actions could be taken to restore the area to its approximate natural condition by backfilling, reducing side slopes, applying topsoil, reseeding, and establishing plant growth.

16.4.6 Socioeconomics

The potential mitigation measure to socioeconomic impacts was to explore means to address the economic self-sufficiency needs of the receiving parties.

16.4.7 Ecological Resources

The following potential mitigation measures to ecological resources impacts were identified:

- Explore means to prevent the inadvertent electrocution of raptors where new above-ground electric lines are installed. Transmission and distribution lines should be constructed in accordance with standards outlined in the publication *Suggested Practices for Raptor Protection on Power Lines* (RRF 1996). The right-of-way holder should assume the burden and expense of proving that pole designs not shown in this publication are "raptor safe." A raptor expert could provide such proof.
- Explore means to manage trash and food items in closed containers to reduce attractiveness to opportunistic predators such as ravens, coyotes, and bears.
- Explore means to reduce the impacts of dogs and cats on other animals.
- Explore means to apply the planned Natural Resource Management Plan to transferred lands to control the quality of existing ecological resources.
- Explore the use of LANL's Threatened and Endangered Species Habitat Management Plan for guidance on the continued management of threatened and endangered species on transferred lands.
- Explore whether detailed surveys for the presence or absence of threatened and endangered species and sensitive species, as well as migratory bird nests could be conducted at sites prior to commencing activities that could result in ground disturbance or destruction. If any of these species were encountered at a site, avoidance measures could be implemented. Such measures could include scheduling the activities outside of the breeding season and transplanting populations to another location. Migratory bird nests and birds occupying those nests, which could be affected by the activity, would be removed in accordance with the *Migratory Bird Treaty Act* permit from the USFWS.
- Explore methods necessary for careful siting and design of new construction and minimizing losses of mature trees and special habitats.

- Explore means to avoid the removal of native vegetation within the riparian corridor(s) during demolition, earth moving, construction, habitat restoration, and trail-building activities. Consider the establishment of a permanent 50-foot (18-meter) wide restricted access buffer zone to protect surface water corridors. Locate all staging areas in already disturbed sites. A qualified biologist could develop a detailed habitat restoration plan for development activities. These plans, to be prepared by the project applicant prior to construction should specify all activities necessary to restore the drainage with minimal erosion and should be supervised by restoration specialists. If vegetation removal were required, project developers could confer with municipal, Pueblo, and State officials regarding the type of vegetation to be removed, the extent of removal, and corresponding revegetation mitigations.
- Explore means to limit impacts when a more site-specific plan is presented to the appropriate jurisdiction (for instance, requiring tree removal permits).

16.4.8 Cultural Resources

The following measures to mitigate potential direct and indirect impacts to cultural resources were identified:

- Explore means to minimize potential impacts to cultural resources by modifying development plans for the subject tracts so that direct disturbance or introduction of elements out of character with the resource or traditional practices are avoided. Ensure that protections for cultural resources from public access are in place and that development does not increase erosion of archaeological resources.
- Minimize impacts to cultural resources by preparing tract-specific Historic Properties Treatment Plans that include provisions for a data recovery program for NRHP-eligible archaeological resources that cannot be avoided, an appropriate level of documentation of historic buildings, any mitigations considered for TCPs, procedures for avoiding and monitoring resource impacts during construction, and a discovery plan for resources observed during construction.

16.4.9 Geology and Soils

The following potential mitigation measures to geology and soils resources impacts were identified:

- Explore means to implement recommend seismic upgrades to reduce life safety risks associated with structural failures for a moderate-probability earthquake. In addition, any existing structures identified for retention for future use should be evaluated in detail to determine the cost effectiveness of seismic upgrades.
- Explore the benefits of using grading permits approved by local authorities for site preparation work involving more than 5 cubic yards (3.8 cubic meters) or slopes greater than 20 percent.

16.4.10 Water Resources

The following potential mitigation measures to water resources impacts were identified:

- Explore means to reduce surface water quantity and improve surface water quality diverted by drainage structures associated with site development. Infiltration basins and erosion control best management practices during construction are examples of such means.

- Map the 100- and 500-year floodplains and restrict development within these areas.
- Explore conducting water resources studies involving introduction of new waste streams into aquifers and watersheds, increases in the amount of automotive chemicals from vehicles in stormwater runoff, and pending legal conflicts with water rights.

16.4.11 Air Resources

The following potential mitigation measures to air resources impacts were identified:

- Explore techniques to control dust during demolition, construction, and renovation activities, including using mowing rather than discing for weed control; seeding and watering inactive portions of construction sites; minimizing the area disturbed by clearing, earthmoving, or excavation; and restricting site clearing, grading, etc. during periods of sustained strong winds.
- Explore the development of processes to measure and control the emissions of chemical pollutants in industrial and commercial development areas.

16.4.11.1 Global Climate Change

No potential mitigation measures were identified for global climate change.

16.4.12 Human Health

The potential mitigation measures to human health impacts were to explore identifying health and safety buffer zones around LANL operations for the protection of the public from both operational and accident exposures to hazardous or radioactive substances in air, water, or soil.

16.4.13 Environmental Justice

The potential mitigation measure to environmental justice impacts was to explore means to ensure continued access of the low-income and minority users of subsistence and traditional resources to those resources.

17.0 APPLICABLE LAWS, REGULATIONS, PERMITS, AND DOE ORDERS

This chapter describes the laws, regulations, permits, and DOE orders that relate to the Proposed Action Alternative and the No Action Alternative. This chapter also details the conveyance and transfer process steps and required environmental compliance actions.

17.1 Introduction

As part of the NEPA process, the DOE must consider if actions discussed in this CT EIS would result in a violation of any Federal, State, or local laws or requirements (40 Code of Federal Regulations [CFR] 1508.27) or require a Federal permit, license, or other entitlement (40 CFR 1502.25). This chapter provides a summary of the regulations and regulatory processes pertaining to the DOE's proposed conveyance or transfer of the 10 tracts at Los Alamos, New Mexico. This chapter also lists the existing major environmental requirements, agreements, and permits that relate to the CT EIS No Action Alternative (that is, LANL keeps the land tracts). Most of these requirements, agreements, and permits are detailed in the LANL SWEIS (DOE 1999c). This chapter focuses on those specific to the transfer of the land tracts.

17.1.1 Conveyance and Transfer Process Steps

The DOE published its *Crosscut Guidance on Environmental Requirements for DOE Real Property Transfer* in October 1997 (DOE 1997c). This guidance discusses the procedures for identifying property for transferal; screening for potential use by other Federal, State, and local agencies; assessing the environmental baseline conditions; preparing any needed NEPA documentation; gaining General Services Administration (GSA) concurrence on determinations of excess property free of encumbrances; and including contract and deed requirements. This guidance document provides direction for complying with the environmental requirements associated with the disposition of real property, including land and improvements on the land (such as buildings, roads, and other structures). It includes comprehensive discussions of the various Federal statutes, regulations, and DOE orders that may be involved in such disposal actions.

Section 1.4.2 of the Crosscut Guidance lists 10 statutes that grant the DOE limited authority to engage directly in real property transfers without engaging the Bureau of Land Management or the GSA disposal processes. An 11th statute, Section 632 of Public Law (PL) 105-119 (the Act), initiated the considered conveyance and transfer of the 10 subject tracts at Los Alamos and prescribed the overall conveyance and transfer process.

The process steps specific to the Act are enumerated in Chapter 1 of this CT EIS in Table 1.1.3-1, PL 105-119 Conveyance and Transfer Process Steps. However, as also noted in Chapter 1, these steps do not constitute the full set of steps that the DOE must take in order to reach final conveyance or transfer of the subject tracts. Several environmental compliance actions are necessary in addition to those required by either the Act or NEPA. These additional requirements include the need for

- Completion of an Environmental Baseline Survey Report to meet the requirements of the 1992 *Community*

Environmental Response Facilitation Act amendments to the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), sections 120(h)(3) to 120(h)(5)

- Completion of consultation requirements under Section 7 of the *Endangered Species Act* (ESA) of 1973 and Section 106 of the *National Historic Preservation Act* (NHPA) of 1966
- Completion of consultation regarding traditional cultural properties (TCPs)
- Completion of compliance actions for 10 CFR 1022, DOE Compliance With Floodplains/Wetlands Environmental Review Requirements

Measures required to effect the environmental remediation and restoration of tracts with potential contamination issues are either ongoing at this time or would have to be initiated before the DOE makes a decision on the conveyance or transfer of the land involved. The environmental restoration process is discussed in Section 17.1.2. The Environmental Restoration Report (DOE 1999b) produced by the DOE in parallel to the CT EIS discusses the process required for the DOE to complete the appropriate restoration or remediation activities on the subject tracts.

Due to the timing of the decision process laid out in the Act, the completion of the DOE's Section 7, Section 106, and TCP consultation processes will be conducted after the County and San Ildefonso Pueblo have identified which of the tracts will be conveyed or transferred to each of the two recipient parties. This is a departure from the usual timing of the completion of these regulatory compliance actions, which normally occur before the NEPA analysis process is completed. The steps and timing of the regulatory compliance efforts anticipated to take place after the completion of this CT EIS are discussed in Sections 17.1.3 and 17.1.4. Mitigation measures likely will be needed before conveyance or transfer of the tracts can be accomplished in order to mitigate potential adverse effects to sensitive cultural resources and animal species. These mitigation measures must be agreed upon by the parties involved and the regulatory agencies responsible for implementing the ESA and the NHPA. Such measures may include, but not be limited to, recovery of information and documentation of data, including photographic documentation. Mitigations also could include leaving archeological or historical resources untouched at this time or even burying archeological resources to better protect them. These potential mitigations are discussed in Chapter 16.

Chapter 18 contains copies of letters sent to various parties initiating the consultation processes required of the DOE under the ESA, NHPA, and various executive orders. The consultation and mitigation processes could require several years to complete and also could prove to be very expensive.

Actions to meet the procedural requirements of DOE (General Provisions) 10 CFR Part 1022, Compliance With Floodplain/Wetlands Environmental Review Requirements, have been undertaken by the DOE, both concurrently with and as part of the CT EIS process. Specifically, as provided for under the requirements of 10 CFR 1022, a Floodplain and Wetland Assessment was prepared and incorporated into the Draft CT EIS (see Appendix D); a separate Notice of Floodplain and Wetlands Involvement was published in the *Federal Register* (FR) (see a copy of this Notice in Appendix C); and a Statement of Findings is included in this Final CT EIS. No comments were received from members of the public regarding the Notice of Floodplain and Wetlands Involvement. The DOE is required to followup any mitigations that the DOE commits to in its Record of Decision(s), such as the imposition of deed restrictions on land conveyed to the County of Los Alamos. With the exception of followup action, the DOE has met the procedural requirements of 10 CFR 1022 with the publication of the Final CT EIS.

In addition to the above-mentioned action steps required of the DOE in order to convey or transfer the 10 subject tracts, the DOE must have the land surveyed to establish the legal definition of the tracts.

17.1.2 Environmental Restoration Process

An environmental restoration or cleanup process for radioactive contaminants is governed by DOE regulations and orders. An environmental restoration or cleanup process for hazardous contaminants is typically governed by the *Resource Conservation and Recovery Act* (RCRA) or the CERCLA and their associated regulations. These sets of regulations and orders govern how environmental contamination is defined, characterized, and remediated. While there are regulatory differences, they generally follow a common process. This common process includes the following steps:

- Initial assessment of suspected areas of contamination
- Preliminary risk assessment to estimate potential risks and needs for further sampling
- Preliminary prioritization of areas that should be characterized
- Planning and implementing a formal sampling and analysis program
- Risk assessment
- Drafting of recommendations based on the data as to how much remediation, if any, is needed for each area
- Review and approval of these recommendations by the appropriate regulator
- Feasibility studies for alternative methods of remediation
- Implementation of remedial actions and post-remediation activities

For almost all of the area within the 10 tracts being evaluated for conveyance or transfer, the process is in the first or second step. LANL's Environmental Restoration (ER) Project is currently being conducted under RCRA in accordance with the NMED as directed by the EPA. The approval for RCRA methodologies is contained in the hazardous waste permit. All decisions and determinations associated with the ER Project are made in negotiations with the regulators. LANL currently plans to perform advance remedial actions (such as interim and voluntary corrective actions) where feasible.

17.1.3 Ecological Consultation Process

For the consultation procedures of the ESA and Section 7(c) of the 1978 amendments, the DOE has compiled information on seven threatened and endangered species that are present or potentially present on lands proposed for conveyance and transfer in order to assess possible effects on these species (PC 1998a). Regulations promulgated under Section 7 of the Act define the process whereby proposed Federal actions that may affect threatened and endangered species are evaluated by the U.S. Fish and Wildlife Service (USFWS). Because listed species are known to be present in some of the land tracts and thus may be impacted by implementation of the proposed action, the DOE cannot make any irreversible or irretrievable commitment of resources until the Section 7 consultation process is completed. The DOE will complete the Section 7 consultation process after the receiving parties and their proposed land uses are determined for the various land tracts.

The specific impact analysis and data will be addressed in a DOE-prepared Biological Assessment (BA) that is submitted to the USFWS. The BA will present the DOE effect determination that transfer and conveyance of certain land tracts would have on listed species. Three findings are possible: "no effect"; "may affect, not likely to adversely affect"; and "may affect, likely to adversely affect." The USFWS, in turn, will issue its concurrence with the DOE's determination, or a biological opinion if necessary, that states the USFWS opinion on whether or not the action is likely to jeopardize the continued existence of a listed species. Should the USFWS find that the proposal is likely to jeopardize a species, they will list reasonable or prudent alternatives or state that none are known. The DOE would then make a determination on how to proceed with the proposed action in light of its Section 7 obligations and BA. If the USFWS finds that the proposal is not likely to jeopardize a listed species, the DOE may proceed with the proposed action.

17.1.4 Cultural Consultation Process

Cultural resources that fall under the consideration of the NHPA, as amended, are located or are potentially located on lands proposed for conveyance and transfer. Under the NHPA, regulations define a process whereby the effects of the proposed undertaking (the conveyance and transfer) on cultural resources eligible for the National Register of Historic Places (NRHP) are considered and the Advisory Council on Historic Preservation is afforded a reasonable opportunity to comment. This process involves consultation between the DOE and the New Mexico State Historic Preservation Office(r) (SHPO) to determine the effect of the undertaking on identified eligible cultural resources and appropriate mitigation measures to avoid or reduce any identified adverse effects. The DOE will not make any irreversible or irretrievable commitment of resources until this consultation process has been completed and any mitigation measures have been conducted. The DOE will complete the NHPA consultation process after the receiving parties and their proposed land uses are determined for the various land tracts.

The DOE has completed a 100 percent pedestrian survey and recording of all identified cultural materials for each of the parcels proposed for conveyance and transfer. This includes archaeological sites (prehistoric and historic) and buildings and structures. The DOE will conduct consultations with potentially interested Native American tribes to identify the presence of any TCPs located in the proposed parcels. This information, along with the DOE's evaluation of eligibility of the identified resources and determination of the effect of the conveyance and transfer on eligible resources, will be presented to the SHPO for concurrence. The SHPO, in turn, will issue an opinion on the eligibility of resources and determination of effect within 30 days after receipt of the information. If the SHPO determines an adverse effect is likely, the SHPO and the DOE will consult to determine appropriate mitigation measures.

Currently, cultural resources located on DOE-administered land are addressed by other Federal mandates. These include the *American Indian Religious Freedom Act*, *Religious Freedom Restoration Act*, Executive Order 13007: "Indian Sacred Sites," *Native American Graves Protection and Repatriation Act*, and the *Archaeological Resources Protection Act*. These acts and executive orders provide for (1) the protection of cultural resources;

17.0 APPLICABLE LAWS, REGULATIONS, PERMITS, AND DOE ORDERS

(2) access to cultural resources by Native American and other traditional practitioners; (3) repatriation of human remains, associated and unassociated funerary objects, sacred items, and items of cultural patrimony to affiliated descendants or Native American tribes; and (4) consultation with culturally affiliated Native American tribes regarding the excavation of archaeological sites and the treatment and disposition of excavated archaeological materials. The application of these pieces of legislation to cultural resources located in the proposed land tracts either will be removed or will be applied differently, depending on the legislation and who receives the particular tract of land, resulting in effects to the resources, traditional practitioners, and descendants or affiliated tribes. In order to determine the extent of these effects, the DOE will conduct extensive consultations with potentially interested Native American tribes to identify the presence of any cultural resources located in the proposed parcels that fall under the purview of these acts and executive orders. Consultations also will address the potential for effects due to changes in the application of these pieces of legislation. The DOE will not make any irreversible or irretrievable commitment of resources until this consultation process has been completed and any mitigation measures have been conducted. The DOE will complete this consultation process after the receiving parties and their proposed land uses are determined for the various land tracts.

17.2 DOE Regulatory Authorities for Environment, Safety, and Health

DOE regulations pertaining to environment, safety, and health are applicable for analysis in this CT EIS only if the No Action Alternative is selected for any or all of the land tracts under consideration. In other words, they apply only if the DOE retains the land. The No Action Alternative is the same as the Expanded Operations Alternative in the LANL SWEIS (DOE 1999c). These regulations are listed in Table 17.2-1. Refer to the LANL SWEIS for detail about each directive.

17.3 Laws, Regulations, and Executive Orders Related to Environmental Planning and Consultation

Table 17.3-1 lists the laws, regulations, and executive orders related to environmental planning and consultation. Most of these directives pertain to the No Action Alternative, which is the same as the Expanded Operation Alternative in the LANL SWEIS. However, these laws also may apply to any land tracts that are conveyed or transferred to the U.S. Department of the Interior to be held in trust for San Ildefonso. Refer to the LANL SWEIS for details on each of these directives.

17.4 Laws, Regulations, and Executive Orders Related to Regulatory Environmental Protection and Compliance

The laws, regulations, and executive orders related to regulatory environmental protection and compliance are shown in Table 17.4-1 for air resources, Table 17.4-2 for water resources, and Table 17.4-3 for land resources. These laws may pertain to both the No Action Alternative and the Proposed Action Alternative, whether the tracts are conveyed or transferred to the County of Los Alamos or to the Department of the Interior. Refer to the LANL SWEIS for details of each directive.

17.0 APPLICABLE LAWS, REGULATIONS, PERMITS, AND DOE ORDERS

Table 17.2-1. DOE Regulatory Requirements for Environment, Safety, and Health

10 CFR Part 1022	Compliance with Floodplain/Wetlands Environmental Review Requirements
42 U.S.C. §2011 *et seq.*	*Atomic Energy Act* of 1954
DOE Order 451.1A	*National Environmental Policy Act* Compliance Program and related requirements, including: • 10 CFR Part 1021, DOE NEPA Implementing Procedures • 40 CFR Parts 1500-1508, Regulations Implementing the Procedural Provisions of NEPA
DOE Order 5400.1	General Environmental Protection Program
DOE Order 5400.5	Radiation Protection of the Public and the Environment
DOE Order 5820.2A	Radioactive Waste Management
DOE Order 1230.2	American Indian Tribal Government Policy

Note: U.S.C. = United States Code

17.0 APPLICABLE LAWS, REGULATIONS, PERMITS, AND DOE ORDERS

Table 17.3-1. Laws, Regulations, and Executive Orders Related to Environmental Planning and Consultation

35 FR 4247	Protection and Enhancement of Environmental Quality, Executive Order 11514, as amended by Executive Order 11991
36 FR 8921	Protection and Enhancement of the Cultural Environment, Executive Order 11593
42 FR 26951	Floodplain Management, Executive Order 11988
42 FR 26961	Protection of Wetlands, Executive Order 11990
59 FR 7629	Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Executive Order 12898
61 FR 26771	Indian Sacred Sites, Executive Order 13007
16 U.S.C. §470	*National Historic Preservation Act*, as amended
16 U.S.C. §470aa	*Archaeological Resource Protection Act*, as amended
16 U.S.C. §1531 *et seq.*	*Endangered Species Act*, as amended, and related requirements including: • 16 U.S.C. §703, *Migratory Bird Treaty Act* • 16 U.S.C. §668, *Bald Eagle Protection Act* • 17-2-37 *et seq.*, NMSA 1978, *New Mexico Wildlife Conservation Act*
25 U.S.C. §3001	*Native American Graves Protection and Repatriation Act* of 1990
42 U.S.C. §1996	*American Indian Religious Freedom Act* of 1978
42 U.S.C. 2000bb	*Religious Freedom Restoration Act* of 1993 (HR 1308)
42 U.S.C. §4321 *et seq.*	*National Environmental Policy Act* of 1969, as amended
Cooperative Agreements	• DE-FC04-93AL-97270, Los Alamos Pueblos Project, Recipient Santa Clara Pueblo • DE-FC04-94AL-99997, Los Alamos Pueblos Project, Recipient Jemez Pueblo • DE-FC04-94AL-99996, Los Alamos Pueblos Project, Recipient Cochiti Pueblo • DE-FC04-97AL-77460, Los Alamos Pueblos Project, Recipient San Ildefonso Pueblo • New Mexico Agreement in Principle, between the State of New Mexico and the U.S. Department of Energy
PL 102-484	*The National Defense Authorization Act* of 1993
Pueblo Accords	• Accord between the Pueblo of Cochiti and the U.S. Department of Energy • Accord between the Pueblo Jemez and the U.S. Department of Energy • Accord between the Pueblo of San Ildefonso and the U.S. Department of Energy • Accord between the Pueblo of Santa Clara and the U.S. Department of Energy

17.0 APPLICABLE LAWS, REGULATIONS, PERMITS, AND DOE ORDERS

Table 17.4-1. Air Resource Directives

43 FR 47707	Federal Compliance with Pollution Control Standards, Executive Order 12088, as amended by Executive Order 12580
20 NMAC 2.70	Operating Permits; General Provisions
20 NMAC 2.72	Construction Permits; Permit Processing and Requirements
20 NMAC 2.74	Permits–Prevention of Significant Deterioration; General Provisions
20 NMAC 2.78	Emission Standards for Hazardous Air Pollutants
42 U.S.C. §4901	*Noise Control Act* of 1972
42 U.S.C. §7401 *et seq.*	*Clean Air Act*, as amended
NMSA 74-2-1 *et seq.*	*New Mexico Air Quality Control Act*

Notes: FR = *Federal Register*, NMAC = New Mexico Administrative Code

Table 17.4-2. Water Resource Directives

40 CFR Part 110.6	Unplanned Discharges, Spills, and Releases
40 CFR Part 112	Oil Pollution Prevention
40 CFR Part 503	Standards for the Use or Disposal of Sewage Sludge
33 U.S.C. §1251	*Clean Water Act*, as amended, and related requirements including: • NMSA 74-6B-1 *et seq.*, *New Mexico Groundwater Protection Act* • NMSA 74-6-1 *et seq.*, *New Mexico Water Quality Act*
42 U.S.C. §300f	*Safe Drinking Water Act*
DOE 5400.1	General Environmental Protection Requirements
DOE 5400.5	Radiation Protection of the Public and the Environment
NPDES Permit NM0028355	Industrial and Sanitary Effluent Discharges at LANL
NPDES Permit NM0028576	Industrial Discharges from the Hot Dry Rock Geothermal Facility at LANL
NPDES Permit NMR00A384	General Permit for Storm Water Associated with Industrial Activity at LANL
Ordinance 85-70	Los Alamos County: "An Ordinance Repealing Chapter 15.16 of the Los Alamos County Code Adopting a New Chapter 17.70 Pertaining to Flood Damage Prevention"
Ordinance 1988-1	Santa Fe County: "An Ordinance to Establish Regulations for Development in Flood Hazard Areas, Set Minimum Floor Elevations for Compliance, Define Flood Plains, Address Required Building Improvements, and Establish Variance Regulations for Cases Where There Isn't an Ability to Comply with Adopted Standards"
Ordinance 1996-1	Santa Fe County: "Flood Hazards"

Notes: U.S.C. = United States Code, NPDES = National Pollutant Discharge Elimination System

Table 17.4-3. Waste Management, Toxic Substances, Pollution Prevention, and Environmental Restoration Directives

20 NMAC 5.1	Underground Storage Tanks, General Provisions
7 U.S.C. §136 *et seq.*	*Federal Insecticide, Fungicide, and Rodenticide Act,* and related requirements including: • 40 CFR Part 165, Procedures for the Disposal and Storage of Pesticides • 40 CFR Part 170, Worker Protection Standards
15 U.S.C. §2601 *et seq.*	*Toxic Substances Control Act*
42 U.S.C. §6901 *et seq.*	*Resource Conservation and Recovery Act*
42 U.S.C. §9601 *et seq.*	*Comprehensive Environmental Response, Compensation, and Liability Act,* as amended
42 U.S.C. §13101 *et seq.*	*Pollution Prevention Act* of 1990
49 U.S.C. §801 *et seq.*	*Hazardous Material Transportation Act*, and related requirements including: • 49 CFR Part 171, General Information, Regulations, and Definitions • 49 CFR Part 172, Hazardous Materials Tables, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements • 49 CFR Part 173, General Requirements for Shipments and Packagings • 49 CFR Part 174, Carriage by Rail • 49 CFR Part 177, Carriage by Public Highway • 49 CFR Part 178, Specifications for Packagings
DOE 5400.5	Radiation Protection of the Public and the Environment
DOE 5820.2A	Radioactive Waste Management
PL 102-386, 106 Stat. 1505	*Federal Facility Compliance Act*

Notes: NMAC = New Mexico Administrative Code, U.S.C. = United States Code

17.4.1 Air Resources

Table 17.4-1 lists the directives related to air resources.

17.4.1.1 Council on Environmental Quality Draft Guidance Regarding Consideration of Global Climatic Change in Environmental Documents Prepared Pursuant to NEPA

The Council on Environmental Quality's draft guidance on global climate change is not included in the LANL SWEIS and is described in detail here. The draft guidance specifically directs Federal agencies to review whether and to what extent continuing and proposed activities contribute directly or indirectly to greenhouse gases and climate change. In doing so, Federal agencies must consider the following two aspects of global climate change in their NEPA documents: (1) the potential for Federal actions to influence global climatic change (that is, increased emissions or sinks of greenhouse gases) and (2) the potential for global climatic changes to affect Federal actions (for example, feasibility of coastal projects in light of projected sea level rise). The guidance also suggests that the most meaningful analysis would be done not at the project level, but at the program level (that is, a programmatic EIS). Please refer to the Global Climate Changes sections for each tract under consideration for more information (Chapters 5 through 14).

17.4.2 Water Resources

Table 17.4-2 lists the directives related to water resources.

Presidential Memorandum on Xeriscaping, April 26, 1994

The Presidential Memorandum on Xeriscaping is not included in the LANL SWEIS and is described in here. This Memorandum directs Federal agencies to implement environmentally and economically beneficial practices on Federal landscaped grounds and to reflect these practices in appropriate NEPA documents. The guidance recommends that NEPA documents reflect beneficial landscape practices, such as use of native plants; design, use, or promotion of construction practices that minimize adverse effects on the natural habitat; pollution prevention; water and energy efficiency; and creation of outdoor demonstration projects.

17.4.3 Waste Management, Toxic Substances, Pollution Prevention, and Environmental Restoration

Table 17.4-3 lists the directives related to waste management, toxic substances, pollution prevention, and environmental restoration.

17.5 Community Right-to-Know and Emergency Planning

Table 17.5-1 lists the directives related to Community Right-to-Know and Emergency Planning.

Table 17.5-1. Community Right-to-Know and Emergency Planning Directives

58 FR 41981	Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements, Executive Order 12856
42 U.S.C. §11001 *et seq.*	*Emergency Planning and Community Right-to-Know Act,* and related requirements including: • 40 CFR Part 355, Emergency Planning and Notification • 40 CFR Part 370.21, Material Safety Data Sheet Reporting • 40 CFR Part 370.28, Inventory Reporting • 40 CFR Part 372, Toxic Chemical Release Reporting: Community Right-to-Know

Note: U.S.C. = United States Code

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25 U.S.C. §3001	*Native American Graves Protection and Repatriation Act*; "Definitions;" Title 25, Indians; Chapter 22, Native American Graves Protection and Repatriation; United States Code, Washington, D.C., November 16, 1990, as amended.
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42 U.S.C. §1996	*American Indian Religious Freedoms Act*; "Protection and Preservation of Traditional Religions of Native Americans;" Title 42, Public Health and Welfare; Chapter 21, Civil Rights; Subchapter I, Generally; United States Code, Washington, D.C.; August 11, 1978.

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42 U.S.C. §7401 — *Clean Air Act*; "Congressional findings and declaration of purpose;" Title 42, Public Health and Welfare; Chapter 85, Air Pollution Prevention and Control; Subchapter I, Programs and Activities; Part A, Air Quality and Emission Limitations; United States Code, Washington, D.C.; July 14, 1955, as amended.

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42 U.S.C. §11001	*Emergency Planning and Community Right-To-Know Act*; "Establishment of State commissions, planning districts, and local committees;" Title 42, Public Health and Welfare, Chapter 116, Emergency Planning and Community Right-To-Know; Subchapter I, Emergency Planning and Notification; United States Code, Washington, D.C.; October 17, 1986.
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20 NMAC 2.72	"Construction Permits;" Title 20, Environmental Protection; Chapter 2, Air Quality (Statewide); Subpart II, Permit Processing and Requirements; *New Mexico Administrative Code*; Environmental Improvement Board, Santa Fe, NM; November 30, 1995, as amended.
20 NMAC 2.74	"Permits—Prevention of Significant Deterioration (PSD);" Title 20, Environmental Protection; Chapter 2, Air Quality (Statewide); Subpart I, General Provisions; *New Mexico Administrative Code*; Environmental Improvement Board, Santa Fe, NM; July 20, 1995.
20 NMAC 2.78	"Emission Standards for Hazardous Air Pollutants;" Title 20, Environmental Protection; Chapter 2, Air Quality (Statewide); *New Mexico Administrative Code*; Environmental Improvement Board, Santa Fe, NM; November 30, 1995.
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19.0 REFERENCES

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Ord. 1988-1 — Santa Fe County: "An Ordinance to Establish Regulations for Development in Flood Hazard Areas, Set Minimum Floor Elevations for Compliance, Define Flood Plains, Address Required Building Improvements, and Establish Variance Regulations for Cases Where There Isn't an Ability to Comply with Adopted Standards"

Ord. 1996-1 — Santa Fe County: "Flood Hazards"

20.0 LIST OF PREPARERS

Name: **James P. Bartosch**
Affiliation: Tetra Tech NUS
Education: B.S. Chemical Engineering, Syracuse University
Technical Experience: 13 years of experience in waste management, infrastructure, regulatory compliance, and environmental analysis
CT EIS Responsibility: Cumulative Impacts and Mitigation Measures

Name: **Melanie N. Briseño**
Affiliation: MDM Services Corporation
Education: TVI and University of New Mexico
Technical Experience: 11 years of word processing experience, including environmental and regulatory documentation
CT EIS Responsibility: Document Production, Lead Word Processing and Formatting

Name: **Bonne L. Cleveland**
Affiliation: MDM Services Corporation
Education: B.A. English (Technical Writing), University of New Mexico
Technical Experience: 14 years of experience as a technical writer-editor, including environmental and regulatory documentation
CT EIS Responsibility: Document Production Lead and Senior Technical Editor

Name: **Patricia Coffin**
Affiliation: Systematic Management Services, Inc.
Education: B.A. History, State University of New York at Binghamton
Technical Experience: 10 years of experience, including over 5 years in NEPA compliance
CT EIS Responsibility: Reviewer, Technical Advisor

Name: **Catherine E. Coghill**
Affiliation: Tetra Tech, Inc.
Education: B.A. Political Science & Sociology, St. Lawrence University
M.S. Environmental Policy & Management, University of Denver
Technical Experience: 4 years of experience with DOE NEPA projects, including public affairs
CT EIS Responsibility: Public Relations

20.0 LIST OF PREPARERS

Name: **Casey Cook**
Affiliation: Los Alamos Technical Associates
Education: B.S. Mechanical Engineering, University of New Mexico
Master's Candidate, Water Resources, University of New Mexico
Technical Experience: Experience in DoD Clean Air Act compliance and DoD/DOE Order compliance
CT EIS Responsibility: Regulatory Compliance/Utilities

Name: **Chris Del Signore**
Affiliation: Los Alamos Technical Associates
Education: B.S. Chemical Engineering, The Pennsylvania State University
MBA, University of Pittsburgh
M.S. Hazardous Waste Management, Idaho State University
Technical Experience: 15 years of experience in environmental issues, including permitting, waste management, and NEPA documents
CT EIS Responsibility: Air Quality/Global Warming/Noise

Name: **Kevin Doyle**
Affiliation: Tetra Tech, Inc.
Education: B.A. Sociology, University of California, Santa Barbara
Technical Experience: 14 years of experience in archaeology, cultural resources management, and NEPA documentation
CT EIS Responsibility: Cultural Resources, Document Manager, and Deputy Project Manager for CT EIS

Name: **David Flynn**
Affiliation: Tetra Tech, Inc.
Education: B.S. Geology, Southern Illinois University
Technical Experience: 19 years of experience in geology and 10 years in New Mexico geology and environmental investigations
CT EIS Responsibility: Geology and Soils

Name: **Steven Fong**
Affiliation: U.S. Department of Energy
Education: B.S. Mechanical Engineering, University of New Mexico
Technical Experience: 9 years of oversight of environmental compliance and monitoring
CT EIS Responsibility: Technical Advisor for Air Quality

20.0 LIST OF PREPARERS

Name:	**Steve Gorin**
Affiliation:	Los Alamos Technical Associates
Education:	B.A. Geology, Hamilton College M.S. Earth and Environmental Science, Wesleyan University
Technical Experience:	10 years of experience managing and implementing environmental investigations, including hydrogeologic investigations, preliminary site assessments, environmental baseline surveys, and geophysical studies
CT EIS Responsibility:	Water Resources

Name:	**Robert W. Hull**
Affiliation:	Los Alamos Technical Associates
Education:	B.S. Geology, Florida State University M.S. Geochemistry and Environmental Geology, Florida State University M.S. Environmental Engineering, Stanford University
Technical Experience:	30 years of DOE, DoD and DOI technical and managerial experience in environmental impact studies, environmental assessments, site characterizations, remedial investigations/feasibility studies, risk assessments and resource appraisals
CT EIS Responsibility:	Human Health, Technical Director for CT EIS

Name:	**Clifford J. Jarman**
Affiliation:	Tetra Tech, Inc.
Education:	B.S. Geology, University of New Mexico M.S. Geophysics, New Mexico Institute of Mining and Technology
Technical Experience:	13 years of experience in preparation of NEPA documents, NEPA compliance, management of environmental programs, and seismic risk assessments
CT EIS Responsibility:	Project Manager for CT EIS

Name:	**William Johns**
Affiliation:	Los Alamos Technical Associates
Education:	B.S. College of Geosciences, Texas A&M University Planning Certificate, University of Poitiers
Technical Experience:	20 years of experience with environmental investigations and planning studies
CT EIS Responsibility:	Land Use

20.0 LIST OF PREPARERS

Name: **Alan Karnovitz**
Affiliation: Tetra Tech, Inc.
Education: B.S. Biology of Natural Resources, University of California, Berkeley
M.P.P. (Master of Public Policy), University of Pennsylvania, Wharton School
Technical Experience: 15 years of experience in environmental and economic analysis
CT EIS Responsibility: Socioeconomics/Environmental Justice

Name: **Kenneth J. Martinez**
Affiliation: Los Alamos Technical Associates
Education: B.S. Environmental Economics
Technical Experience: Experience with DOE NEPA projects, including environmental restoration issues
CT EIS Responsibility: Environmental Restoration

Name: **Rebecca Martinez**
Affiliation: Los Alamos Technical Associates
Education: Business courses, New Mexico State University
Technical Experience: 4 years of business and office administration experience, including NEPA administrative experience
CT EIS Responsibility: Administrative Record Coordinator

Name: **Sara McQueen**
Affiliation: Tetra Tech, Inc.
Education: B.A. Economics, Wittenberg University
Technical Experience: 4 years of experience with socioeconomic impacts and environmental justice analysis for NEPA documentation
CT EIS Responsibility: Socioeconomics/Environmental Justice

Name: **Sue Mortier**
Affiliation: Consensus Planning
Education: B.S. Architecture, University of Wisconsin
M. Arch. Architecture, University of New Mexico
Technical Experience: 3 years of experience in visual resource analysis and inventory, 8 years of landscape architecture
CT EIS Responsibility: Visual Resources

20.0 LIST OF PREPARERS

Name: **John Nash**
Affiliation: Tetra Tech, Inc.
Education: B.A. Political Science, LaSalle University
Technical Experience: 5 years of experience in technical editing, including NEPA regulatory compliance
CT EIS Responsibility: Technical Editor

Name: **Donna L. Navarrete**
Affiliation: Tetra Tech, Inc.
Education: B.A. English (Professional Writing), University of New Mexico
Technical Experience: 15 years of experience in technical writing and editing, including environmental documentation and NEPA regulatory compliance
CT EIS Responsibility: NEPA Regulatory Compliance Assistant

Name: **John Ordaz**
Affiliation: U.S. Department of Energy
Education: B.S. Chemical Engineering, New Jersey Institute of Technology
Technical Experience: 20 years of experience, including over 8 years in DOE program management and NEPA compliance
CT EIS Responsibility: DOE Headquarters Program Manager

Name: **Charles C. Pergler**
Affiliation: Tetra Tech, Inc.
Education: B.S. Range and Wildlands Science, University of California, Davis
M.S. Range Management, University of California, Davis
Technical Experience: 14 years developing and implementing natural resource range plans, biological assessments, NEPA manager, and technical author
CT EIS Responsibility: Ecological Resources

Name: **Karen B. Pulliam**
Affiliation: MDM Services Corporation
Education: International Business College
Technical Experience: 13 years of word processing experience, including environmental and regulatory documentation
CT EIS Responsibility: Document Production, Word Processing and Formatting

20.0 LIST OF PREPARERS

Name:	**Katherine Roxlau**
Affiliation:	Tetra Tech NUS
Education:	B.A. Anthropology, Colorado College M.A. Anthropology, Northern Arizona University
Technical Experience:	12 years of experience in cultural resource management, archaeology, ethnography, and NEPA documentation
CT EIS Responsibility:	Cultural Resources

Name:	**Mark Sifuentes**
Affiliation:	U.S. Department of Energy
Education:	B.S. Biology M.S. Microbiology
Technical Experience:	28 years in NEPA compliance and biological sciences
CT EIS Responsibility:	Technical Advisor for Ecological and Cultural Resources Analysis

Name:	**Constance L. Soden**
Affiliation:	U.S. Department of Energy
Education:	B.A. Radiation Biophysics
Technical Experience:	23 years of experience in areas of occupational health and environmental protection
CT EIS Responsibility:	Technical Advisor

Name:	**Ada Suzanne Swanton**
Affiliation:	Los Alamos Technical Associates
Education:	B.S. Geology, University of Texas El Paso M.S. Geology, University of Texas El Paso
Technical Experience:	6 years of experience in environmental issues, including hydrology
CT EIS Responsibility:	Water Resources

Name:	**Theodore Taylor**
Affiliation:	U.S. Department of Energy
Education:	B.A. Political Science, Economics, Mathematics, Wichita State University M.A. Political Science, University of Kansas Ph.D. Economics, University of Kansas
Technical Experience:	19 years of environmental compliance with 9 years of Environmental Restoration Project oversight
CT EIS Responsibility:	Technical Advisor for Environmental Restoration

20.0 LIST OF PREPARERS

Name:	**Albert Thomas**
Affiliation:	Bohannan-Huston
Education:	B.S. Civil Engineering, New Mexico State University
Technical Experience:	7 years of experience in highway and roadway design, including interstate interchange reconstruction, urban arterial, intersection reconstruction, and multiple lane rural highways
CT EIS Responsibility:	Transportation

Name:	**Scott Truesdale, P.G.**
Affiliation:	Tetra Tech, Inc.
Education:	B.A. Environmental Science, University of Virginia
Technical Experience:	12 years of experience in site characterization, environmental programs, and NEPA analysis
CT EIS Responsibility:	Technical Reviewer

Name:	**Joseph Vozella**
Affiliation:	U.S. Department of Energy
Education:	B.S. Civil Engineering (MSCE), University of Lowell M.S. Business Administration, Florida Institute of Technology
Technical Experience:	20 years of project management; quality assurance; weapons/protective equipment design and production; and environmental, safety, and health management
CT EIS Responsibility:	Technical Advisor

Name:	**Julia Whitworth**
Affiliation:	Los Alamos Technical Associates
Education:	B.S. Chemistry, Transylvania University B.A. Math, Transylvania University M.S. Hydrogeology, New Mexico Institute of Mining and Technology
Technical Experience:	10 years experience in site-investigation, including authority ground water remediation projects
CT EIS Responsibility:	Water Resources

Name:	**Elizabeth Withers**
Affiliation:	DOE Los Alamos Area Office
Education:	B.S. Botany, Louisiana Tech University M.S. Life Sciences, Louisiana Tech University
Technical Experience:	16 years of experience in environmental investigations and regulatory compliance, including 7 years of direct NEPA compliance
CT EIS Responsibility:	DOE Document Manager for CT EIS

20.0 LIST OF PREPARERS

Name:	**Eric Wrage**
Affiliation:	Bohannan-Huston
Education:	B.S. Engineering, Northern Arizona University M.S. Civil Engineering/Traffic and Transportation Engineering, University of New Mexico
Technical Experience:	Experience with traffic impact and corridor studies and alignment analyses
CT EIS Responsibility:	Transportation

21.0 LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS TO WHOM COPIES OF THIS EIS HAVE BEEN SENT

United States Senate

The Honorable Jeff Bingaman
Ranking Minority Member
Subcommittee on Strategic Forces
Committee on Armed Services

The Honorable Pete V. Domenici
Chairman
Subcommittee on Energy and Water Development
Committee on Appropriations

The Honorable Harry Reid
Ranking Minority Member
Subcommittee on Energy and Water Development
Committee on Appropriations

The Honorable Robert Smith
Chairman
Subcommittee on Strategic Forces
Committee on Armed Services

U.S. House Of Representatives

The Honorable Pete Visclosky
Ranking Minority Member
Subcommittee on Energy and Water Development
Committee on Appropriations

The Honorable Duncan Hunter
Chairman
Subcommittee on Military Procurement
Committee on National Security

The Honorable Ron Packard
Chairman
Subcommittee on Energy and Water Development
Committee on Appropriations

The Honorable Tom Udall

The Honorable Heather Wilson

The Honorable Joe Skeen

The Honorable Norman Sisisky
Ranking Minority Member
Subcommittee on Military Procurement
Committee on National Security

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
Department of Defense
Department of the Interior
Department of Justice
Office of Management and Budget
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Nuclear Regulatory Agency

Federally Recognized Native American Tribes

Hopi Tribe
Pueblo of Acoma
Pueblo of Cochiti
Pueblo of Isleta
Pueblo of Jemez
Jicarilla Apache Tribe
Pueblo of Laguna
Mescalero Apache Tribe
Pueblo of Nambe
Navajo Nation
Pueblo of Picuris
Pueblo of Pojoaque
Pueblo of Sandia
Pueblo of San Felipe
Pueblo of San Ildefonso
Pueblo of San Juan
Pueblo of Santa Ana
Pueblo of Santa Clara
Pueblo of Santo Domingo
Pueblo of Taos
Pueblo of Tesuque
Pueblo of Zia
Pueblo of Zuni

21.0 LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS TO WHOM COPIES OF THIS EIS HAVE BEEN SENT

Tribal Organizations

All Indian Pueblo Council
Eight Northern Indian Pueblo Council
Five Sandoval Indian Pueblo, Inc.
Hopi Tribe Cultural Preservation Office
LAAP
Navajo Nation Historic Preservation Dept.
Northern Pueblos Agency, BIA

New Mexico State Government

New Mexico Department of Game and Fish
New Mexico Environment Department
Office of the Governor
State Historic Preservation Office(r)

Cooperating Agencies

Bandelier National Monument
Bureau of Indian Affairs
Bureau of Land Management
Incorporated County of Los Alamos
Pueblo of San Ildefonso
Santa Fe National Forest

Local Government

Incorporated County of Los Alamos
Rio Arriba County

Companies and Organizations

Albuquerque Center for Peace and Justice
Albuquerque Journal North
Alliance for Nuclear Accountability
American Friends Service Committee
Arms Control and Disarmament Agency
Citizen Alert
Citizens for Alternatives to Radioactive Dumping
Concerned Citizens for Nuclear Safety
Defense Nuclear Safety Board
Government Accountability Project
Greenpeace
Idaho National Engineering and Environmental Laboratory Citizens Advisory Board
Institute for Energy and Environmental Research
Institute for Science and International Security
La Communidad
LANL Outreach Center & Reading Room
League of Women Voters
Los Alamos National Laboratory
Los Alamos Study Group
Mesa Public Library
National Audubon Society
National Parks and Conservation Association
Natural Resources Defense Council
The Nature Conservancy
The New Mexican
New Mexico Alliance
New Mexico Environmental Law Center
New Mexico Green Party
Northern New Mexico Citizens' Advisory Board
People for Peace
Physicians for Social Responsibility
Plutonium Challenge
Responsible Environmental Action League
Rural Alliance for Military Accountability
The Sanctuary Foundation
The Sierra Club
Southwest Research and Information Center
Tribal Environmental Watch Alliance
Zimmerman Library, University of New Mexico

Individuals

New Mexico

Tom Alexander
Jody Benson
Ralph Barr
Bonnie Bonneau
David Bouquin
Jim Brannon
Harry Clifford
Jane S. Cooper
Lisa Fox
Dolores Garcia
John Geddie

21.0 LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS TO WHOM COPIES OF THIS EIS HAVE BEEN SENT

Gregg Giesler
Terry Johnson
Steve Koch
Donald A. McClure
Carmen Rodriguez
Mario Schillaci
Michael Smith
Steve and Barbara Stoddard
Catherine Thayer
Rebecca Trujillo
Bob Vocke

Others

Steve Craig, CA
Paul Dunigan, WA
H. Paul Friesema, IL
Glenn Hanson, NV
Joe Masco, OR
Candida Neal, CA
Richard H. Powell, NY
Trish Powell, CO
Carol Sykes, CO
Celeste Werner, AZ

22.0 GLOSSARY

Accident. An unexpected or undesirable event. In this context, accidents may lead to the release of hazardous material within a facility or into the environment, exposing workers or the public to hazardous materials or radiation.

Accord Pueblos. Four Pueblos that have each executed formal accord documents with the DOE setting forth the government-to-government relationship between each of the Pueblos and the DOE. The four Pueblos are Cochiti, San Ildefonso, Santa Clara, and Jemez.

Advisory Council of Historic Preservation (Council). An independent 19-member Federal council created by the *National Historic Preservation Act* of 1996, Title II (16 United States Code [U.S.C.] §470 et seq.). Under Section 106, the Council must be afforded the opportunity to comment on undertakings that affect National Register of Historic Places (NRHP)-eligible properties.

Air pollutant. Any substance in air that could, if in high enough concentration, harm humans, other animals, or vegetation.

Air quality standards. The level of "criteria" pollutants in the air prescribed by regulations that may not be exceeded during a specified time in a defined area.

Ambient air. That portion of the atmosphere, external to buildings, to which the general public is exposed.

Aquifer. Rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to conduct groundwater.

Archaeological sites (resources). Any location where humans have altered the terrain or left material remains (artifacts) during prehistoric or historic times.

Artifact. An object of archaeological or historical interest produced or shaped by human workmanship.

Atomic Energy Commission. A five-member commission, established by the *Atomic Energy Act* of 1946, to supervise nuclear weapons design, development, manufacturing, maintenance, modification, and dismantlement. In 1974, the Atomic Energy Commission was abolished and all functions were transferred to the U.S. Nuclear Regulatory Commission and the Administrator of the Energy Research and Development Administration. The Energy Research and Development Administration was later terminated and its functions vested by law in the Administrator were transferred to the Secretary of Energy.

Background radiation. Radiation from (1) naturally occurring radioactive materials that have not been technologically enhanced, (2) cosmic sources, (3) global fallout as it exists in the environment (such as from the testing of nuclear explosive devices), (4) radon and its progeny in concentrations or levels existing in buildings or the environment that have not been elevated as a result of current or past human activities, and (5) consumer products containing nominal amounts of radioactive material or producing nominal levels of radiation (10 Code of Federal Regulations [CFR] 835.2).

Baseline. A quantitative expression of conditions, costs, schedule, or technical progress to serve as a base or standard for measurement during the performance of an effort; the established plan against which the status of resources and the progress of a project can be measured. For the CT EIS, the environmental baseline is the site environmental conditions that are considered representative for the purpose of projecting future impacts.

22.0 GLOSSARY

Beryllium. An extremely lightweight and strong metal used in weapons systems.

Biota. Living organisms, including plants and animals.

Bounding. A credible upper limit to consequences or impacts.

Bounding analysis. An analysis designed to overestimate or determine an upper limit to potential impacts or risks.

"Bound the impacts." The use of assumptions and analytical methods in an analysis of impacts or risks such that the result overestimates or describes an upper limit on ("bounds") potential impacts or risks.

Caldera. A large crater formed by the collapse of the central part of a volcano.

Cancer. The name given to a group of diseases characterized by uncontrolled cellular growth with cells having invasive characteristics such that the disease can transfer from one organ to another.

Capability. The combination of equipment, facilities, infrastructure, and expertise required to undertake types or groups of activities and implement mission element assignments.

Capacity. The maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions.

Cavate Pueblo. Structure making use of natural rock to form the sides of a single structure or group of buildings, frequently by hollowing out the interior space.

Cesium. A silver-white alkali metal. A radioactive isotope of cesium, cesium-137, is a common fission product.

Climatology. The characteristics of the weather over a period of time. The science of climatology addresses the causes, distribution, and effects of weather on the environment and humans.

Code of Federal Regulations (CFR). All Federal regulations in force are published in codified form in the Code of Federal Regulations.

Cold War period. The historic period from 1949 to 1989, characterized by international tensions and nuclear armament buildup, especially between the United States and the U.S.S.R. The era began approximately at the end of World War II when the *Atomic Energy Act* was passed, establishing the Atomic Energy Commission, and ended with the dissolution of the U.S.S.R. into separate republics and the ending of large-scale nuclear weapons production in the United States.

Collective dose. The sum of the total effective dose equivalent (TEDE) values of all individuals in a specified population. Collective dose is expressed in units of person-rem (or person-sievert) (10 CFR 835).

Collector street. The collector street system provides both land access service and traffic circulation within residential neighborhoods and commercial and industrial areas

Community (biotic). All plants and animals occupying a specific area and their relationships.

Consideration. A contract term in real estate defined as that which is received by the grantor in exchange for his or her deed; something of value that induces a person to enter into a contract. Consideration is most commonly given in the form of currency.

Contamination. The deposition or discharge of chemicals, radionuclides, or particulate matter above a given threshold, usually associated with an effects level onto or into environmental media, structures, areas, objects, personnel, or nonhuman organisms.

22.0 GLOSSARY

Convey. As used in this CT EIS, refers to the disposition of land parcels away from Federal Government Ownership.

Cooperating Agency. As defined by the Council on Environmental Quality regulations for implementing the NEPA, any Federal agency other than a lead agency that has jurisdiction by law of special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action. The selection and responsibilities of a Cooperating Agency are described in 40 CFR §1501.6. A State or local agency of similar qualifications or, when the effects are on a reservation, a Native American tribe, may by agreement with the lead agency become a Cooperating Agency (40 CFR 1508.5).

Credible accident. An accident that has a probability of occurrence greater than or equal to once in a million years.

Criteria of adverse effect. Regulations in 36 CFR Parts 800.5(a)(1) and 800.9(b) and Section 106 of the *National Historic Preservation Act* (16 U.S.C. §470 *et seq.*) that provide guidelines for determining the kind and intensity of effect to an NRHP-eligible cultural resource.

Criteria pollutant. Six air pollutants for which National Ambient Air Quality Standards are established by the U.S. Environmental Protection Agency: sulfur dioxide, nitric oxides, carbon monoxide, ozone, particulate matter-10 (smaller than 10 microns in diameter), and lead.

Cultural resource site. The specific place or location of regular human occupation or use.

Cultural resources survey. A systematic inventory of an area to identify cultural resources.

Cultural resources. Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. Cultural resources include expressions of human culture and history in the physical environment such as prehistoric or historic sites, buildings, structures, objects, districts, or other places including natural features and biota which are considered to be important to a culture, subculture, or community. Cultural resources also include traditional lifeways and practices, and community values and institutions.

Cumulative impacts. The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal), private industry, or individuals undertake such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7).

Debitage. The refuse flakes created when stone tools are manufactured.

Decay (radioactive). The decrease in the amount of any radioactive material with the passage of time, due to the spontaneous transformation of an unstable nuclide into a different nuclide or into a different energy state of the same nuclide; the emission of nuclear radiation (alpha, beta, or gamma radiation) is part of the process.

Decibel, A-weighted (dBA). A unit of weighted sound pressure level measured by the use of a metering characteristic and the "A" weighting specified by the American National Standards Institute (S1.4-1971[R176]).

Decibel (dB). A unit of sound measurement. In general, a sound doubles in loudness for every increase of 10 decibels.

Decommissioning. As used in the CT EIS, the process of decontamination, disassembly, and storage or disposal in a manner and state that assures future exposure of humans and the environment would be at acceptable levels.

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Decontamination. The removal or reduction of radioactive or chemical contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.

Deposition. In geology, the laying down of potential rock-forming materials (sedimentation). In atmospheric sciences, the collection and retention of airborne particulates of gases on any solid or liquid surface (called dry deposition), or their removal from the air by precipitation (called wet deposition or precipitation scavenging).

Dispersion. The downwind spreading of a plume by turbulence and meander in wind direction, resulting in a plume of lower concentration over a larger area.

Disposal. The process of placing waste in a final repository.

Distance zones. The relative visibility from travel routes or observation points.

DOE orders. DOE directives that promulgate requirements and policies to DOE employees and contractors, including requirements to comply with other laws and regulations.

Dose (or radiation dose). The amount of energy deposited in body tissue as a result of radiation exposure. Various technical terms, such as absorbed dose, collective dose, dose equivalent, and effective dose equivalent, are used to evaluate the amount of radiation an exposed person receives. Each of these terms is defined in this glossary.

Dose equivalent. The product of absorbed dose in rad (or gray) in tissue, a quality factor, and other modifying factors. Dose equivalent is expressed in units of rem (or sievert) (1 rem = 0.01 sievert) (10 CFR 835.2).

Dosimeter. A device, instrument, or system that measures radiation dose (for example, film badge or ionization chamber).

Drawdown. The height difference between the natural water level in a formation and the reduced water level in the formation caused by the withdrawal of groundwater.

Drinking-water standards. The prescribed level of constituents or characteristics in a drinking water supply that cannot be exceeded legally.

Ecosystem. Living organisms and their nonliving (abiotic) environment functioning together as a community.

Ecotone. Transition zone between two adjacent distinct plant or animal communities.

Effective dose equivalent (EDE). The summation of the products of the dose equivalent received by specified tissues or organs of the body and the appropriate weighting factor. It includes the dose from radiation sources internal and/or external to the body. The effective dose equivalent is expressed in units of rem (or sievert) (10 CFR 835.2).

Effluent. Liquid or gaseous waste streams discharged into the environment.

Eligible cultural resource. A cultural resource that has been evaluated and reviewed by an agency and the State Historic Preservation Office(r) and recommended as eligible for inclusion in the National Register of Historic Places, based on the criteria of significance.

Eligible properties. Eligible properties (or historic properties) are cultural resources that meet the requirements for listing on the National Register of Historic Places (NRHP). The effects of Federal actions on eligible properties must be assessed by agencies, and consultation is required to avoid, reduce, or minimize adverse effects.

Emission standards. Legally enforceable limits on the quantities and/or kinds of air contaminants that can be emitted into the atmosphere.

Endangered species. Plants and animals or other living organisms in danger of extinction by human-produced or natural changes in their environment. Requirements for declaring a species endangered are contained in the *Endangered Species Act* of 1973.

Environmental assessment (EA). A written environmental analysis that is prepared pursuant to the *National Environmental Policy Act* to determine whether a major Federal action could significantly affect the environment and thus require preparation of an environmental impact statement. If the action would not significantly affect the environment, then a finding of no significant impact is issued.

Environmental impact statement (EIS). A document required of Federal agencies by the *National Environmental Policy Act* for proposals for legislation or major Federal actions significantly affecting the quality of the human environment. A tool for decision making, it describes the positive and negative environmental impacts of the proposed action and alternative actions.

Environmental justice. A requirement of Executive Order 12898 for Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental impacts of Federal programs, policies, and activities on minority or low-income populations.

Environmental monitoring. The process of sampling and analysis of environmental media in and around a facility being monitored for the purpose of (1) confirming compliance with performance objectives and (2) early detection of any contamination entering the environment to facilitate timely remedial action.

Ephemeral stream. A stream that flows only after a period of heavy precipitation.

Epicenter. The point on the Earth's surface directly above the focus of an earthquake.

Epidemiology. The science concerned with the study of events that determine and influence the frequency and distribution of disease, injury, and other health-related events and their causes in defined human populations.

Ethnographic. Information about cultural beliefs and practices.

Exposure limit. The legal limit of accumulated exposure (to ionizing radiation, nonionizing radiation, noise, chemicals, or other hazardous substances).

Fault. A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred.

Fee title. A contract term in real estate that means the holder is entitled to all rights incident to the property. There are no time limitations on its existence (it is said to run forever). The ownership of the land by a fee holder is complete and free of State domination (except the rights of the State of taxation, police power, and eminent domain).

Finding of no significant impact (FONSI). A document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and will not require an environmental impact statement.

Formation. In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.

Fugitive emissions. Emissions to the atmosphere from pumps, valves, flanges, seals, and other process points not vented through a stack. Also includes emissions from area sources such as ponds, lagoons, landfills, and piles of stored material.

Geology. The science that deals with the Earth, the materials, processes, environments, and history of the planet, including the rocks and their formation and structure.

Groundwater. Water below the ground surface in a zone of saturation.

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Hazardous material. A material, including a hazardous substance, as defined by 49 CFR 171.8 that poses a risk to health, safety, and property when transported or handled.

Hazardous waste. A solid waste that, because of its quantity, concentration, or physical chemical or infectious characteristics, may significantly contribute to an increase in mortality; or may pose a potential hazard to human health or the environment when improperly treated, stored, or disposed. The *Resource Conservation and Recovery Act* (RCRA) defines a "solid" waste as including solid, liquid, semisolid, or contained gaseous material (42 U.S.C. 6901 *et seq*.). By definition, hazardous waste has no radioactive components.

Historic context. A planning unit that is based on a shared theme, specific time period, and/or geographical area. Historical contexts are developed for predicting the types of cultural resources that may be present, the activities that may have taken place in the area, and determining the role individual cultural resources played in expressing or demonstrating the shared theme, time period, and/or geographic area. The evaluation process uses the historic context to identify data deficits and to determine the relative significance of particular cultural resources.

Historic district. A significant concentration, linkage, or continuity of sites, buildings, structures, or objects historically or aesthetically united by plan or physical development and eligible for inclusion in the National Register of Historic Places because of cultural significance.

Historic properties. Historic properties (or eligible properties) are cultural resources that meet specific criteria for eligibility for inclusion in the National Register of Historic Places (NRHP). The effects of Federal actions on historic properties must be assessed by agencies and consultation is required to avoid, reduce or minimize adverse effects.

Historic resources. Historic resources include the material remains and landscape alterations that have occurred since the arrival of Europeans in the region.

Homesteaders. A person or people who settle in an area of wilderness; an individual who settles on U.S. public land by filing a record and living on and cultivating the land under the homestead law; a person who establishes a colony or settles as a colonist in a new area.

Hunter-gatherers. A nomadic way of life where small bands of people exploit plant and animal resources sequentially, following seasonal availability.

Hydrology. The science dealing with the properties, distribution, and circulation of water on and below the Earth's surface and in the atmosphere.

Infrastructure. The basic services, facilities, and equipment needed for the functioning and growth of an area.

Integrity. Integrity is an assessment of the authenticity and survival of physical characteristics that existed during the property's period of significance. In order for a property to be eligible for listing on the National Register of Historic Places, the resource must retain most, if not all, aspects of integrity: location, design, setting, workmanship, material, and association.

Interim (permit) status. Period during which treatment, storage, and disposal facilities coming under the *Resource Conservation and Recovery Act* of 1980 are temporarily permitted to operate while awaiting denial or issuance of a permanent permit.

Ionizing radiation. Radiation with sufficient energy to displace electrons from atoms or molecules, thereby producing ions.

Isotope. Nuclei of the same element with different numbers of neutrons are isotopes of the element. Isotopes have the same chemical properties but may have different radioactive properties.

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Latent cancer fatality (LCF). Death from cancer resulting from, and occurring some years after, exposure to excess ionizing radiation or other carcinogens.

Level of service (LOS). A qualitative measure that characterizes operational conditions within a traffic stream and the perception by motorists and passengers of conditions. Six levels of service are defined, from LOS A, representing the best operating conditions to LOS F, the worst.

Lithic scatter. Concentrations of stones showing evidence of human manufacturing of stone tools, including finished artifacts, roughly formed artifacts, the cores of stone from which they were made, and the waste flakes from the tool manufacturing process.

Lithic. Stone, rock.

Local street. A local street primarily permits direct access to abutting lands and connections to higher order systems (collectors and arterials).

Low-income population. Community in which 25 percent or more of the population is characterized as living in poverty. The CT EIS uses the U.S. Bureau of the Census 1990 data to establish poverty thresholds; the 1990 poverty threshold for unrelated individuals was a 1989 income of $6,451 for those under age 65; $5,947 for those age 65 and older; and $12,674 for a family of four.

Low-level radioactive mixed waste (LLMW). Waste that contains both hazardous and low-level radioactive components. The hazardous component in LLMW is subject to regulation under the RCRA.

Low-level radioactive waste (LLW). All radioactive waste that is not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or "11e(2) by-product material" as defined by DOE Order 5820.2A, Radioactive Waste Management. By-product material includes tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level radioactive waste, provided that the concentration of transuranic waste is less than 100 nanocuries per gram.

Major arterial. Major arterials are roads that serve the major centers of activity, the highest traffic volume corridors, and the longest trips.

Maximally exposed individual (MEI). A hypothetical person whose location and habits result in the highest concentration or exposure and who takes no protective actions to lessen his or her exposure.

Meteorology. The science dealing with the atmosphere and its phenomena, especially as relating to weather.

Migration. The natural movement of a material through the air, soil, or groundwater; also, seasonal movement of animals from one area to another.

Migratory Bird Treaty Act. This act states that it is unlawful to pursue, take, attempt to take, capture, possess, or kill any migratory bird, or any part, nest, or egg of any such bird other than permitted activities.

Minority population. Area where minority individuals comprise 25 percent or more of the population. Minority refers to people who classified themselves in the 1990 U.S. Census as African Americans, Asian or Pacific Islanders, Native Americans (American Indians), Hispanics of any race or origin, or other non-White races.

Mitigation. The alleviation of adverse impacts on resources by avoidance, by limiting the degree or magnitude of an action, by repair or restoration, by preservation and maintenance that reduces or eliminates the impact, or by replacing or providing substitute resources or environments.

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Mixed waste. See low-level radioactive mixed waste.

National Ambient Air Quality Standards (NAAQS). Air quality standards established by the *Clean Air Act*, as amended. The primary NAAQS are intended to protect the public health with an adequate margin of safety, and the secondary NAAQS are intended to protect the public from any known or anticipated adverse effects of a pollutant.

National Environmental Research Park. An outdoor laboratory set aside for ecological research to study the environmental impacts of energy developments. National environmental research parks were established by the DOE to provide protected land areas for research and education in the environmental sciences and to demonstrate the environmental compatibility of energy technology development and use.

National Pollutant Discharge Elimination System (NPDES). Federal permitting system required for hazardous effluents regulated through the *Clean Water Act*, as amended.

National Pollutant Discharge Elimination System Permit. Federal regulation (40 CFR Parts 122 and 125) requires permits for the discharge of pollutants from any point source into the waters of the United States regulated through the *Clean Water Act*, as amended.

National Register of Historic Places (NRHP). A list of districts, sites, buildings, structures, and objects of prehistoric or historic local, state, or national significance maintained by the Secretary of the Interior. The list is expanded as authorized by Section 2(b) of the *Historic Sites Act* of 1935 (16 U.S.C. §462) and Section 101(a)(1)(A) of the *National Historic Preservation Act* of 1966, as amended.

NRHP eligibility. The criteria of significance in American history, architecture, archeology, engineering, and culture. The criteria require integrity and association with lives or events, distinctiveness for any of a variety of reasons, or importance because of information the property does or could hold.

Native American. A tribe, people, or culture that is indigenous to the United States. Also referred to as American Indians.

Natural event accidents. Accidents that are initiated by events such as earthquakes, tornadoes, floods, etc.

Noise. Unwanted or undesirable sound, usually characterized as being so loud as to interfere with, or be inappropriate to, normal activities such as communication, sleep, study, or recreation.

Nonattainment area. An air quality control region (or portion thereof) in which the EPA has determined that ambient air concentrations exceed National Ambient Air Quality Standards (NAAQS) for one or more criteria pollutants.

Noncriteria pollutant. A pollutant with an effects screening level guideline. Some noncriteria pollutants have a state standard as well.

Offsite. As used in the CT EIS, the term denotes a location, facility, or activity occurring outside of the boundary of the entire LANL site.

Onsite. As used in the CT EIS, the term denotes a location or activity occurring somewhere within the boundary of the LANL site.

Outfall. The discharge point of a drain, sewer, or pipe as it empties into a body of water.

Paleontological resources. Fossils, including those of microbial, plant, or animal origin.

Paleontology. A science dealing with life of past geological periods as known from fossil remains.

Perched aquifer. Groundwater separated from the underlying main body of groundwater, or aquifer, by unsaturated rock.

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Perched groundwater. A body of groundwater of small lateral dimensions lying above a more extensive aquifer.

Perennial. Acting or lasting throughout the year or through many years (perpetual).

Permeability. The degree to which or rate at which a fluid or gas can pass through a substance.

Person-rem. A redundancy meaning a dose of 1 rem. When used with a collective dose or population dose, it is a unit for expressing the dose when integrated across all people in the population.

Physical setting. The land and water form, vegetation, and structures that compose the landscape.

Plume. The elongated pattern of contaminated air or water originating at a point source, such as a smokestack or a hazardous waste disposal site.

Plutonium. A heavy, radioactive, metallic element with the atomic number 94. It is produced artificially in a reactor by bombardment of uranium with neutrons and is used in the production of nuclear weapons.

Pollution prevention. Involves recycling or reduction of any hazardous substance, pollutant, or contaminate before generation, along with practices that protect natural resources through conservation or more efficient use.

Population dose. See "collective dose."

Potable. Suitable for drinking.

Potential release site (PRS). Areas that have been designated by the LANL Environmental Restoration Project as having actual, suspected, or potential releases of contamination.

Prehistoric resources. Prehistoric cultural resources refer to any material remains, structures, and items used or modified by people before the establishment of a European presence in the upper Rio Grande Valley in the early 17th Century.

Programmatic environmental impact statement (PEIS). A broad-scope EIS prepared in accordance with the requirements of 102(2)(C) of the NEPA that analyzes the environmental impacts of proposed Federal policies or programs that involve multiple decisions potentially affecting the environment at one or more sites.

Project-specific environmental impact statement. An EIS prepared in accordance with the requirements of 102(2)(C) of the NEPA that evaluates the environmental impacts of a single proposed action. See "Environmental impact statement."

Protected area. An area encompassed by physical barriers, subject to access controls, surrounding material access areas, and meeting the standards of DOE Order 5632.1C, Protection and Control of Safeguards and Security Interests.

Pueblo. The communal dwelling of a Native American village of Arizona, New Mexico, or adjacent areas, consisting of contiguous flat-roofed stone or adobe houses in groups, sometimes several stories high; a Native American village of the southwestern United States; a member of a group of Native American people of the southwestern United States.

Rad. See "Radiation absorbed dose."

Radiation absorbed dose (rad). The basic unit of absorbed dose equal to the absorption of 0.01 joule per kilogram of absorbing material.

Radiation. As used in the CT EIS, means ionizing radiation. The emitted particles or photons from the nuclei of radioactive atoms.

Radioactive waste. Materials from nuclear operations that are radioactive or are contaminated with radioactive materials, and for which use, reuse, or recovery are impractical.

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Radioactive. The state of emitting radiation energy in forms of waves (rays) or particles.

Radioactivity. The spontaneous decay or disintegration of unstable atomic nuclei accompanied by the emission of radiation.

Radioisotopes. See “Isotope.”

Radionuclide. Any radioactive element.

Radon. A heavy gaseous, radioactive element with a half life of about 4 days from the decay of radium.

Raptor. Birds of prey including various types of hawks, falcons, eagles, vultures, and owls.

Recharge. Replenishment of water to an aquifer.

Record of decision (ROD). A document prepared in accordance with the requirements of 40 CFR 1505.2 that provides a concise public record of the DOE’s decision on a proposed action for which an EIS was prepared. A ROD identifies the alternatives considered in reaching the decision, the environmentally preferable alternative(s), factors balanced by the DOE in making the decision, whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why they were not.

Region of influence (ROI). Region in which the principal direct and indirect socioeconomic effects of actions are likely to occur and are expected to be of consequence for local jurisdictions.

Reliability. The ability of a nuclear weapon, weapon system, or weapon component to perform its required function under stated conditions for a specified period of time (essentially equivalent to performance).

Rem (Roentgen equivalent man). The conventional unit or radiation dose equivalent. A unit of individual dose of absorbed ionizing radiation used to measure the effect on human tissue. The dosage of an ionizing radiation that will cause the same biological effect as one roentgen of x-ray or gamma-ray exposure.

Remediation. Remediation is defined as the process of remedying a site where a hazardous substance release has occurred. Remedial actions (most often concerned with contaminated soil and groundwater, and decontamination and decommissioning) are responsibilities of the LANL Environmental Restoration Project.

Restoration. Restoration is defined as the assessment and cleanup of both contaminated (radioactive and/or hazardous substances) DOE-owned facilities in use and of DOE sites that are no longer a part of active operations.

Risk assessment (chemical or radiological). The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific chemical or radiological materials.

Risk. A quantitative or qualitative expression of possible loss that considers both the probability that a hazard will cause harm and the consequences of that event.

Roentgen equivalent man (rem). See “Rem.”

Roentgen. A unit of exposure to ionizing x-ray or gamma radiation equal to 2.58 x 10^{-4} coulomb per kilogram. (A coulomb is a unit of electrical charge.) A roentgen is approximately equal to 1 rad.

Runoff. The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and may eventually enter streams.

Sanitary wastes. Liquid or solid (includes sludge) wastes that are not hazardous or radioactive and that are generated by industrial, commercial, mining, or agricultural operations or from community activities.

Scenic class. A scenic class represents the relative value of visual resources and provides a basis for considering visual values during the site planning process. Class I represents very high public value. Class II represents high public value. Class III represents a moderate public value. Class IV is considered to be of low public value.

Scenic quality. The measure of the visual appeal of a tract of land. Scenic quality is the measure of the visual appeal of a tract of land, which is determined using seven key factors: landforms, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

Scope. In a document prepared pursuant to the NEPA, the range of actions, alternatives, and impacts to be considered.

Scoping. Involves the solicitation of comments from interested people, groups, and agencies at public meetings, public workshops, in writing, electronically, or via fax to assist the DOE in defining the proposed action, identifying alternatives, and developing preliminary issues to be addressed in an environmental impact statement.

Section 106 process. A *National Historic Preservation Act* (16 U.S.C. §470 *et seq.*) review process used to identify, evaluate, and protect cultural resources eligible for nomination to the National Register of Historic Places that may be affected by Federal actions or undertakings.

Sedimentation. The settling out of soil and mineral solids from suspensions under the force of gravity.

Seismic zone. Geographic region that is assumed to possess uniform earthquake potential throughout.

Seismic. Pertaining to any earth vibration, especially an earthquake.

Seismicity. Occurrence of earthquakes in space and time.

Sensitivity levels. The measure of public concern for scenic quality.

Setting. The physical environment of a property.

Settlement patterns. The distribution of archaeological sites within a given geographical region, arranged by cultural conditions or environmental necessity.

Severe accident. An accident with a frequency rate of less then 10^{-6} per year that would have more severe consequences than a design-basis accident, in terms of damage to the facility, offsite consequences, or both.

Sewage. The total of organic waste and wastewater generated by an industrial establishment or a community.

Site-wide environmental impact statement (SWEIS). A type of programmatic EIS that analyzes the environmental impacts of all or selected functions at a DOE site. As part of its regulations for implementation of the NEPA, the DOE prepares site-wide EISs for certain large, multiple-facility DOE sites; it may prepare EISs or EAs for other sites to assess the impacts of all or selected functions at those sites (10 CFR 1021.330[c]).

Socioeconomics. The social and economic condition in the study area.

Solid waste management unit (SWMU). Any unit from which hazardous constituents may migrate, as defined by the *Resource Conservation and Recovery Act*. A designated area that is or is suspected to be the source of a release of hazardous material into the environment that will require investigation and/or corrective action.

Source term. The quantity of material released and parameters (such as exhaust temperature) that determine the downwind concentration, given a specific meteorological dispersion condition.

Species of concern. Includes species that are considered to be potential candidates for addition to the List of Endangered Species (50 CFR 17) by the Federal agency responsible for *Endangered Species Act* compliance oversight, the U.S. Fish and Wildlife Service. These are primarily species for which there is insufficient information on biological vulnerability and threat to warrant legal protection.

State Historic Preservation Office(r) (SHPO). A position in each U.S. state that coordinates state participation in the implementation of the *National Historic Preservation Act* (16 U.S.C. §470 *et seq*.). The SHPO is a key participant in the Section 106 process, reviewing the identification of eligible resources and evaluation of effects of undertakings, and assisting in the development of mitigation measures or management plans to reduce any adverse effects to eligible cultural resources.

Strike. The direction or trend that a structural surface (for example, a bedding or fault plane) takes as it intersects the horizontal.

Surface water. Water on the Earth's surface, as distinguished from water in the ground (groundwater).

Threatened species. Animals, plants, or other living organisms threatened with extinction, serious depletion, or destruction of critical habitat by human-produced or natural changes in their environment. Requirements for declaring species threatened are contained in the *Endangered Species Act* of 1973.

Total effective dose equivalent (TEDE). The sum of the effective dose equivalent from external exposures and the committed effective dose equivalent from internal exposures (10 CFR 835).

Toxic waste. Individual chemical wastes (liquid or solid), such as polychlorinated biphenyls or asbestos, that are regulated by the *Toxic Substances Control Act*.

Traditional cultural properties (TCPs). Traditional cultural properties are places associated with the cultural practices or beliefs of a living community. These sites are rooted in the community's history and are important in maintaining cultural identity.

Traditional lifeways. The religious, social, economic, or institutional aspects of a group's life that have been passed on and continued through time.

Transfer. As used in this CT EIS, refers to the disposition of land parcels to another Federal Government agency, with the retention of ownership by the Federal Government.

Tritium. A radioactive isotope of the element hydrogen with two neutrons and one proton. Common symbols for the isotope are H–3 and T.

Undetermined resources. Undetermined resources are those for which eligibility for listing on the NRHP cannot be determined based on current knowledge of the resource and where further work is needed to make an evaluation. Resources that may be present in an area but that have not been identified, including buried archaeological sites, buildings or structures, and TCPs also are undetermined resources. Undetermined resources are treated as eligible until a formal evaluation is completed.

Visual Resource Inventory Class. Scenic quality, distance zones, and sensitivity levels combine to establish Visual Resource Inventory Classes, which in turn provide the basis for considering visual values and objectives in the planning or management process.

Waste management. The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste, as well as associated pollution prevention, surveillance, and maintenance activities.

Weapons laboratories. Colloquial term for the three DOE national laboratories—Los Alamos, Lawrence Livermore, and Sandia—that are responsible for the design, development, and stewardship of U.S. nuclear weapons.

22.0 GLOSSARY

Wetland. Land or area exhibiting hydric (requiring considerable moisture) soil concentrations, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions.

Wind rose. A depiction of wind speed and direction frequency for a given period of time.

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APPENDIX A PUBLIC LAW 105-119

This appendix contains the text of Public Law 105-119, which was passed by Congress on November 26, 1997.   Public Law 105-119, the "Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act," 1998 (section 632, 42 United States Code [U.S.C.] §§2391; "the Act"), directs the DOE to convey or transfer parcels of DOE land in the vicinity of LANL to the Incorporated County of Los Alamos, New Mexico, and the Secretary of the Interior, in trust for the Pueblo of San Ildefonso. The Act sets forth the criteria, processes and dates by which the tracts will be selected, titles to the tracts reviewed, environmental issues evaluated, and decisions made as to the allocation of the tracts between the two recipients defined in the Act.

APPENDIX A PUBLIC LAW 105-119

H.R.2267
Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1998 (Enrolled Bill [Sent to President])

SEC. 632. (a) IN GENERAL- The Secretary of Energy shall--

(1) convey, without consideration, to the Incorporated County of Los Alamos, New Mexico (in this section referred to as the ‘County’), or to the designee of the County, fee title to the parcels of land that are allocated for conveyance to the County in the agreement under subsection (e); and

(2) transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso (in this section referred to as the ‘Pueblo’), administrative jurisdiction over the parcels that are allocated for transfer to the Secretary of the Interior in such agreement.

(b) PRELIMINARY IDENTIFICATION OF PARCELS OF LAND FOR CONVEYANCE OR TRANSFER- (1) Not later than 90 days after the date of enactment of this Act, the Secretary of Energy shall submit to the congressional defense committees a report identifying the parcels of land under the jurisdiction or administrative control of the Secretary at or in the vicinity of Los Alamos National Laboratory that are suitable for conveyance or transfer under this section.

(2) A parcel is suitable for conveyance or transfer for purposes of paragraph (1) if the parcel--

(A) is not required to meet the national security mission of the Department of Energy or will not be required for that purpose before the end of the 10-year period beginning on the date of enactment of this Act;

(B) is likely to be conveyable or transferable, as the case may be, under this section not later than the end of such period; and

(C) is suitable for use for a purpose specified in sub-section (h).

(c) REVIEW OF TITLE- (1) Not later than one year after the date of enactment of this Act, the Secretary shall submit to the congressional defense committees a report setting forth the results of a title search on each parcel of land identified as suitable for conveyance or transfer under subsection (b), including an analysis of any claims against or other impairments to the fee title to each such parcel.

(2) In the period beginning on the date of the completion of the title search with respect to a parcel under paragraph (1) and ending on the date of the submittal of the report under that paragraph, the Secretary shall take appropriate actions to resolve the claims against or other impairments, if any, to fee title that are identified with respect to the parcel in the title search.

(d) ENVIRONMENTAL RESTORATION- (1) Not later than 21 months after the date of enactment of this Act, the Secretary shall--

(A) identify the environmental restoration or remediation, if any, that is required with respect to each parcel of land identified under subsection (b) to which the United States has fee title;

(B) carry out any review of the environmental impact of the conveyance or transfer of each such parcel that is required under the provisions of the *National Environmental Policy Act* of 1969 (42 U.S.C. 4321 *et seq*.); and

(C) submit to Congress a report setting forth the results of the activities under subparagraphs (A) and (B).

(2) If the Secretary determines under paragraph (1) that a parcel described in paragraph (1)(A) requires environmental restoration or remediation, the Secretary shall, to the maximum extent practicable, complete the environmental restoration or remediation of the parcel not later than 10 years after the date of enactment of this Act.

(e) AGREEMENT FOR ALLOCATION OF PARCELS- As soon as practicable after completing the review of titles to parcels of land under subsection (c), but not later than 90 days after the submittal of the report under subsection (d)(1)(C), the County and the Pueblo shall submit to the Secretary an agreement between the County and the Pueblo which allocates between the County and the Pueblo the parcels identified for conveyance or transfer under subsection (b).

(f) PLAN FOR CONVEYANCE AND TRANSFER- (1) Not later than 90 days after the date of the submittal to the Secretary of Energy of the agreement under subsection (e), the Secretary shall submit to the congressional defense committees a plan for conveying or transferring parcels of land under this section in accordance with the allocation specified in the agreement.

(2) The plan under paragraph (1) shall provide for the completion of the conveyance or transfer of parcels under this section not later than 9 months after the date of the submittal of the plan under that paragraph.

(g) CONVEYANCE OR TRANSFER- (1) Subject to paragraphs (2) and (3), the Secretary shall convey or transfer parcels of land in accordance with the allocation specified in the agreement submitted to the Secretary under subsection (e).

(2) In the case of a parcel allocated under the agreement that is not available for conveyance or transfer in accordance with the requirement in subsection (f)(2) by reason of its requirement to meet the national security mission of the Department, the Secretary shall convey or transfer the parcel, as the case may be, when the parcel is no longer required for that purpose.

(3)(A) In the case of a parcel allocated under the agreement that is not available for conveyance or transfer in accordance with such requirement by reason of requirements for environmental restoration or remediation, the Secretary shall convey or transfer the parcel, as the case may be, upon the completion of the environmental restoration or remediation that is required with respect to the parcel.

(B) If the Secretary determines that environmental restoration or remediation cannot reasonably be expected to be completed with respect to a parcel by the end of the 10-year period beginning on the date of enactment of this Act, the Secretary shall not convey or transfer the parcel under this section.

(h) USE OF CONVEYED OR TRANSFERRED LAND- The parcels of land conveyed or transferred under this section shall be used for historic, cultural, or environmental preservation purposes, economic diversification purposes, or community self-sufficiency purposes.

(i) TREATMENT OF CONVEYANCES AND TRANSFERS- (1) The purpose of the conveyances and transfers under this section is to fulfill the obligations of the United States with respect to Los Alamos National Laboratory, New Mexico, under sections 91 and 94 of the *Atomic Energy Community Act* of 1955 (42 U.S.C. 2391, 2394).

(2) Upon the completion of the conveyance or transfer of the parcels of land available for conveyance or transfer under this section, the Secretary shall make no further payments with respect to Los Alamos National Laboratory under section 91 or section 94 of the *Atomic Energy Community Act* of 1955.

(j) REPEAL OF SUPERSEDED PROVISION- In the event of the enactment of the *National Defense Authorization Act* for Fiscal Year 1998 by reason of the approval of the President of the conference report to accompany the bill (H.R. 1119) of the 105th Congress, section 3165 of such Act is repealed.

APPENDIX B ENVIRONMENTAL RESTORATION DATA

This appendix contains a brief summary of the "Environmental Restoration Report to Support Land Conveyance and Transfer Under Public Law 105-119," Public Information (Environmental Restoration Report) (DOE 1999b). This report is intended to give Congress and DOE decisionmakers information about the potential environmental restoration and remediation activities that may be undertaken for the subject land tracts. The Environmental Restoration Report contains the best information available at this time regarding any contamination that may be present on these tracts, anticipated cleanup activities and predictions of costs, duration, and waste volumes.

APPENDIX B ENVIRONMENTAL RESTORATION DATA

In parallel with the completion of the Final CT EIS, the DOE is completing the *Environmental Restoration Report to Support Land Conveyance and Transfer Under Public Law 105-119*, Public Information (Environmental Restoration Report) (DOE 1999b). The mandated completion time for both documents is August 26, 1999. This appendix briefly summarizes the Environmental Restoration Report. A greater level of detail is presented in the actual Report, which may be reviewed at the LANL Outreach Center and Reading Room, 1350 Central Avenue, Suite 101, MS-C314, Los Alamos, New Mexico 87544; and the Technical Vocational Institute, Montoya Campus Library, 4700 Morris NE, Albuquerque, New Mexico 87111. A copy of the Environmental Restoration Report may be obtained by contacting Mr. Ted Taylor in writing at 528 35th Street, Los Alamos, New Mexico 87544, or by telephone at (505) 665-7203.

The Environmental Restoration Report is intended to give Congress and DOE decisionmakers information about the potential environmental restoration and remediation activities (including decontamination and decommissioning [D&D], and demolition of site structures[1]) that may be undertaken for 9 of the 10 subject tracts. (Note: one of the 10 subject tracts, the Miscellaneous Manhattan Monument Tract, is not known to require any environmental restoration or remediation.) Information presented in the Environmental Restoration Report is based upon current knowledge of actual, suspected, or potential contamination on the subject tracts. Some of the tracts have not yet undergone field investigation and characterization for site contamination or may have been only partially investigated and characterized; thus, no information or only very limited information may be known at this time about a particular tract's actual contaminant condition. Additionally, the DOE's preliminary set of recommended cleanup activities will undergo public input and a review and approval process by the administrative authority, namely, the New Mexico Environment Department (NMED), the DOE, or both. As such, the information contained in the Environmental Restoration Report and in this appendix has a great level of uncertainty associated with it. However, it is the best information available at this time and, together with the information contained with the CT EIS, will serve the DOE decisionmakers in their decisionmaking efforts regarding the conveyance and transfer of the 10 subject tracts. Additionally, this information will serve to help with determining funding allocations and in making various other auxiliary decisions.

More site information will be generated as sampling and characterization progress and will result in refinements to current estimates of, for example, cleanup costs, cleanup techniques, and waste volumes. Some tracts already have undergone extensive site investigation and remediation; other tracts are in the beginning stages of the process, and little site investigation or work has occurred. The administrative authority review and approval process may result in changes to final plans and the actual amount of wastes generated by the cleanup activities. Ultimate costs of the cleanup would be adjusted accordingly. Site cleanup of the entire LANL facility is necessary as part of the DOE's national environmental remediation strategy for DOE facilities; however, the environmental restoration activities required on these subject tracts may be expedited in order for them to be considered suitable for conveyance or transfer by the end of the 10-year schedule required by Public Law (PL) 105-119 (the Act), which concludes November 26, 2007. In general, the projected environmental restoration and remediation activities are the same as those discussed in the DOE's plan, *Accelerating Cleanup: Paths to Closure* (DOE 1998c). Changes to this plan or the

[1] The term "structures" is used in the Environmental Restoration Report to denote all manmade construction items, including such items as permanent buildings, portable storage units, water supply wells, manholes, etc., that have at some time been assigned a LANL structure number. No attempt to verify actual structure ownership has been made. In this sense, the term is used much more broadly in the Environmental Restoration Report than in the CT EIS. The CT EIS refers to "structures" to mean a more selective set of manmade construction items such as permanent buildings or other constructed items using concrete pads for their footings. Where knowledge is readily available, an attempt to identify only DOE-owned site buildings also has been made in the CT EIS.

development of other, similar plans may be necessary to address the final site environmental restoration actions decided upon for the subject tracts.

The Environmental Restoration Report states that there are approximately 200 potential release sites (PRSs), approximately 152 structures, and 7 individual canyons within the 10 subject tracts. Some of the canyons have reaches that cross more than one of the tracts. The numbers of PRSs per tract range from none (for the Miscellaneous Manhattan Monument Tract) to 154 (for the Technical Area [TA] 21 Tract), and the numbers of structures range from one (Miscellaneous Site 22 Tract) to 125 (the TA 21 Tract). The Rendija Canyon, White Rock, DP Road, and Airport Tracts each have a single canyon floodplain within their borders; three other tracts have dual canyon floodplains within their boundaries: the TA 21, White Rock Y, and TA 74 Tracts. There are two tracts that have no PRSs recommended for remediation, no canyon systems recommended for restoration, and no structure for which decommissioning is projected: the Miscellaneous Manhattan Monument Tract and the White Rock Tract (as considered for cultural preservation and commercial development as the contemplated land use). The remaining tracts all require some level of cleanup activities, including the White Rock Tract, should residential and commercial development subsequently be considered as land uses.

Three PRS cleanup techniques are considered in Environmental Restoration Report: removal, in situ treatment, and in situ containment. Two decommissioning techniques are projected: removal of hazardous materials and complete demolition. Canyon system cleanups are all removal of contaminated soils. It is estimated that for seven of the nine tracts requiring cleanup, the necessary cleanup activities are fairly straightforward and can be completed in a few years, assuming the administrative authorities approve the recommended cleanup activities. Cleanup of the Airport Tract, DP Road Tract, and the TA 21 Tract may require a far longer period of time due to the complexity of the cleanup activities required of those sites, and in some cases, a degree of uncertainty regarding the technical feasibility of recommended cleanup activities. Costs for cleanup are expected to be greatest for these two tracts as well.

The Environmental Restoration Report bases most of its cleanup information projections upon the cleanup of PRSs. Six types of PRSs are identified in the report:

- **Surface Unit:** Areas having known or potential releases that are confined primarily to surface soils.
- **Subsurface Unit:** Areas having known or potential releases that reach deeper than surface soils. These units include underground seepage pits, dry wells, acid pits, etc.
- **Material Disposal Areas (MDAs):** Areas for the disposal of radioactive and/or other types of wastes. Area G at TA 54, for the disposal of low-level radioactive wastes, is an example of an active MDA.
- **Outfall:** An area whose contamination resulted from discharges from an existing or former wastewater outfall.
- **Construction Debris:** Rubble from standard construction activities, such as bricks, mortar, concrete blocks, drywall, ceiling tiles, etc.
- **Incinerators:** Areas of potential contamination resulting from stack emissions. These PRSs include incinerators and filter houses that will require the assessment of soils for elevated contamination levels.

The Environmental Restoration Report also discusses canyon systems within each tract. Canyon systems represent the channel created or followed by storm waters and outfall effluents, either now or in the past. Additionally, the Environmental Restoration Report discusses the decommissioning, including demolition or razing, of site structures that have been associated with LANL operations. Structures are not limited to just buildings but include items such as electric substations, underground liquid storage tanks, cooling towers, etc. These have been categorized in the Environmental Restoration Report as one of six structure types (Types I through VI), based on the estimated cost per unit area anticipated for their decommissioning. The greater costs are typically associated with such things as the complexity of contaminant removal and/or difficulty of demolition.

The Environmental Restoration Report provides estimates of waste volumes for the cleanup of PRSs; some estimates for waste volumes to be generated by the decommissioning, including demolition of structures; and some estimates for waste generation resulting from cleanup of canyon systems. Projected waste volumes are provided with subtotals of volumes given by type of waste to be generated. Eight waste types are discussed: solid wastes (noncontaminated with either hazardous or radioactive wastes); hazardous wastes; low-level radioactive wastes (LLW); transuranic (TRU) wastes; mixed wastes (having both hazardous waste and radioactive waste components); asbestos wastes; polychlorinated biphenyl (PCB) wastes; and mixed PCB wastes (having both PCB and hazardous waste components). Definitions for these wastes can be found in either EPA regulations in Title 40 of the Code of Federal Regulations (CFR) (for example, solid waste and hazardous waste) or in DOE Order 5820.2A. Some of these terms also are included in Chapter 22, the glossary for this CT EIS.

Finally, the Environmental Restoration Report presents information and data that have been developed to date and provides estimates for all tracts. In the case of more than one potential contemplated use for a particular tract, the Environmental Restoration Report has taken a "bounding" approach that may, in some cases, be more conservative than the future site condition assumptions contemplated by the recipients and used in the CT EIS analysis of impacts. For example, where the contemplated use of a tract is a mixture of both residential and commercial purposes, the Environmental Restoration Report analysis used the bounding assumption that the entire tract would be cleaned up to accommodate future residential use based on human health and ecological risk analyses[2], rather than assuming that only a portion of the tract would need to meet the cleanup levels for residential future use as envisioned by the recipients. In other instances, differing assumptions were made in the Environmental Restoration Report with regard to structures

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[2] The Environmental Restoration Report states that the LANL Environmental Restoration (ER) Project makes its decisions about site remediation based on the risks to human health, the environment, and ecological systems posed by residual site contamination. There are several references within the report to "No Action" (that is, No Further [Remediation] Action) being required based on [risks to] "human health." In these instances, the Environmental Restoration Report refers to human health risk analysis for an industrial future use scenario, namely, the continuation of LANL activities for a tract, as was assumed to be the future use before the enacted of PL 105-119. This type of use scenario assumes site occupants are present on the site for a portion of each day, 5 days a week during the year, for a small number of years. The residential future use scenario assumes a more intense site use, where the site occupants reside on the tract for 24 hours a day, 350 days a year for a large number of years. Similarly, ecological risk analysis considers the risk to animals and plants from residual site contamination and the wildlife's ability to bioaccumulate certain chemicals and heavy metals, up through the food chain. In the past, the ER Project did not consider the ecological risks that may be associated with site cleanups, although they do now so. It should be noted that both human health risk analysis and, especially, ecological risk analysis are relatively new tools that have been developed to aid the environmental restoration practicians and regulators. Both analytical methods are very conservative in the assumptions employed in their mathematical formulas due to the high degree(s) of uncertainties that underpin those assumptions. These uncertainties may result from unknown length of substance exposures, questionable contaminant pathways assumptions for exposures, inability to accurately predict ultimate doses to various body parts, limited scientific study of a chemical's effects to the human body (assumptions are frequently based on extremely limited animal studies that may not themselves be statistically adequate for the species studied and for which the subsequent extrapolation and application to the human body may result in very dubious consequences), unknown synergistic effects of chemicals and substances in the human body, etc.

being demolished than were made in the CT EIS analysis. For example, the Environmental Restoration Report analysis calculated the bounding waste produced from demolition of buildings associated with records center operations at the DP Road Tract based on possible cost savings that could result from the demolition of the buildings rather than the remodeling necessary for building reuse after decommissioning. These buildings were assumed to remain standing under the CT EIS analysis, however, due to stated intended reuse by the recipients. While these and other similar assumptions are inconsistent with the approach used for the CT EIS, which was to make as much use of tract planning documents, site drawings, and information from the recipients as reasonable (for analyzing the indirect impacts subsequent to the conveyance or transfer), the approach is consistent with the use of the bounding analysis approach employed where precise information is unknown or uncertain. The bounding approach allows the DOE to take uncertainties into account in its analysis with results that usually overestimate the final realities. In the case of the environmental restoration activities projected for these tracts, the bounding approach should result in an overestimate of the degree of site cleanup actually undertaken and the resulting waste volumes generated. Costs and cleanup durations should be overestimated as well. The CT EIS discusses the upper bounding estimates of waste volumes, etc. in its description of LANL Environmental Restoration (ER) Project activities under the existing environment at LANL.

B.1 Tract Summaries

The following sections summarize information from the Environmental Restoration Report for each of the 10 land tracts. The presentation sequence has been reordered from the Environmental Restoration Report to match the tract sequence presented elsewhere in this CT EIS, which proceeds from the northern-most tract to the southern-most tract, and is grouped by mesa top and canyon bottom locations.

B.1.1 Rendija Canyon

Information about this tract appears in Chapter 7 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Tables B.1.1-1 and B.1.1-2. Information about estimated waste volumes (in cubic yards) is provided in Appendix A of the Environmental Restoration Report and is summarized in Table B.1.1-3 and B.1.1-4. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report’s Appendix A. Footnotes stating the specific assumptions are provided in Tables B.1.1-3 and B.1.1-4 as appropriate. Cleanup of the Los Alamos Sportsman’s Club is included in both cleanup estimates. Cost estimates for remediation range from $19,053,000 to $20,462,000.

APPENDIX B ENVIRONMENTAL RESTORATION DATA

Table B.1.1-1. Proposed Remedies for Rendija Canyon Tract Land Use: Cultural Preservation

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	1	3	30
Structures	--	--	--
Canyon Systems	0	1	16

Table B.1.1-2. Proposed Remedies for Rendija Canyon Tract Land Use: Natural Areas and Residential Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	4	0	30
Structures	--	--	--
Canyon Systems	0	1	16

Table B.1.1-3. Waste Volume Estimates for Rendija Canyon Tract Land Use: Cultural Preservation

WASTE TYPE	CLEANUP OF PRSs	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	0	--	0	0
Hazardous	7,500	--	0	7,500
LLW	0	--	0	0
Mixed	0	--	0	0
PCB	0	--	0	0
Mixed PCB	0	--	0	0
Transuranic	0	--	0	0
Asbestos	0	--	0	0
Totals	7,500	--	0	7,500

[a] These waste volume totals are derived from assuming the D&D of no buildings and the cleanup of 3 PRSs (00-015, 00-011(c), and 00-11(e))

Table B.1.1-4. Waste Volume Estimates for Rendija Canyon Tract
Land Use: Natural Areas and Residential Development

WASTE TYPE	CLEANUP OF PRSs	D&D OF STRUCTURES	CLEANUP OF CANYONS	TOTALS
Solid	1	--	0	1
Hazardous	7,500	--	0	7,500
LLW	0	--	0	0
Mixed	0	--	0	0
PCB	0	--	0	0
Mixed PCB	0	--	0	0
Transuranic	0	--	0	0
Asbestos	0	--	0	0
Totals	7,501	--	0	7,501

Note: These waste volume totals are derived from assuming the D&D of no buildings and the cleanup of 4 PRSs (00-011(a), 00-015, 00-011(c), and 00-11(e))

B.1.2 DOE LAAO Tract

Information about this tract appears in Chapter 4 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.2-1 and Table B.1.2-2. Information about estimated waste volumes (in cubic yards) is provided in Appendix A of the Environmental Restoration Report and is summarized in Table B.1.2-3 and Table B.1.2-4. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report's Appendix A. Footnotes stating the specific assumptions are provided in Tables B.1.2-3 and B.1.2-4 as appropriate. Cost estimates for remediation range from $4,253,000 to $9,680,000.

Table B.1.2-1. Proposed Remedies for the DOE LAAO Tract
Land Use: Commercial Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	3	0	18
Structures	1	2	18
Canyon Systems	--	--	--

Table B.1.2-2. Proposed Remedies for the DOE LAAO Tract Land Use: Residential Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	3	0	18
Structures	2	1	18
Canyon Systems	--	--	--

Table B.1.2-3. Waste Volume Estimates for the DOE LAAO Tract Land Use: Commercial Development

WASTE TYPE	CLEANUP OF PRSs	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	94	256	--	350
Hazardous	0	0	--	0
LLW	0	0	--	0
Mixed	0	0	--	0
PCB	0	0	--	0
Mixed PCB	0	0	--	0
Transuranic	0	0	--	0
Asbestos	0	46	--	46
Totals	94	302	--	396

[a] These waste volume totals are derived from assuming the D&D of Building 43-41 only.

Table B.1.2-4. Waste Volume Estimates for the DOE LAAO Tract
Land Use: Residential Development

WASTE TYPE	CLEANUP OF PRSs	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	231	2,700	--	2,931
Hazardous	0	0	--	0
LLW	0	0	--	0
Mixed	0	0	--	0
PCB	0	0	--	0
Mixed PCB	0	0	--	0
Transuranic	0	0	--	0
Asbestos	0	486	--	486
Totals	231	3,186	--	3,417

[a] These waste volume totals are derived from assuming the D&D of Building 43-41 and 43-39.

B.1.3 Miscellaneous Site 22 Tract

Information about this tract begins appears in Chapter 9 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.3-1. Waste volumes for the Miscellaneous Site 22 Tract are estimated to total 10 cubic yards of solid wastes. The cost estimation for remediation of this tract is about $91,000.

Table B.1.3-1. Proposed Remedies for the Miscellaneous Site 22 Tract
Land Use: Commercial Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
Construction Debris	1	0	9

B.1.4 Miscellaneous Manhattan Monument Tract

The Miscellaneous Manhattan Monument Tract contains no PRSs within its boundaries and contains no structures other than the monument itself. Neither environmental restoration nor decommissioning activities are anticipated.

B.1.5 DP Road Tract

Information about this tract appears in Chapter 3 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.5-1 and B.1.5-2. Information about estimated waste volumes (in cubic yards) is provided in Appendix A of the Environmental Restoration Report and is summarized in Table B.1.5-3 and B.1.5-4. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report's Appendix A. Footnotes stating the specific assumptions are provided in Tables B.1.5-3 and B.1.5-4 as appropriate. Cost estimates for remediation range from $26,986,000 to $29,070,000.

Table B.1.5-1. Proposed Remedies for the DP Road Tract
Land Use: Industrial and Commercial Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	6	4	70
Structures	10	0	13
Canyon Systems	0	1	8

Table B.1.5-2. Proposed Remedies for the DP Road Tract
Land Use: Commercial and Residential Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	6	4	84
Structures	10	0	13
Canyon Systems	0	1	8

Table B.1.5-3. Waste Volume Estimates for the DP Road Tract Land Use: Industrial and Commercial Development

WASTE TYPE	CLEANUP OF PRSs[a]	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	10	1,883	0	1,893
Hazardous	750	4	0	754
LLW	0	0	0	0
Mixed	0	0	0	0
PCB	0	0	0	0
Mixed PCB	0	0	0	0
Transuranic	0	0	0	0
Asbestos	50	330	0	380
Totals	810	2,217	0	3,027

[a] These waste volume totals are derived from assuming the D&D of all site structures and from the removal of waste from 3 PRSs (00-004, 00-027 and 00-033(a)).

Table B.1.5-4. Waste Volume Estimates for the DP Road Tract Land Use: Commercial and Residential Development

WASTE TYPE	CLEANUP OF PRSs[a]	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	10	1,883	0	1,893
Hazardous	740	4	0	744
LLW	0	0	0	0
Mixed	0	0	0	0
PCB	0	0	0	0
Mixed PCB	0	0	0	0
Transuranic	0	0	0	0
Asbestos	0	330	0	330
Totals	750	2,217	0	2,967

[a] These waste volume totals are derived from assuming the D&D of all site structures and from the removal of waste from 2 PRSs (000-027 and 0-033(a)).

B.1.6 TA 21 Tract

Information about this tract appears in Chapter 2 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.6-1. Information about estimated waste volumes (in cubic yards) is provided in

Appendix A of the Environmental Restoration Report and is summarized in Table B.1.6-2. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report's Appendix A. A footnote stating the specific assumptions is provided in Table B.1.6-2 as appropriate. The cost estimation for remediation of this tract is about $400,184,000.

Table B.1.6-1. Proposed Remedies for the TA 21 Tract Land Use: Commercial and Industrial Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	104	50	84
Structures	125	0	12
Canyon Systems	0	2	12

Table B.1.6-2. Waste Volume Estimates for the TA 21 Tract

WASTE TYPE	CLEANUP OF PRSs[a]	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	598	46,440	0	47,038
Hazardous	121	266	0	387
LLW	7,826	7,265	0	15,091
Mixed	479	629	0	1,108
PCB	169	27	0	196
Mixed PCB	40	0	0	40
Transuranic	54	0	0	54
Asbestos	0	1,929	0	1,929
Totals	9,287	56,556	0	65,843

[a] These waste volume totals are derived from assuming the D&D of all site structures and from the removal of waste from 104 PRSs.

B.1.7 Airport Tract

Information about this tract appears in Chapter 5 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.7-1. Information about estimated waste volumes (in cubic yards) is provided in Appendix A of the Environmental Restoration Report and is summarized in Table B.1.7-2. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report's Appendix A. Footnotes stating the specific assumptions are provided in Table B.1.7-2 as appropriate. The cost estimation for remediation of this tract is $28,217,000.

Table B.1.7-1. Proposed Remedies for the Airport Tract
Land Use: Commercial and Industrial Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	19	6	75
Structures	0	4	0
Canyon Systems	--	--	--

Table B.1.7-2. Waste Volume Estimates for the Airport Tract

WASTE TYPE	CLEANUP OF PRSs[a]	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS[b]	TOTALS
Solid	24,056	0	--	24,056
Hazardous	0	0	--	0
LLW	400	0	--	400
Mixed	0	0	--	0
PCB	0	0	--	0
Mixed PCB	0	0	--	0
Transuranic	0	0	--	0
Asbestos	0	0	--	0
Totals	24,456	0	--	24,456

[a] These waste volume totals are derived from assuming the D&D of none of the site structures and from the removal of waste from the cleanup of 5 PRSs (73-001(a), 73-002, 73-004(a), c-73-001, and C-73-005(a)).

[b] DP Canyon, which lies within the boundaries of both the TA 21 and Airport Tracts, has been addressed in the section above for the TA 21 Tract.

B.1.8 White Rock Y Tract

Information about this tract appears in Chapter 8 of the Environmental Restoration Report. Information about estimated waste volumes (in cubic yards) is provided in Appendix A of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.8-1 and B.1.8-2. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report's Appendix A. A footnote stating the specific assumptions is provided in Table B.1.8-2 as appropriate. Cost estimates for remediation range from $1,880,000 to $10,424,000.

Table B.1.8-1. Proposed Remedies for the White Rock Y Tract
Land Use: Cultural and Environmental Preservation

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	--	--	--
Structures	0	6	0
Canyon Systems	0	2	24

Table B.1.8-2. Waste Volume Estimates for the White Rock Y Tract

WASTE TYPE	CLEANUP OF PRSs[a]	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	--	0	0	0
Hazardous	--	0	0	0
LLW	--	0	3,767	3,767
Mixed	--	0	0	0
PCB	--	0	0	0
Mixed PCB	--	0	0	0
Transuranic	--	0	0	0
Asbestos	--	0	0	0
Totals	--	0	3,767	3,767

[a] These waste volume totals are derived from assuming the D&D of none of the site structures, but, rather, from the selective removal of sediments within the floodplain area of the canyons.

B.1.9 TA 74 Tract

Information about this tract appears in Chapter 11 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.9-1. Information about estimated waste volumes (in cubic yards) is provided in Appendix A of the Environmental Restoration Report. The estimated waste volumes are based on specific assumptions of PRS cleanup waste removal and the D&D of certain structures and may represent a subset of the total information presented in the Environmental Restoration Report's Appendix A. A footnote stating the specific assumptions is provided in Table B.1.9-2 as appropriate. Cost estimates for remediation range from $3,683,000 to $215,666,000.

Table B.1.9-1. Proposed Remedies for the TA 74 Tract
Land Use: Cultural and Environmental Preservation

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	0	4	18
Structures	0	3	0
Canyon Systems	0	2	22

Table B.1.9-2. Waste Volume Estimates for the TA 74 Tract

WASTE TYPE	CLEANUP OF PRSs[a]	D&D OF STRUCTURES[a]	CLEANUP OF CANYONS	TOTALS
Solid	2	0	0	2
Hazardous	2	0	0	2
LLW	1	0	98,881	98,882
Mixed	2	0	0	2
PCB	0	0	0	0
Mixed PCB	0	0	0	0
Transuranic	0	0	0	0
Asbestos	0	0	0	0
Totals	7	0	98,881	98,888

[a] These waste volume totals are derived from assuming the D&D of none of the site structures and from the removal of no waste from the cleanup of any PRSs, but, rather, from the selective removal of sediments within the floodplain area of the canyons.

B.1.10   White Rock Tract

Information about this tract appears in Chapter 6 of the Environmental Restoration Report. The number of cleanup actions and time required to complete the cleanup are summarized in Table B.1.10-1 and B.1.10-2.

Table B.1.10-1. Proposed Remedies for the White Rock Tract
Land Use: Cultural Preservation and Commercial Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	--	--	--
Structures	0	1	0
Canyon Systems	0	1	16

Table B.1.10-2. Proposed Remedies for the White Rock Tract
Land Use: Commercial and Residential Development

MEDIA	CLEANUP / D&D	NO ACTION	ESTIMATED DURATION (months)
PRSs	--	--	--
Structures	0	1	0
Canyon Systems	1	0	16

Because plans call for no cleanup or decommissioning under cultural preservation and commercial development, this land use scenario would generate no wastes. Under the commercial and residential development land use scenario, selective removal of sediments from the canyon system would generate an estimated 942 cubic yards of LLW wastes. Cost estimates for remediation range from $954,000 to $3,374,000.

B.2 Data Summary

Individual tract estimates are summarized in the following three tables. Table B.2-1 summarizes the total number of PRSs, structures, and canyon systems reported in the Environmental Restoration Report, as well as the number of cleanup actions planned for each tract and each contemplated land use. For example, one of four PRSs would be cleaned up in Rendija Canyon if cultural preservation is the contemplated land use subsequent to transfer of the tract; however, four of four PRSs would be cleaned up under the residential development land use scenario. The table enables a quick overview of planned cleanup actions, although details are not presented.

Table B.2-2 summarizes the estimated times required to perform cleanup of the 10 tracts. For example, cleanup of PRSs at TA 74 is estimated to require 18 months; decontamination of structures is estimated to require 2 months; and 22 months are estimated for removal of contaminated sediments from the canyons. Durations in the table are those estimated for the longest cleanup segment. Multiple sites within a tract can be restored simultaneously so that cleanup duration is determined by that PRS or structure or canyon that requires the most time.

Table B.2-3 summarizes estimated waste volumes resulting from cleanup of PRSs, D&D of structures, and remediation of canyons. The table also indicates the waste type that comprises the majority of expected wastes.

Table B.2-1. Summary of Estimated Environmental Restoration Actions

TRACT	CONTEMPLATED LAND USE	CLEANUP OF PRSs[a]	D&D[b] OF STRUCTURES	REMEDIATION OF CANYONS [c]	MAJOR WASTE TYPE
Rendija Canyon	Cultural Preservation	1/4	--	0/1	Hazardous wastes from munitions
	Residential	4/4	--	0/1	Hazardous wastes from munitions
DOE LAAO	Commercial	3/3	1/3	--	Construction debris
	Residential	3/3	2/3	--	Construction debris
Miscellaneous Site 22	Commercial	1/1	--	--	Construction debris
Miscellaneous Manhattan Monument	Cultural Preservation	--	--	--	No cleanup required
DP Road	Comm./Ind.	6/10	10/10	0/1	Solid wastes and RCRA hazardous wastes
	Res./Comm.	6/10	10/10	0/1	Solid wastes and RCRA hazardous wastes
TA 21	Comm./ Ind.	104/154	125/125	0/2	Radioactive and RCRA hazardous waste from historic operations
Airport	Comm./ Ind.	19/25	0/4	--	Solid waste from former landfill
White Rock Y	Preservation	--	0/6	0/2	Low-level radioactive canyon sediments
TA 74	Preservation	0/4	0/3	0/2	Low-level radioactive canyon sediments
White Rock	Pres./Comm.	--	0/1	0/1	No cleanup required
	Res./Comm.	--	0/1	1/1	Low-level radioactive canyon sediments

Note: Dash (--) indicates there are no PRSs or structures or canyons.
[a] For example, 1/3 indicates cleanup of one PRS with a total of 3 PRSs within the tract
[b] For example, 1/3 indicates D&D of one structure with a total of three structures within the tract
[c] For example, 2/2 indicates cleanup of sediments in two canyons with a total of two canyons within the tract

Table B.2-2. Estimated Duration of Environmental Restoration Actions[a,b]

TRACT	CONTEMPLATED LAND USE	CLEANUP OF PRSs	D&D OF STRUCTURES	REMEDIATION OF CANYONS	MAJOR WASTE TYPE
Rendija Canyon	Cultural Preservation	30	--	16	Hazardous wastes from munitions
	Residential	30	--	16	Hazardous wastes from munitions
DOE LAAO	Commercial	18	18	--	Construction debris
	Residential	18	18	--	Construction debris
Miscellaneous Site 22	Commercial	9	--	--	Construction debris
Miscellaneous Manhattan Monument	Cultural Preservation	--	--	--	No cleanup required
DP Road	Comm./ Ind.	70	13	8	Solid wastes and RCRA hazardous wastes
	Res./ Comm.	84	13	8	Solid wastes and RCRA hazardous wastes
TA 21	Comm./ Ind.	84	12	12	Construction debris
Airport	Comm./ Ind.	75	--	--	Solid waste from former landfill
White Rock Y	Cultural Preservation	--	0	24	Low-level radioactive canyon sediments
TA 74	Cultural Preservation	18	0	22	Low-level radioactive canyon sediments
White Rock	Pres./ Comm.	--	0	16	No cleanup required
	Res./ Comm.	--	0	16	Low-level radioactive canyon sediments

Note: Dash (--) indicates there are no PRSs or structures or canyons.

[a] In months

[b] Longest cleanup segment. Multiple sites can be restored simultaneously, so cleanup duration is determined by that PRS or structure or canyon which requires the most time.

Table B.2-3. Estimated Environmental Restoration Waste Volumes[a]

TRACT	CONTEMPLATED LAND USE	CLEANUP OF PRSs	D&D OF STRUCTURES	REMEDIATION OF CANYONS	MAJOR WASTE TYPE	COST ESTIMATE RANGES ($K)	TO $(K)
Rendija Canyon	Cultural Preservation	7,500 (5,700)	--	0	Hazardous wastes from munitions	19,053	20,462
	Residential	7,500 (5,700)		0	Hazardous wastes from munitions		
DOE LAAO	Commercial	90 (70)	300 (230)	--	Construction debris	4,253	9,680
	Residential	230 (176)	3,190 (2,440)	--	Construction debris		
Miscellaneous Site 22	Commercial	10 (8)	--	--	Construction debris	91	--
Miscellaneous Manhattan Monument	Cultural Preservation	--	--	--	No cleanup required	0	0
DP Road	Comm./Ind.	810 (620)	2,220 (1,690)	0	RCRA hazardous wastes	26,986	29,070
	Res./Comm.	750 (570)	2,220 (1,690)	0	RCRA hazardous wastes		
TA 21	Comm./Ind.	9,290 (7,090)	56,560 (43,220)	0	Construction debris	400,184	--
Airport	Comm./Ind.	24,460 (18,690)	0	--	Solid waste from former landfill	28,217	--
White Rock Y	Cultural Preservation	--	0	3,770 (2,880)	Low-level radioactive canyon sediments	1,880	10,424
TA 74	Cultural Preservation	0	0	98,880 (74,910)	Low-level radioactive canyon sediments	3,683	215,666
White Rock	Pres./Comm.	--	0	0	No cleanup required	954	3,374
	Res./Comm.	--	0	940 (720)	Low-level radioactive canyon sediments		

Notes:
Dash (--) indicates there are no PRSs or structures, or canyons.
Zero indicates that no wastes are expected to be generated.
[a] All volumes are cubic yards (approximate), followed by cubic meters (rounded).

APPENDIX D FLOODPLAINS AND WETLANDS

This appendix contains wetlands and floodplains documentation for the 10 subject tracts. Section D.1 is the Floodplain Statement of Finding. Section D.2 is an Addendum to the Floodplain and Wetland Assessments that contains recently modeled information on changes to stormwater flood flows estimated to result from the contemplated land uses. Section D.3 contains the Floodplain and Wetland Assessments that was produced as a stand-alone report by LANL and thus has its own format, page numbering, and references.

APPENDIX D FLOODPLAINS AND WETLANDS

D.1 Statement of Findings

DEPARTMENT OF ENERGY

Floodplain Statement of Findings for the Conveyance and Transfer of Certain Tracts Administered by the Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico

AGENCY: Department of Energy (DOE)

ACTION: Floodplain Statement of Findings

SUMMARY: This is a Floodplain Statement of Findings for the Conveyance and Transfer of Certain Tracts Administered by the Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico, prepared in accordance with 10 CFR Part 1022. DOE proposes to convey to the Incorporated County of Los Alamos and transfer to the Secretary of the Department of the Interior, in trust for San Ildefonso Pueblo, ten (10) tracts of land located at Los Alamos National Laboratory in compliance with the requirements established by Public Law 105-119. The acreage involved is about 4,800 acres; tracts are located within various canyon systems and over several mesa tops. Some of these tracts encompass floodplains and wetlands located in Los Alamos and Santa Fe Counties, New Mexico. The land shall be used by the named recipients for the purposes of historic, cultural, or environmental preservation purposes; economic diversification purposes; or community self-sufficiency purposes. DOE prepared floodplain and wetlands assessments (published in the Draft EIS and attached, together with a short addendum of newly developed clarifying information) describing the effects, alternatives, and measures designed to avoid or minimize potential harm to or within the affected floodplain. DOE will allow 30 days of public review after publication of the statement of findings before implementing the proposed action.

FOR FURTHER INFORMATION, CONTACT:

Elizabeth Withers, CT EIS Document Manager
Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544
PHONE: (505) 667-8690; FAX: (505) 665-4872

APPENDIX D FLOODPLAINS AND WETLANDS

FOR FURTHER INFORMATION ON GENERAL DOE FLOODPLAIN/WETLANDS ENVIRONMENTAL REVIEW REQUIREMENTS, CONTACT:

Carol M. Borgstrom, Director
Office of NEPA Policy and Assistance, EH-42
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585
(202) 586-4600 or (800) 472-2756

SUPPLEMENTARY INFORMATION:

This Floodplain Statement of Findings for the Conveyance and Transfer of Certain Tracts Administered by the Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico, was prepared in accordance with 10 CFR Part 1022. A Notice of Intent to Prepare an Environmental Impact Statement was published in the *Federal Register* on May 6, 1998 (63 FR 25022), followed by a Notice of Availability for the Draft Environmental Impact Statement published in the *Federal Register* on February 26, 1999 (164 FR 9483); a floodplain and wetlands assessment was incorporated in the Draft Environmental Impact Statement. DOE is proposing to convey and transfer ten (10) tracts of land, totaling about 4,800 acres, to the Incorporated County of Los Alamos and the Secretary of the Interior, in trust for San Ildefonso Pueblo, in compliance with the requirements of Public Law 105-119. Six (6) of the ten tracts encompass wetlands and floodplains within their boundaries: the Rendija Canyon Tract, TA-21 Tract, Airport Tract, White Rock “Y” Tract, TA-74 Tract and the White Rock Tract. These tracts are located within or contain portions of Rendija Canyon, DP Canyon, Los Alamos Canyon, Bayo/Pueblo Canyons confluence, and in Canada del Buey (see individual tract maps within the attached Floodplain/Wetlands Assessments). Future use of the tracts is established in Public Law 105-119 as for: historic, cultural, or environmental preservation purposes; economic diversification purposes; or community self-sufficiency purposes. The two named recipients identified their contemplated uses of the tract as follows:

- Rendija Canyon Tract (about 910 acres) – environmental preservation (including recreational use) and residential development **or** cultural preservation.
- TA-21 Tract (about 260 acres) – commercial and industrial development.
- Airport Tract (about 205 acres) – commercial and industrial development **or** commercial development.
- White Rock “Y” Tract (about 540 acres) – environmental preservation **or** cultural preservation.
- TA-74 Tract (about 2715 acres) – cultural preservation **or** environmental preservation.
- White Rock Tract (about 100 acres) – cultural preservation and commercial development **or** commercial and residential development.

Each of these tracts may have existing or future infrastructure uses that include utility lines, utility support structures, water supply wells, storage tans or structures, water or effluent treatment structures and transportation routes.

APPENDIX D FLOODPLAINS AND WETLANDS

The action is proposed to be located within the floodplains and wetlands due to the requirements of Public Law 105-119 that states that DOE should identify land that is suitable per the criteria established by the Law; the suitability criteria do not exclude lands lying within wetland and floodplain areas. Therefore, such potentially suitable lands were included in the tracts identified for possible conveyance and transfer action by the DOE. The conveyance and transfer of each tract, in whole or in part, constitutes DOE's Proposed Action Alternative. The only alternative to the proposed action considered is the No Action Alternative. The proposed action of conveying and transferring each of the tracts, either in whole or in part, does conform to applicable State or local floodplain protection standards. Subsequent use of the tracts by the named recipients would also conform to applicable State or local floodplain protection standards. Both Los Alamos and Santa Fe Counties have protective ordinances pertaining to flood damage prevention that is inclusive of language requiring new construction to be placed outside of floodplains. The pertinent Los Alamos County Code Ordinance is: 85-70 "An Ordinance Repealing Chapter 15.16 of the Los Alamos County Code Adopting a New Chapter 17.70 Pertaining to Flood Damage prevention". The pertinent Santa Fe County Code Ordinances are: 1988-1, "An Ordinance to Establish Regulations for Development in Flood Hazard Areas, Set Minimum Floor Elevations for Compliance, Define Flood Plains, Address Required Building Improvements, and Establish Variance Regulations for Cases Where There Isn't an Ability to Comply with Adopted Standards"; and 1996-1, "Flood Hazards".

DOE may include deed restrictions in the conveyance documents requiring the placement of new construction outside of the areas occupied by 100- and 500-year floodplains or wetlands in order to further minimize the possibility of potential harm to or within the affected floodplain consistent with the provisions of Public Law 105-119. DOE will also recommend to the potential recipients ways to reduce or eliminate surface water runoff and protect surface water quality degradation for those tracts where development may take place.

DOE will allow 30 days of public review after publication of the statement of findings prior to implementing the proposed action.

Issued in Los Alamos, New Mexico on July 20, 1999.

Program Office Official

D.2 Addendum

Quantitative information on stormwater flood flows from the 10 individual tracts was not available when the Floodplain and Wetland Assessment was prepared in December 1998 for inclusion in the Draft CT EIS. In February 1999, University of California employees developed computer modeled estimations for the 6-hour, 100-year storm event for each of the 10 subject land tracts and combinations of tracts for affected watersheds in which the tracts are located (McLin 1999). The analyses were completed to provide estimates of quantitative information on the potential changes to stormwater flood flows as a result of urbanization at the proposed conveyance and transfer tracts. Although these numbers and figures provide insight to the changes anticipated under the modeled scenarios, quantification of the corresponding potential effects is still unavailable. Data on the determination of the relationship between peak flow (flood flow height), width of canyon floodplains, and the potential for modeled flows to scour streambed material and impact structures would be needed to provide this type of predictive information.

The 10 individual land tracts were assigned to one or more of the established watersheds at LANL (McLin 1992). Each of these groups was then used in Hydrologic Engineering Center (HEC)-1 model (Dodson 1995) simulations using the 6-hour, 100-year design storm event for Los Alamos County (McLin 1999). Baseline hydrographs were developed for each watershed to simulate pre-existing (current) conditions. These baseline hydrographs were then compared to modeled hydrographs. Only areas with a slope of less than 20 percent were considered as available for urbanization. Consideration was given to the fact that several tracts are located in the Los Alamos Canyon watershed.

Bayo Canyon above Los Alamos Canyon and Barrancas Canyon above Guaje Canyon were identified as experiencing the highest percent change in peak flow (149.5 percent) and volume (117.5 percent). Although these values are significant, neither Bayo Canyon above Los Alamos Canyon nor Barrancas Canyon above Guaje Canyon would be developed (urbanized) as a result of the conveyance and transfer process. Under this assumption, impacts are nonexistent for the TA 74 Tract. Increases in the stormwater runoff from Rendija Canyon modeled for the Guaje Canyon confluence approximate 20 percent in both peak flow and volume within the canyon itself, and in increased flows in Guaje Canyon. These changes could be significant with respect to utility locations in Guaje Canyon just downstream of the Rendija Canyon confluence. The increased stormwater runoff from Rendija Canyon could result in flow changes predicted over a distance of several miles downstream to within Los Alamos Canyon. However, the Los Alamos Canyon floodplain is probably broad enough to dampen the increased runoff. Thus, based on the proposed development scenarios for each tract, urbanization in the Rendija Canyon Tract is of greatest concern with regard to stormwater runoff effects.

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D.3 Floodplain and Wetland Assessment

Floodplain and Wetland Assessments
for the
Proposed Conveyance and Transfer Tracts
at
Los Alamos National Laboratory,
Los Alamos and Santa Fe Counties, New Mexico

Date Prepared: December 22, 1998

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Acronyms

ac	*acres*
BMPs	*Best Management Practices*
CFR	*Code of Federal Regulations*
cfs	*cubic feet per second*
cms	*cubic meters per second*
DOE	*Department of Energy*
EIS	*environmental impact statement*
E.O.	*Executive Order*
EPA	*Environmental Protection Agency*
ft	*feet*
GIS	*geographic information system*
ha	*hectares*
km	*kilometers*
LAAO	*Los Alamos Area Office*
LANL	*Los Alamos National Laboratory*
m	*meter*
mi	*miles*
NPDES	*National Pollutant Discharge Elimination System*
NWI	*National Wetlands Inventory*
P.L.	*Public Law*
SWPP	*Storm Water Pollution Prevention*
TA	*technical area*
UC	*University of California*
USFWS	*United States Fish and Wildlife Service*

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Summary

Ten land tracts are proposed for conveyance or transfer from Department of Energy (DOE) administrative control under mandates of Public Law (P.L.) 105-119 (1997). Floodplains as defined in 10 Code of Federal Regulations (CFR) 1022 are present in six of the ten tracts: Rendija Canyon Land Tract; TA-21 Land Tract; Airport Land Tract; White Rock "Y" Land Tract; TA-74 Land Tract; and White Rock Land Tract. Wetlands as defined in 10 CFR 1022 are present in six of the ten tracts: Rendija, TA-21, Airport, White Rock "Y," TA-74, and White Rock. Floodplain and wetland values for each land tract are evaluated against the guidance in 10 CFR 1022 and the DOE "Guidance on Environmental Requirements for DOE Real Property Transfers." Impacts are reported for each land tract. Issues associated with increases in stormwater flows from mesa top areas into canyon areas are identified with respect to suggested mitigations for protecting floodplain values, wetland values and potential contaminant migration.

1.0 Project Description

1.1 Department of Energy Notice of Intent

The U.S. Department of Energy (DOE) announced its intent (FR May 6, 1998, Volume 63, Number 87) to prepare an environmental impact statement (EIS) to assess the potential environmental impacts of conveying and transferring certain land tracts located within the Incorporated Counties of Los Alamos and Santa Fe at Los Alamos National Laboratory (LANL) in north-central New Mexico. This Notice of Intent to prepare an EIS was issued in response to Section 632 of the Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1997, P.L. 105-119.

1.2 Purpose and Scope of This Document

This document provides an analysis of potential impacts to floodplains and wetlands associated with the proposed conveyance and transfer action as required by 10 Code of Federal Regulations (CFR) 1022. The No Action Alternative for this proposed action is to not convey and transfer the subject parcels of land. Individual tracts would continue to be used as they are currently. Two primary mandates from 10 CFR 1022 drive floodplain and wetland review and analysis requirements for real property transfers: Executive Order (E.O.)11988, "Floodplain Management," and E.O. 11990 "Protection of Wetlands." Both E.O.s dictate that Federal agencies take action to minimize loss and to preserve the natural and beneficial values of floodplains and wetlands in carrying out their responsibilities for acquiring, managing, and disposing of Federal land and facilities. Section 3(d) of E.O. 11988 and Section 4 of E.O. 11990 direct that when Federal property in a floodplain or wetland is proposed for lease, easement, right-of-way, or disposal to a non-Federal party, the Federal agency shall:

(1) Reference in the conveyance (e.g., lease, property deed, etc.) those uses that are restricted under identified Federal, State, or local floodplain/wetland regulations;

(2) Attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or

(3) Withhold such properties from conveyance.

This document addresses regulatory issues associated with floodplain and wetland resources. Other issues such as Endangered Species Act considerations within the boundaries of the land tracts proposed for conveyance or transfer are addressed in a separate Biological Assessment currently under preparation. Analysis of potential impacts to floodplains and wetlands is conservative in that the highest anticipated impact is evaluated based on proposed uses noted in Table 1.

Table 1[1]. Conveyance and Transfer Land Tracts and Proposed Uses

Land Tract Name	Proposed Uses		
Rendija Canyon	Cultural Preservation	or	Natural Areas & Residential
DOE LAAO	Commercial Development	or	Residential
Site 22	Commercial		
Manhattan Monument	Cultural Site		
DP Road	Commercial Development	or	Commercial/Industrial
TA-21	Commercial/Industrial		
Airport	Commercial Use	or	Commercial/Industrial
White Rock Y	Cultural Preservation	or	Natural Areas, Transportation & Utilities
TA-74	Cultural Preservation	or	Natural Areas & Utilities
White Rock	Cultural Preservation & Commercial Development	or	Commercial/Residential

Information is from two sources: (1) Letter from Joseph C. King, Los Alamos County Administrator to Dennis Martinez, Assistant Area Manager, DOE LAAO dated June 30, 1998, regarding Land Use Information for the Land Transfer EIS; and (2) Letter from Governor Harvey A. Martinez, Pueblo of San Ildefonso to DOE LAAO dated June 8, 1998, regarding DOE/Laboratory Land Parcel Use Determination.

1.3 U.S. Congressional Mandate

Congress mandated that DOE convey fee title to lands allocated for conveyance to the Incorporated County of Los Alamos (County) and transfer to the Secretary of the Interior, in trust for the San Ildefonso Pueblo (Pueblo). Parcels of land for conveyance and transfer were determined by DOE pursuant to Section 632 of the Departments of Commerce, Justice, and State; the Judiciary; and Related Agencies Appropriations Act, 1998, P.L. 105-119.

This proposed action, conveyance and transfer of federal lands, requires an EIS per 10 CFR 1021, DOE's National Environmental Policy Act Implementing Procedures. This Conveyance and Transfer EIS, in response to the Congressional mandate, will analyze potential direct impacts regarding the relocation of existing site tenants and indirect impacts of up to three uses of land for the individual tracts: (1) historic, cultural, or environmental preservation purposes; (2) economic diversification purposes; or (3) community self-sufficiency purposes. A No Action Alternative, retaining the land tracts in their current state with continuance of the existing uses of land, is also analyzed in the EIS.

Only parcels of land presently under the administrative control of DOE are considered in the proposed conveyance and transfer action. DOE administratively controls 28,654 acres (ac) (11,596 hectares [ha]) of the approximately 70,400 ac (28,489 ha) of Los Alamos County. Total area of the tracts being considered for conveyance or transfer is about 4,646 ac (1,918 ha), of which approximately 3,000 ac (1,214 ha) is within Santa Fe County and the remainder is within the boundaries of Los Alamos County (Figures 1 and 2).

1.4 Project Setting

LANL and the communities of Los Alamos and White Rock are situated primarily in Los Alamos County in north-central New Mexico (Figures 1 and 2). Portions of LANL and portions of the tracts proposed for conveyance and transfer are in Santa Fe County. LANL is located approximately 60 miles (mi) (100 kilometer [km]) north-northwest of Albuquerque and 25 mi (40 km) northwest of Santa Fe. Los Alamos County is located on the Pajarito Plateau on the eastern slope of the Jemez Mountains.

The Pajarito Plateau is composed of numerous narrow mesas defined by canyons. From the base of the Jemez Mountains, the Plateau slopes gently downward to the east-southeast for more than 15 mi (24 km) to end in a scarp that drops to the Rio Grande. The upper reaches of the Plateau are approximately 7,800 feet (ft) (2,380 meters [m]) above sea level, and its lower edge, on the rim of White Rock Canyon, is at 6,200 ft (1,890 m). Plateau canyons are 150–300 ft (46−91 m) deep and 300−1150 ft (91–350 m) wide.

Pajarito Plateau and the Los Alamos area are biologically diverse. This diversity is due partly to the dramatic 5,000-ft (1,500-m) elevation gradient from the Rio Grande on the east to the Jemez Mountains 12 mi (20 km) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative community types are found in Los Alamos County: juniper-grassland; piñon-juniper; ponderosa pine; mixed conifer; and spruce-fir. Juniper-grassland communities predominate along the Rio Grande on the eastern border of the plateau and extend upward on the south-facing sides of canyons, at elevations between 5,600 to 6,200 ft (1,700 and 1,900 m). The piñon-juniper community, generally in the 6,200- to 6,900-ft (1,900- to 2,100-m) 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 6,900- to 7,500-ft (2,100- to 2,300-m) elevation range. These three communities predominate, each occupying roughly one-third of the LANL site. The mixed conifer community, at an elevation of 7,500 to 9,500 ft (2,300 to 2,900 m), overlaps the ponderosa pine community in the deeper canyons and on north slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. The subalpine grassland community is mixed with the spruce-fir communities at higher elevations of 9,500 to 10,500 ft (2,900 to 3,200 m). Wetlands and several riparian areas enrich the diversity of plant and animals found on LANL lands. Diversity of species on LANL is reflected in the Final LANL Site Wide Environmental Impact Statement as follows:

> “ ... diversity is illustrated by the presence of over 900 species of vascular plants; 57 species of mammals; 200 species of birds, including 112 species known to breed in Los Alamos County 28 species of reptiles; 9 species of amphibians; over 1,200 species of arthropods; and 12 species of fish (primarily found in the Rio Grande, Cochiti Lake and the Rito de los Frijoles). No fish species have been found within LANL boundaries” (DOE 1999c).

Partially as a result of this diversity, significant use of these resources is made by both residents and visitors. Biking, hiking, skiing, photography, and other unstructured, outdoor recreation activities are common throughout the mesas and canyons of the Pajarito Plateau, including portions of those areas presented for conveyance and transfer.

Each of the canyon areas of the individual tracts includes stream courses, areas where the long-term effects of runoff water are apparent.

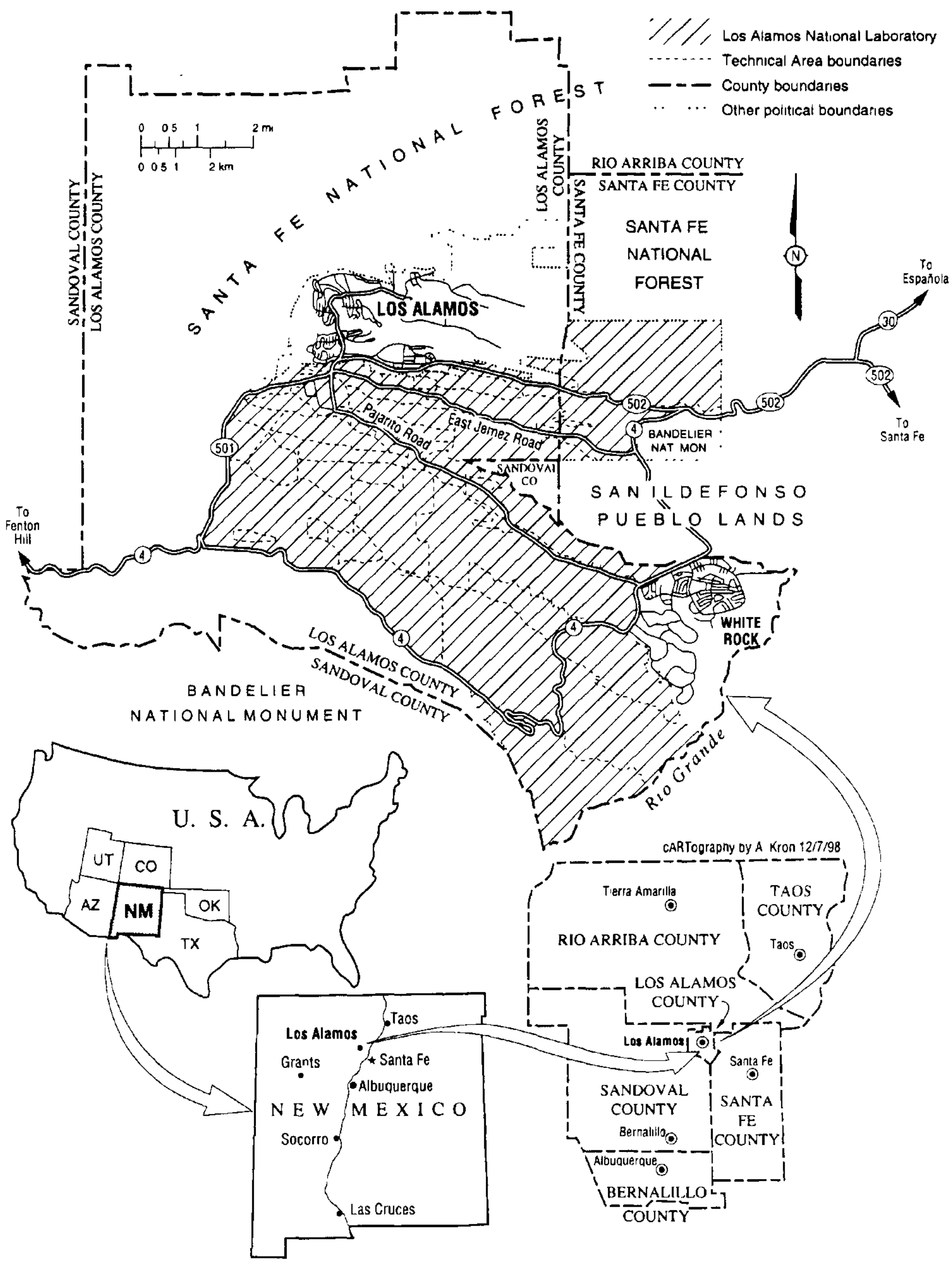

Figure 1. Location of Los Alamos National Laboratory

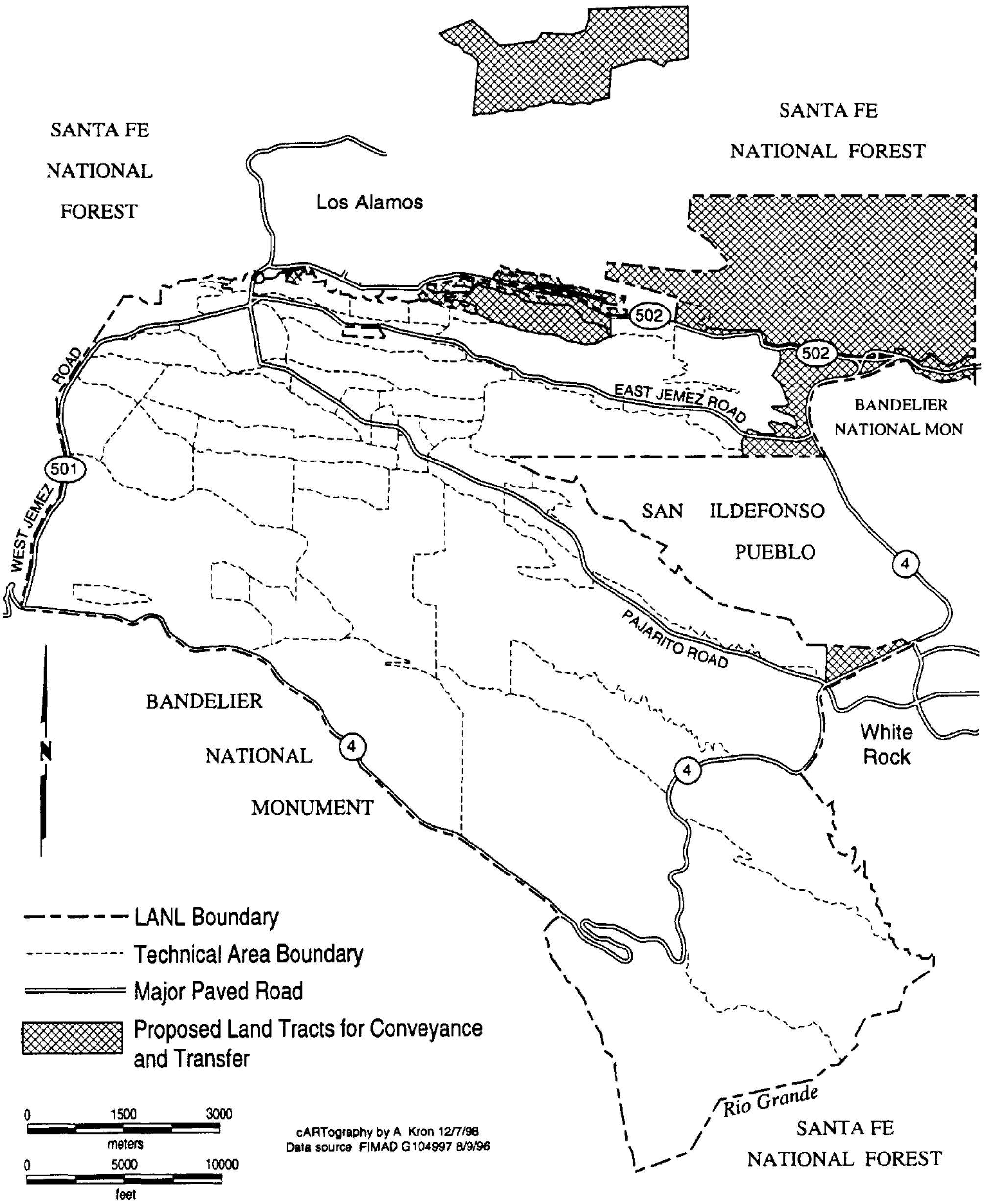

Figure 2. Location of proposed conveyance and transfer land tracts in Los Alamos and Santa Fe Counties

Floodplains are present in the Rendija, TA-21, Airport, White Rock "Y," TA-74, and White Rock tracts. Well-defined wetlands occur in the TA-21, Airport, and TA-74 tracts. These wetlands, although mapped, have not been delineated using the 1987 Corps of Engineers Wetlands Delineation Manual. Wetlands identified by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) exist in Rendija Canyon, White Rock "Y," and White Rock tracts. Additionally, the NWI reflects wetlands in Los Alamos Canyon near the DOE Los Alamos Area Office(LAAO), DP Road, TA-21 tracts, part of the Airport tract, and in Pueblo Canyon near the Airport tract. These NWI wetland features are described using the methodology of Cowardin et al. (1979). Wetlands features cataloged in the NWI may not be consistent with the wetland delineation process in the 1987 Corps of Engineers Wetland Delineation Manual. Table 2 includes information for each tract regarding floodplain and wetland areas. Table 3 includes information for each tract regarding NWI features both within the tract and in nearby canyons. No floodplain or wetland resources are present in the DOE LAAO, Site 22, Manhattan Monument, or DP Road land tracts.

Table 2[1]. Conveyance and Transfer Tracts: Floodplains and Wetlands Areas.

Tract Name	Area ac/ha	Wetland Area in Tract ac/ha	Floodplain Area in Tract ac/ha
Rendija Canyon	910/368	NWI Area, See Table 3 [2]	6.0/2.5
DOE LAAO	15/6	None	None
Site 22	< 0.25/0.10	None	None
Manhattan Monument	< 0.25/0.10	None	None
DP Road	50/20	None	None
TA-21	260/105	NWI Area, See Table 3 [2] See also footnotes 3, and 4	See footnote 5
Airport	205/83	See footnote 4	See footnote 5
White Rock "Y"	540/219	NWI Area, See Table 3 [2]	11.7/4.7
TA-74	2,715/1,099	10.7/4.33 and see footnote 2	37.9/15.3
White Rock	100/40	NWI Area, See Table 3 [2]	4.0/1.64
TOTALS	4,795/1,950	10.7/4.33	56.1/27.6

1. Floodplain and Wetland areas calculated from GIS ARC/INFO and ArcView software using multiple UC data sets (Koch 1998). These figures are preliminary in nature. Final area calculations will be based upon surveyed boundaries for each land tract.
2. This tract includes wetlands identified on the NWI database in "line feature" format. These NWI wetlands are described in Table 3. Methods used to identify these areas may not be consistent with the wetland delineation process in the 1987 Corps of Engineers Wetland Delineation manual.
3. Wetlands in TA-21. These mesa top wetlands were associated with industrial outfalls. At some time in the past, these outfalls resulted in the creation of small (<1 ac, <1 ha) wetlands. These industrial outfalls have since been decommissioned and closed (DOE 1996). Eventually, these wetlands will disappear. This finding was confirmed by on-site evaluation during the 1998 field season.
4. A small (<1 ac, <1 ha) wetland exists in the bottom of DP Canyon, near the head of the canyon. With presently designated conveyance and transfer tract boundaries, portions of this wetland exist in both the Airport Tract (III) and the TA-21 Tract (I).
5. A non-delineated floodplain is present in DP Canyon. Location with respect to land tract has not been established. This floodplain may occur entirely in the TA-21 land tract or be partially in the Airport land tract.

Table 3. Conveyance and Transfer Tracts and Adjacent Canyons: National Wetlands Inventory Features[1] (Bennett 1993)

Tract	NWI Wetland Line Feature on Tract	NWI Wetlands in Nearby Canyons	Length of NWI Feature ft/m	Estimated Area[2] ac/ha
Rendija Canyon	R4SBA[3]	See below	5,597/1,706	1.3/0.5
Rendija Canyon	See above	Guaje Canyon[4] R4SBA/PEM1A[5]	22,068/6,726 40,401/12,314	5.1/2.1 9.3/3.8
DOE LAAO	None	LA Canyon[6] R4SBA/PSS1A[7]	32,369/13,100	7.4/3.0
Site 22	None	None	NA	NA
Manhattan Monument	None	None	NA	NA
DP-Road	None	LA Canyon R4SBA/PSS1A	NA	NA
TA-21	None	LA Canyon R4SBA/PSS1A	NA	NA
Airport	None	Pueblo Canyon[8] R4SBA/R4SBJ[9] PEM1KF[10] R4SBKC[11] PEM1A	24,346/7,421	5.6/2.3
White Rock "Y"	R4SBA/R4SBC[12]	None	19,373/5,905	4.5/1.8
TA-74	R4SBA/R4SBJ PEM1KF[/] R4SBKC	None	13,518/4,120	3.1/1.3
White Rock	R4SBA	None	957/292	0.2/0.09
TOTALS	NA	NA	NA	36.5/14.8

1. Based on electronic versions of the NWI and classification terminology of Cowardin et al. (1979).
2. Area of the NWI wetlands was calculated by multiplying the total length by a mean width of 10 ft (3 m) and converting to acres and hectares.
3. R4SBA - Riverine (associated with a river or stream course, wetland not dominated by trees, shrubs, etc.), intermittent (flowing only part of each annual cycle), streambed (located in a streambed), and temporarily flooded (surface or subsurface water is present some portion of the year).
4. Length of Rendija Canyon NWI below transfer tract measured from tract to New Mexico (NM) State Route 502. Length of Guaje NWI measured from Guaje/Rendija confluence to NM State Route 502.
5. PEM1A - palustrine, (all nontidal wetlands dominated by trees, shrubs), emergent (plant tissue above the water surface), persistent (consistently present), temporarily flooded.
6. Length of Los Alamos Canyon NWI measured from Diamond Drive (Otowi Bridge) to NM State Route 4.
7. PSS1A - palustrine, scrub-shrub, broad-leaved deciduous plant species, temporarily flooded.
8. Length of Pueblo Canyon NWI measured from the West Airport Tract Boundary to NM State Route 502.
9. R4SBJ - riverine, intermittent, streambed, intermittently flooded.
10. PEM1KF - palustrine, emergent, persistent, artificially and intermittently flooded.
11. R4SBKC - riverine, intermittent, streambed, artificially and seasonally flooded.
12. R4SBC - riverine, intermittent, streambed, seasonally flooded

2.0 Description and Effects on Floodplains and Wetlands

Floodplains and wetlands are defined in 10 CFR 1022. 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; ground water discharge, or recharge; land nutrient retention and removal. Wetland values are ascribed by society based on 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, 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 DRAFT LANL Site-Wide Environmental Impact Statement as follows:

> "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 (DOE 1998)."

Presence or absence of floodplains and wetlands on each of the ten land tracts proposed for conveyance or transfer has been assessed using Flood Hazard Boundary Maps for Los Alamos County (DHUD 1987), geographic information system (GIS) data sets, including the USFWS NWI, University of California (UC) internal data sets, on-site surveys, and previously developed floodplain modeling (McLin 1992). Proposed uses for each of the ten tracts being evaluated for conveyance or transfer are discussed, and specific information on floodplains, tract wetlands, and adjoining or nearby wetlands is provided. Land tract boundaries presented in this report are approximate. All land tracts will be surveyed and boundary lines defined prior to conveyance and transfer. These changes, if relevant to floodplain or wetlands concerns, will be addressed in revisions to the information presented in this report, as appropriate.

Each of the ten subject tracts is discussed below in the context of land uses proposed by the future recipients: the Los Alamos County (County), or the Secretary of Interior in trust for the San Ildefonso Pueblo (Pueblo). Only a "bounding" use is analyzed for each tract with respect to floodplains and wetlands. Floodplain and wetland considerations are presented as mandated in 10 CFR 1022 and the DOE Guidance on Environmental Requirements for DOE Real Property Transfers (1997).

Locations of floodplains and wetlands associated with, or in close proximity to, land tracts proposed for conveyance or transfer appear with the discussion of the individual tracts, in sections 2.1 through 2.10, below. McLin (1992) modeled all major 100-year floodplains for LANL using U.S. Army Corps of Engineers Hydrologic Engineering Center Hec-1 and Hec-2 computer based models. Figure 3 represents those floodplains on LANL. Wetlands within LANL have been broadly mapped by the USFWS. This information is available in the NWI in a GIS-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. Additional on-site surveys and internal UC databases were also used to gather information regarding these resources.

Sections 2.1 through 2.10 discuss the direct and indirect (both primary and secondary) effects of the Proposed Conveyance and Transfer Action on floodplain and wetlands resources located in the tracts or located within adjoining or nearby tracts not proposed for conveyance or transfer. Effect of proposed floodplain actions on lives and property, and on natural and beneficial floodplain values is evaluated. Los Alamos County Code NO. 85-70 (1987) identifies and addresses floodplain issues with respect to Los Alamos County lands. Provisions of the Los Alamos County Code No. 85-70 (1987) limit development in floodplains, eliminating or reducing the potential for loss of life or property. Similar provisions are provided by Santa Fe County Building Codes for construction within floodplain areas. Clean Water Act

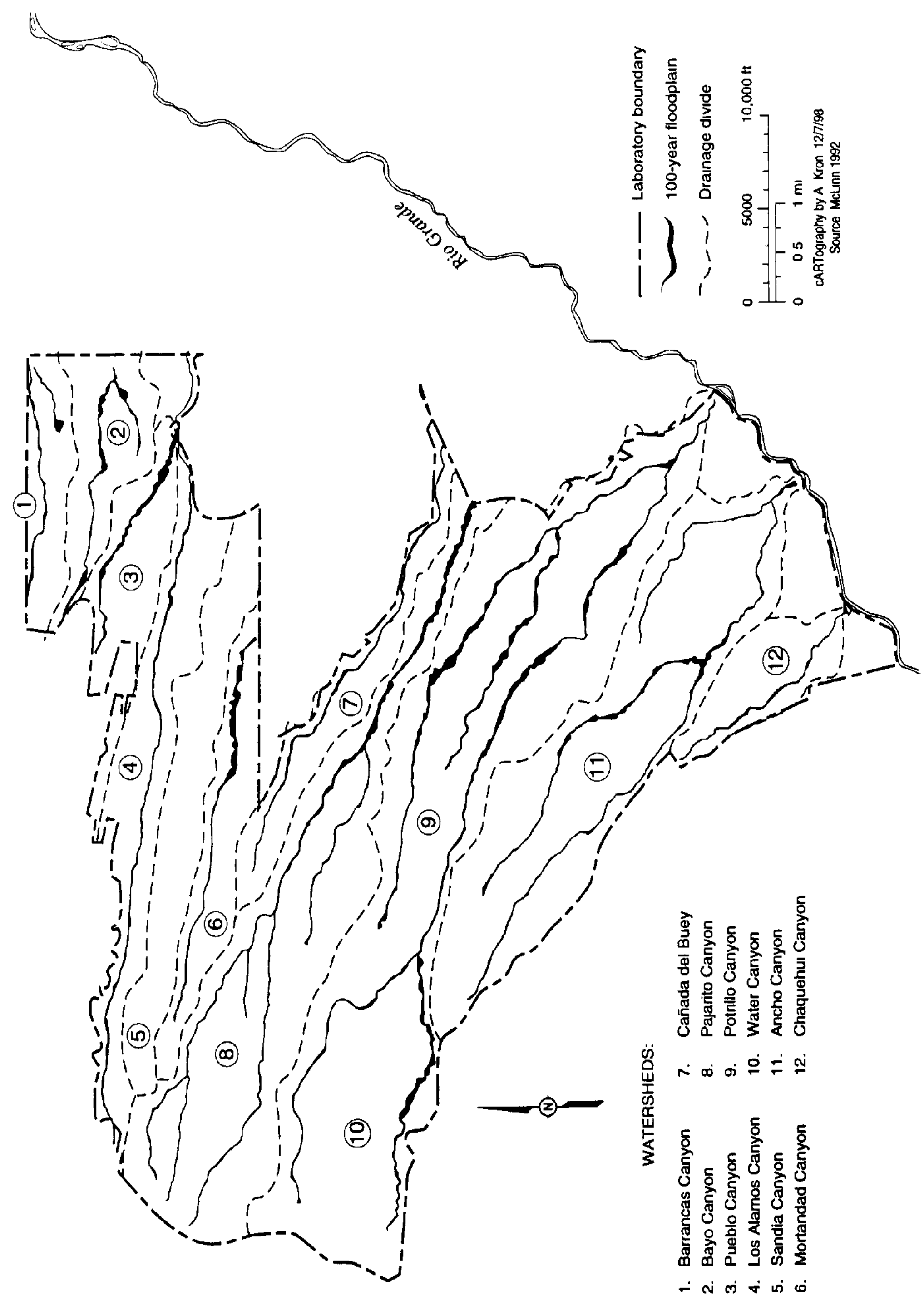

Figure 3. Los Alamos National Laboratory 100-year floodplain map.

404 permit process requirements would limit development in wetlands without regulatory review and consensus from the Corps of Engineers.

In the preparation of this report, a qualitative evaluation of potential development on mesa tops identified increased stormwater flows off mesas into canyons as a concern. These concerns include a potential for impacts to floodplain and wetland values, and contaminant-plume-movement. Potential effects are based on areas of impervious surface during and following development of mesa top areas.

Previous studies have quantified stormwater runoff for areas similar to the TA-21, DP Road, Airport, and DOE LAAO land tracts. In the "Environmental Assessment for the Transfer of the DP Road Tract to the County of Los Alamos, Los Alamos New Mexico," DOE (1997a), an analysis of the effect of changes to the DP Road Tract stormwater run-off is presented, noting:

> 'The Los Alamos Canyon watershed upstream from the DP Road Tract comprises about 24.6 sq km (9.5 sq mi) (based on McLin 1995). The DP Road Tract contributes about 12 hectares (28 acres) to the Los Alamos Canyon watershed. An individual six-hour storm event with a probability of reoccurring once every two years, would produce a total runoff volume in Los Alamos Canyon in the vicinity of the DP Road tract of about 8 acre-feet, with a peak flow of about 19 cubic feet per second.'

DOE concluded that the effects of this change were minimal, stating:

> 'Because stormwater runoff from the DP Road tract would constitute a very small fraction of the runoff from the upstream watershed, surface water quality would not be appreciably affected by the Proposed Action. BMPs (Best Management Practices) to control soil and sediment erosion would be implemented during construction.
>
> Development of the DP Road tract would probably increase stormwater runoff into Los Alamos Canyon. If the County discharges stormwater from a point source then LANL may implement erosion controls, such as the use of hay bales, riprap, and splash pads. Since the DP Road tract is approximately 0.1 percent of the Los Alamos Canyon watershed, the amount of additional runoff from development of the tract would be small compared to that derived from the total upstream watershed area. Therefore, any increase in mobilization of contaminated sediments due to increased runoff is expected to be negligible.'

Additional analysis was performed in the environmental assessment for the Research Park land lease (DOE 1997b). In this instance, DOE noted:

> 'Surface water discharge and soil erosion from annual and 100-year storm events are primary water quality issues associated with the construction and operation of new facilities at LANL. The proposed Research Park tract is situated in an area that is partially developed for use as parking lots and includes vacant land covered by native vegetation and undisturbed rock and soil. The 30 ac (12 ha) proposed for development has a less than 20 percent slope and is divided by a natural drainage channel which flows from the west to the east and northward into Los Alamos Canyon (See Figure 2-2). Los Alamos Canyon contains an established perennial stream, which flows from the west down stream to the east. Currently, it is estimated that the site proposed for development generates 14 acre-feet of runoff per year and could generate 58 cubic feet per second (cfs) during a 100-year flood event (Lemke 1997). Surface water generated during storm events is directly absorbed by soil and vegetation, collected from over a small portion of the site into a small existing retention pond, or flows off the site into Los Alamos Canyon via natural drainage channels.'

In this instance, DOE (1997b) presented two conclusions, one addressing responsibilities of the parties to the lease agreement:

> 'As a provision of the DOE lease on the proposed Research Park tract, the County would be required to apply for, and attain, an NPDES [sic National Pollutant Discharge Elimination System] permit through the State of New Mexico or EPA. As part of the NPDES construction permit application, the County would prepare and submit an NPDES SWPP [sic Storm Water Pollution Prevention (SWPP)] Plan. The NPDES SWPP Plan would formally identify all site surface water drainage plans and the BMPs that would be implemented to avoid unnecessary soil erosion during the construction and operation of the proposed Research Park. The BMPs would include designs for constructing and maintaining all necessary surface water flow check dams, stormwater retention ponds, and other erosion control measures. Specific measures would be implemented to avoid disturbance, stormwater run-on and run-off from existing PRSs as deemed necessary by the NMED and EPA under the NPDES permit.'

and a second, concerning potential impacts:

> 'A maximum of about 30 ac (12 ha) would be disturbed during construction of the proposed Research Park, and after construction, the developed area would consist of an estimated 14.2 ac (5.6 ha) of rooftops, asphalt, and concrete surfaces. Based on this and other site-specific information, LANL analyzed the potential stormwater discharge that could be generated during and after the construction of the proposed Research Park. During construction, the site under development could generate a peak surface water discharge of 58 cfs [sic cubic feet per second] during a single 100-year flood event. Once constructed, the developed area of the proposed Research Park would generate 27 ac-ft [sic acre-feet] of stormwater runoff annually, and could generate as much as 118 cfs during a single 100-year flood event (Lemke 1997).
>
> The EPA has established regulations and guidelines for the development of a SWPP Plan for construction sites. The EPA regulations state that for a common drainage serving an area with 10 or more disturbed ac (4 or more ha), a stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity must be provided to sufficiently control erosion from surface water discharges. During both construction and operation of the proposed Research Park, surface water discharges off the site would be controlled using the BMPs specified in the NPDES permit and SWPP Plan. Under these conditions, the proposed action is not expected to adversely affect water quality.'

Quantitative information with respect to stormwater flood flows from the ten individual land tracts has not been developed. Stormwater flood flows for the White Rock land tract were assessed (McLin 1998) using current commercial versions of the U.S. Army Hec-1 and Hec-2 hydrology models. Soils, slope, and vegetation on the White Rock land tract are similar to conditions existing on other land tracts, but a direct correlation between all tracts has not been established. McLin's (1998) model evaluation of the White Rock land tract indicates current runoff from the White Rock land tract, with no human-made impervious services is 26 cubic feet per second (cfs) (0.7 cubic meters per second [cms]). That flow would increase to 74 cfs (2.1 cms) if one-half of the White Rock land tract were paved. Additional information for other flows is presented in Section 2.10 on the White Rock land tract.

Although this information is not specific to all areas being considered for conveyance or transfer, it reflects the nature and scope of the anticipated effects on floodplain values, wetland values, and potential movement of contaminant plumes in canyon areas. Existing human-made structures designed to collect and convey stormwater flows may be insufficient to control increased stormwater flows. Also, current "end-of-pipe" velocity diffusing devices (such as "rip/rap") and erosion control devices (such as silt fence) may be overwhelmed by increased flows, potentially impacting downstream floodplain or wetland values on lands not associated with the conveyance and transfer process.

2.1 Rendija Canyon Tract

2.1.1 Description

The Rendija Canyon tract consists of approximately 910 ac (368 ha) (Figure 4). Rendija Canyon lies at the extreme north edge of the Los Alamos townsite and extends north and east into open land without facilities or structures. This tract includes a significant portion of Rendija Canyon. The tract is adjacent to Forest Service property in Guaje Canyon to the north and Barrancas Canyon to the south.

Rendija Canyon is mostly undeveloped. There is a shooting range on land leased from DOE and a single residence near the shooting range. A portion of this tract was previously used as a firing site for military ordnance by LANL's management and operations contractor. Water well pumping stations exist in the bottom of the canyon just off the tract.

2.1.2 Proposed Use

Rendija Canyon tract may be used for cultural preservation or natural areas and residential use. Residential use is the bounding use for the purposes of this analysis. The bounding use assumes all land area with less than a 20 percent slope will be incorporated in that use, if the use is commercial, industrial, or residential. Uses for cultural preservation or natural areas assume no development will occur.

2.1.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

Rendija Canyon has an ephemeral stream with a moderately broad floodplain occupying 30 to 50 percent of the canyon bottom. Flow and seasonality information are not available. It is apparent from a reconnaissance of the area that flood waters have occurred in the past. Floodplain information is depicted in DHUD (1987), and was confirmed by on-site evaluation during the 1998 field season (April to October 1998).

Tract Wetlands

Wetlands in Rendija Canyon consist primarily of disjointed segments separated by non-wetland vegetation and exposed rock. These linear wetlands range in width from a few feet (<1 m) to perhaps 10 ft (3 m). Individual segments of wetland plant species range from sparse to moderately dense. These wetlands are primarily riparian (stream associated), and vegetation is dominated by willow (*Salix* sp.). Other species that may occur include cottonwood (*Populus* sp.), Rocky Mountain maple, or box elder (*Ace*r sp.) and water birch (*Betula* sp.). Species of wet grasses may also be present. These riparian wetlands function primarily as sediment traps and also provide valuable habitat diversity for resident animals and migratory birds. Small quantities of water, sufficient for requirements of resident or

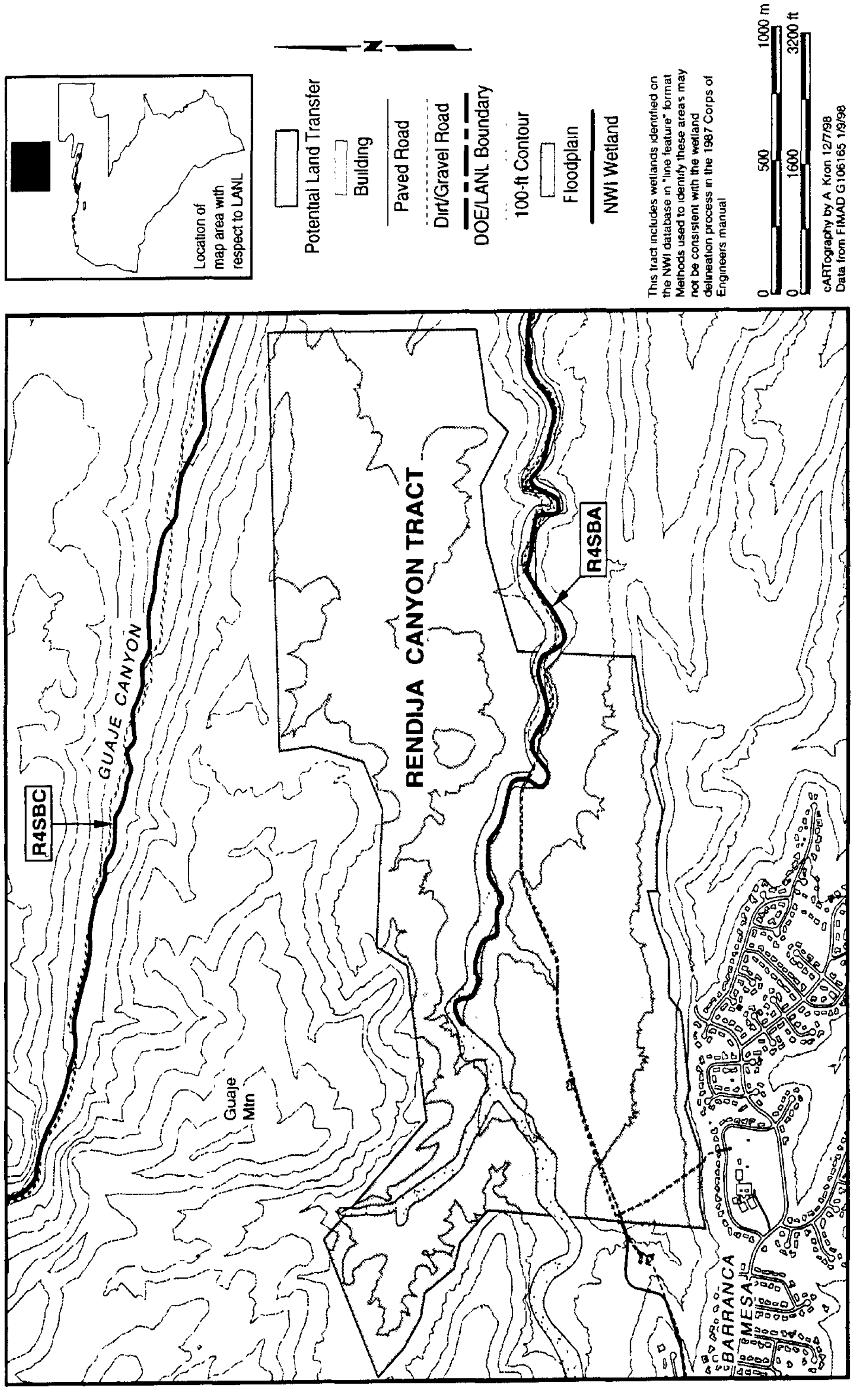

Figure 4. Overview and surface water features (floodplains and wetlands) for proposed land tract Rendija Canyon.

migratory species, may be present during dry portions of the year, depending upon precipitation, evaporation, and other natural processes.

These wetlands were identified as a "line feature" and categorized by the NWI process as "riverine," or "R4SBA," where R-riverine is associated with a river or stream course, wetland not dominated by trees, shrubs, etc., 4-intermittent is flowing only part of each annual cycle, SB-streambed is located in a streambed, and A-temporarily flooded is surface or subsurface water is present some portion of the year. A total of approximately 5,597 ft (1,706 m) of R4SBA category of wetlands exists in the Rendija Canyon land tract. Methods used to identify these areas may not be consistent with the wetland delineation process in the 1987 Corps of Engineers Wetland Delineation Manual. An explanation of the types and extent of these NWI wetlands is presented in Table 3 in Section 1.4 of this assessment.

Summary of Impacts

Direct impacts or effects on floodplain or wetland values have not been identified for the Rendija Canyon land tract. No potential for loss of life or property have been identified with respect to floodplains in this tract.

Primary indirect impacts (on tract lands) resulting from future development of this tract for residential use could result in complete or partial loss of wetlands and their associated values as a direct result of construction activities (removal of wetland areas or impact from vehicle activity) or by indirect effects (such as runoff). Wetland values are described in the first paragraph of Section 2.0 of this assessment. Wetland values potentially impacted by residential development in the Rendija Canyon land tract include food production, nesting or resting habitat, sediment retention, water quality improvement, and experiential or educational. Development in the floodplain portion of the tract could result in a potential for loss of human life and/or property. Mitigations could be installed to reduce or eliminate these impacts.

Secondary indirect impacts (off tract lands) resulting from future development of the Rendija Canyon land tract for residential use could result in effects to floodplain and wetland resources in canyon bottoms not associated with the subject tract. These secondary indirect effects are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Floodplain values potentially impacted by residential development in the Rendija Canyon land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Wetland values potentially impacted by residential development in the Rendija Canyon Land Tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities. Mitigations could be installed to reduce or eliminate these off-site impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and Environmental Protection Agency (EPA) requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity is the EPA standard for NPDES permits for a common drainage serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements.

2.2 DOE Los Alamos Area Office Tract

2.2.1 Description

The DOE LAAO tract consists of approximately 15 ac (6 ha) within the Los Alamos townsite. It is located in the urban portion of the Los Alamos townsite (Figure 5) and is accessible from Trinity Drive, a major vehicle artery. The site is separated from Trinity Drive by private property. This tract is above and to the north of Los Alamos Canyon. All utilities (gas, water, sewer, and electric) are present at the site.

2.2.2 Proposed Use

The DOE LAAO tract has been identified for future commercial or residential use; commercial use constitutes the bounding future use for this analysis. The bounding use assumes all land area with less than a 20 percent slope will be incorporated in that use if the use is commercial, industrial, or residential. Uses for cultural preservation or natural areas assume no development will occur.

2.2.3 Floodplains and Wetlands Description and Summary of Impacts from Conveyance and Transfer Action

Floodplains

The DOE LAAO land tract has no floodplains within its boundaries. Floodplains have been defined in adjacent Los Alamos Canyon.

Tract Wetlands

The DOE LAAO tract has no wetlands within its boundaries. Wetlands have been defined in adjacent Los Alamos Canyon.

Nearby or Adjoining Wetlands

Wetlands are present in Los Alamos Canyon which adjoins the DOE LAAO land tract, the DP Road land tract, the TA-21 land tract, and the Airport land tract (through DP Canyon). These Los Alamos Canyon wetlands consist of lengthy but disjointed segments with non-wetland vegetation or rock areas intermixed. These linear wetland features range in width from one to several feet (<1 m to ~ 3 m) and individual segments of vegetation may be sparse, consisting of only a few plants, or moderately dense. A “riverine” element, or “R4SBA,” has been identified by the NWI, where R-riverine is associated with a river or stream course, wetland not dominated by trees, shrubs, etc., 4-intermittent is flowing only part of each annual cycle, SB-streambed is located in a streambed, and A-temporarily flooded is surface or subsurface water and is present some portion of the year. Vegetation in these stretches is dominated by willow. Other species that may occur include cottonwood, Rocky Mountain maple or box elder, and water birch. Species of wet grasses may also be present.

“Palustrine” reaches of wetlands, or “PSS1A,” have also been identified by the NWI for this tract, where P-palustrine is all non-tidal wetlands dominated by trees and shrubs, SS-scrub-shrub is 1-broad-leaved deciduous plant species, and A-temporarily flooded. These wetlands are primarily riparian (stream associated) in nature, and the understory vegetation is dominated by cattails (*Typha* sp.) or sedges (*Carex* sp.) and rushes (*Juncus* sp.), generally occurring in the stream channel. Overstory species include

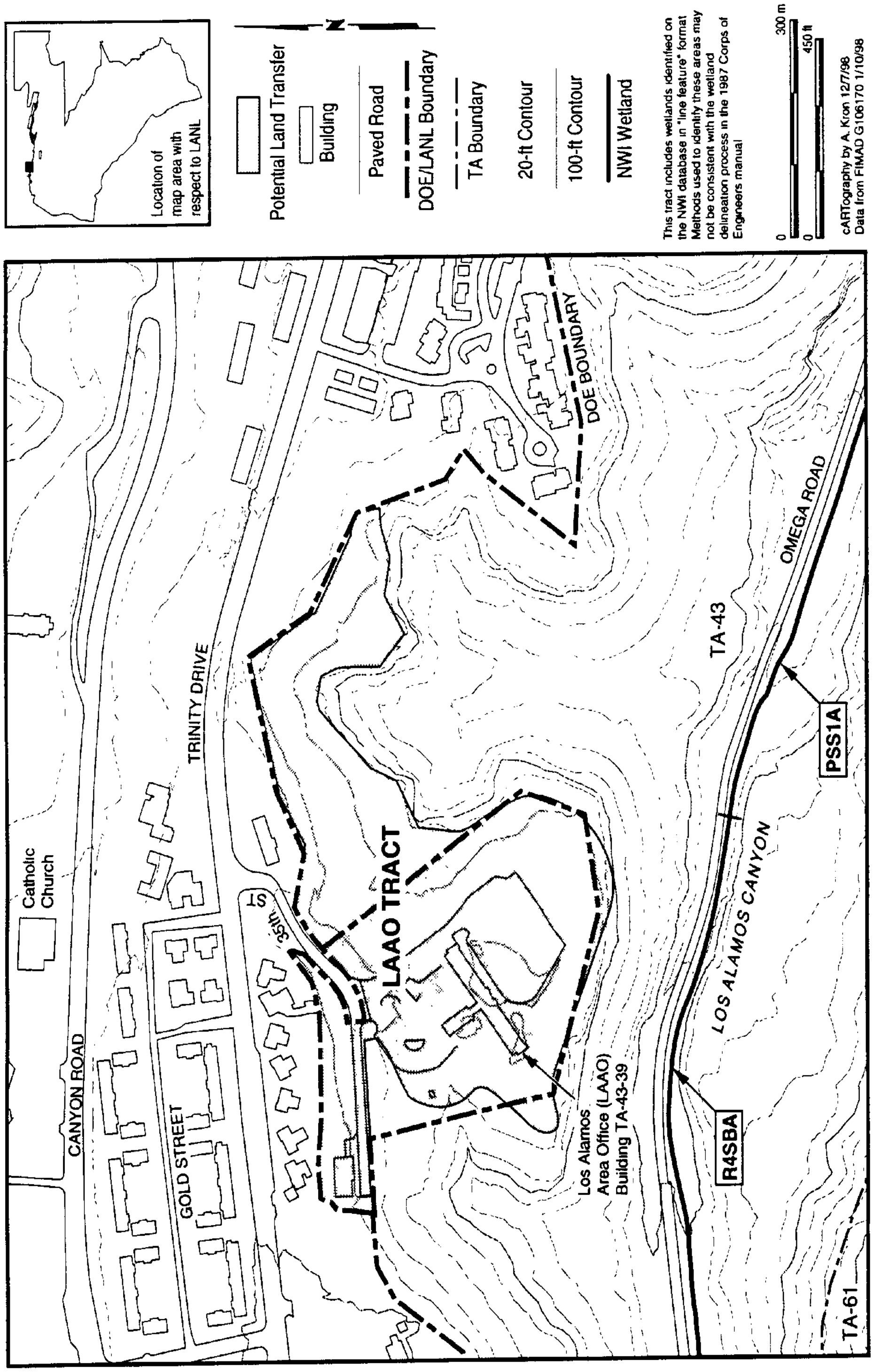

Figure 5. Location of proposed land tract LAAO.

cottonwood and willow with other species such as Rocky Mountain maple or box elder present in some locations.

These riparian wetlands function primarily as sediment traps and also provide valuable diversity of habitat for resident animals and migratory birds. Small quantities of water, sufficient for requirements of resident or migratory species may be present during dry portions of the year, depending upon precipitation, evaporation and other natural processes. Hydrology for these wetlands is surface water and potentially subsurface alluvial flow from the stream in Los Alamos Canyon. A total of 32,369 ft (13,100 m) of RS4BA and PSS1A wetlands are present in Los Alamos Canyon between the Otowi Bridge and New Mexico State Route 4.

Summary of Impacts

Direct impacts or effects on floodplain or wetland values have not been identified for the DOE LAAO land tract. No potential for loss of life or property have been identified with respect to floodplains in this tract.

Primary indirect impacts (on tract lands) to floodplains or wetlands resulting from future development of the DOE LAAO land tract for commercial or industrial use have not been identified. No on tract floodplain or wetland values would be impacted by commercial development on the DOE LAAO land tract.

Secondary indirect impacts (off tract lands) resulting from future development of the DOE LAAO land tract for commercial or industrial use could result in minimum impacts to floodplain and wetland values in canyon bottoms not associated with the subject tract. Off tract floodplain values potentially impacted by commercial development in the DOE LAAO land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration.

Wetland values are described in the first paragraph of Section 2.0 of this assessment. Off tract wetland values potentially impacted by commercial development in the DOE LAAO land tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities. These minor secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation could be installed to eliminate or minimize these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity is the EPA standard for NPDES permits for common drainage serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements.

2.3 Site 22 Tract

The Site 22 land tract consists of a location west of Trinity Drive and surrounded by commercial development (Figure 6) that totals less than 0.25 ac (0.10 ha) in the center of the Los Alamos townsite on the Los Alamos mesa top. Site 22 is immediately adjacent to Los Alamos Canyon and behind commercial developments on Trinity Drive. No floodplains or wetlands are associated with this land tract. Commercial use is the bounding use for this analysis.

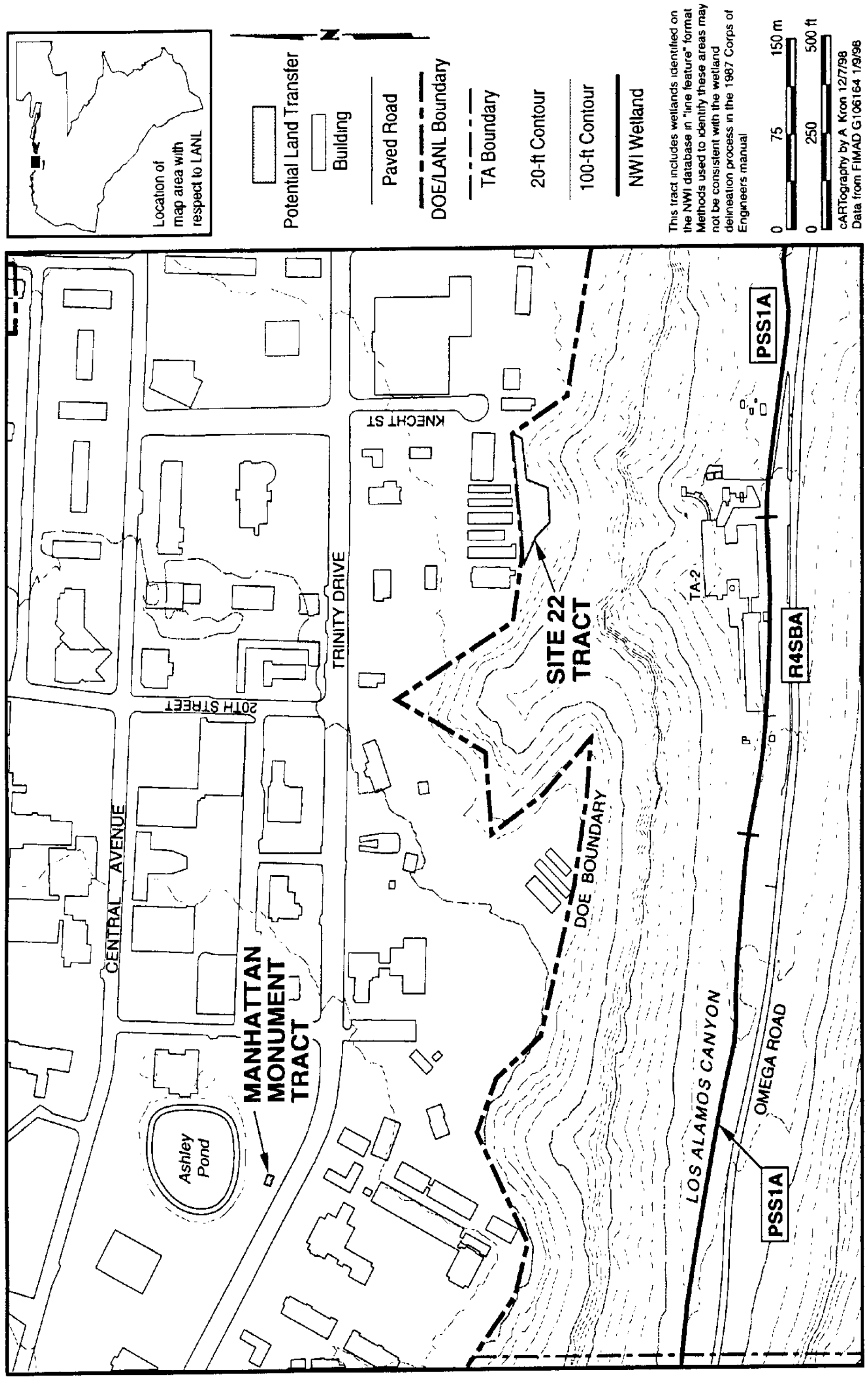

Figure 6. Location of proposed land tract Site 22 and Manhattan Monument.

2.4 Manhattan Monument Tract

The Manhattan Monument (Figure 6) consists of a small timber and roof building in the center of the Los Alamos commercial district. A plaque is displayed. Total area of this site is less than 0.25 ac (0.10 ha). No floodplains or wetlands are associated with this land tract. Future use is expected to remain unchanged.

2.5 DP Road Tract

2.5.1 Description

The DP Road tract consists of approximately 50 ac (20 ha) of generally undeveloped lands on the eastern edge of the Los Alamos townsite (Figure 7). The DP Road segments, north, south and west, are west of the TA-21 Tract and adjacent to it. The south DP Road area is adjacent to Los Alamos Canyon. A portion of the extreme upper end of DP Canyon may be included in the DP Road land tract.

The land proposed for conveyance or transfer is on the mesa top above Los Alamos Canyon on the south and DP Canyon on the north at elevations of approximately 7,200 ft (2,195 m). This tract is bisected by DP Road which terminates at a LANL complex (TA-21) at the end of South Mesa.

2.5.2 Proposed Use

DP Road tract has been identified as an area for commercial and industrial use. DP Road South has been identified for possible residential use. The bounding use for the tract is commercial/industrial. The bounding use assumes all land area with less than a 20 percent slope will be incorporated in that use, if the use is commercial, industrial, or residential. Uses for cultural preservation or natural areas assume no development will occur.

2.5.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

At this time, no floodplains have been identified on the DP Road land tract.

Tract Wetlands

A review of the USFWS NWI revealed no wetlands in the DP Road land tract. An on-site evaluation performed during the 1998 field season confirmed that there are no wetlands within the tract boundaries.

Nearby or Adjoining Wetlands

Wetlands are present in Los Alamos Canyon which adjoins the DP Road land tract. These wetland features are presented in Section 2.2.3 “Nearby or Adjoining Wetlands” for the DOE LAAO land tract.

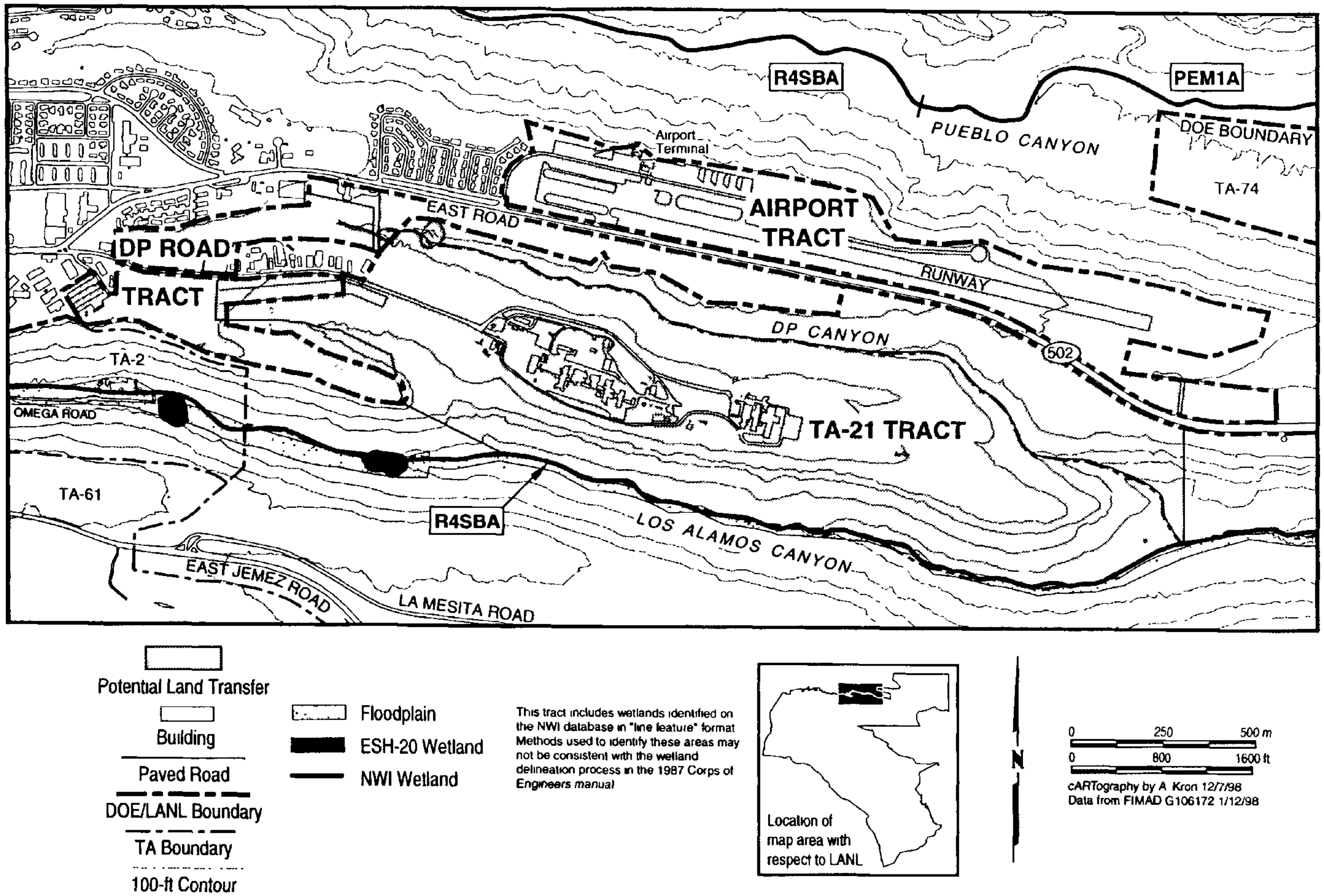

Figure 7. Overview and surface water features (floodplains and wetlands) for proposed land tracts TA-21, DP Road, and Airport.

Summary of Impacts

Direct impacts or effects on floodplain or wetland values have not been identified for the DP Road land tract. No potential for loss of life or property have been identified with respect to floodplains in this tract.

No floodplains or wetlands are present on the DP Road land tract. No primary indirect impacts (on tract lands) resulting from future development of the DP Road land tract for commercial or industrial would occur.

Secondary indirect impacts (off tract lands) resulting from future development of the DP Road land tract for commercial or industrial use could result in minimum effects to floodplain and wetland resources in canyon bottoms not associated with the subject tract. Off tract floodplain values potentially impacted by commercial development in the DP Road land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Wetland values are described in the first paragraph of Section 2.0 of this assessment. Off tract wetland values potentially impacted by commercial development in the DP Road land tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities. These secondary indirect effects are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigations could be installed to eliminate or minimize these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity is the EPA standard for NPDES permits for common drainage areas serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements.

2.6 TA-21 Tract

2.6.1 Description

Technical Area (TA) 21 (Figure 7) consists of approximately 260 ac (105 ha) of land on the eastern edge of the Los Alamos townsite. TA-21 tract is located primarily on a mesa top above Los Alamos Canyon on the south and DP Canyon on the north at elevations of approximately 7,200 ft (2,195 m). A portion of the DP Canyon is included in the TA-21 land tract. TA-21 is among the oldest technical areas at LANL. It is the site of the former radioactive materials (plutonium) processing facility.

2.6.2 Proposed Use

The TA-21 land tract has been identified for commercial and industrial use. Commercial or industrial use constitutes the bounding use. The bounding use assumes all land area with less than a 20 percent slope will be incorporated in that use.

2.6.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

The TA-21 land tract mesa top lands include no floodplain areas. Boundary lines for the TA-21 land tract extend to the canyon bottoms in Los Alamos Canyon and DP Canyon where floodplains exist. Land tract boundaries presented in Figure 7 indicate that a portion of the upper end of DP Canyon is included in the TA-21 land tract. This DP Canyon floodplain has not been evaluated for size or extent.

Tract Wetlands

TA-21 has two types of wetlands present within its boundaries. A review of the USFWS NWI and wetland mapping data of LANL indicated the presence of wetlands in TA-21. At some time in the past, industrial outfalls resulted in the creation of these small, mesa top (<1 ac [<0.4 ha]) wetlands. These industrial outfalls have since been decommissioned and closed. Eventually, these associated wetlands will be depleted and disappear. Additionally, a small section of non-delineated riverine wetland and wetland dominated by willows exists in the bottom of DP Canyon, near the upper end of the canyon. The apparent water source for this wetland is surface runoff from the top and sides of the canyon. This wetland is in the floodplain for DP Canyon. This wetland is located between the Airport land tract on the north and the TA-21 land tract on the south. Final surveys for land tract boundaries may result in this wetland being incorporated in one or the other of these tracts.

Nearby or Adjoining Wetlands

Wetlands are present in Los Alamos Canyon which adjoins the TA-21 land tract. These wetland features are presented in Section 2.2.3 “Nearby or Adjoining Wetlands” for the DOE LAAO land tract.

Summary of Impacts

Direct impacts or effects on floodplain or wetland values have not been identified for the TA-21 land tract. No potential for loss of life or property have been identified with respect to floodplains in this tract.

Primary indirect impacts (on tract lands) resulting from future development of the TA-21 land tract for commercial or industrial use could result in complete or partial loss of wetlands and their associated values as a direct result of construction activities (removal or wetland areas or impact from vehicle activity) or by indirect effects (such as runoff).

Wetland values are described in the first paragraph of Section 2.0 of this assessment. Wetland values potentially impacted by commercial or industrial development in the TA-21 land tract include food production, nesting or resting habitat, sediment retention, water quality improvement, and experiential or education. Mitigations could be installed to eliminate or minimize these impacts.

Secondary indirect impacts (off tract lands) resulting from future development of the TA-21 land tract for commercial or industrial use could result in slight impacts to floodplain and wetland resources in canyon bottoms not associated with the subject tract. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigation could be installed to minimize or eliminate these impacts. Off tract floodplain values potentially impacted by commercial development in the TA-21 land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Off tract wetland values potentially impacted by commercial development in the TA-21 land tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity is the EPA standard for NPDES permits for a common drainage serving an area with 10 or more disturbed acres (4 ha or more).
Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements.

2.7 Airport Tract

2.7.1 Description

The Los Alamos Airport tract consists of approximately 205 ac (83 ha) located east of the Los Alamos townsite (Figure 7). The Airport Tract is immediately adjacent to New Mexico State Route 502 (East Road) near the old “East Gate” location.

The Airport tract occupies the mesa top above Pueblo Canyon on the south and Bayo Canyon on the north. To the south approximately 0.4 km (0.25 mi), is Los Alamos Canyon. Single-family residential development borders the western side of this tract and commercial development and East Gate Park are to the east on New Mexico State Route 502. Airport features include a single runway, taxi-ways, a terminal building, private hangars, parking and other associated facilities. All utilities are available: water, sewer, gas, and electric. Commercial air transportation has been present at this site since 1948. Prior to use as an airport, the area was used as a landfill. Other areas of the tract are currently undeveloped.

2.7.2 Proposed Use

The Airport tract has been identified as an area for commercial use or commercial and industrial use. The bounding use assumes all land area with less than a 20 percent slope will be incorporated in that use, if the use is commercial, industrial, or residential. Uses for cultural preservation or natural areas assume no development will occur.

2.7.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

The Airport land tract contains primarily mesa top lands and includes no floodplains on the mesa top. Land tract boundaries presented in Figure 7 indicate that a portion of the upper end of DP Canyon is included in the Airport land tract. This DP Canyon floodplain has not been evaluated for size or extent.

Tract Wetlands

The Airport land tract has no USFWS NWI wetlands. However, a small willow-dominated wetland exists in the bottom of DP Canyon near the top of the drainage. With the designated tract boundaries, portions of this wetland exist in both the Airport tract and the TA-21 tract. This wetland and potential impacts to wetland values are discussed in Section 2.6, TA-21 Land Tract.

Nearby or Adjoining Wetlands

Adjoining the Airport land tract is Pueblo Canyon (Figures 3 and 8) where stretches of riverine (R4SBA) and palustrine (PEM1A) wetlands are identified by the USFWS NWI. These wetlands are discussed in the TA-74 Land Tract, Section 2.9.3.

Summary of Impacts

Direct impacts on floodplain or wetland values have not been identified for the Airport land tract. No potential for loss of life or property has been identified with respect to floodplains in the tract.

Primary indirect impacts (on tract lands) resulting from future development of the Airport land tract for commercial or industrial use could result in complete or partial or complete loss of wetlands and their associated values as a direct result of construction activities (removal or wetland areas or impact from vehicle activity) or by indirect effects (such as runoff).

These losses of floodplain and wetland values are discussed in the TA-74 and TA-21 sections. Mitigations could be installed to eliminate or minimize these impacts.

Secondary indirect impacts (off tract lands) resulting from future development of the Airport land tract for commercial or industrial use could result in minor impacts to floodplain and wetland resources in canyon bottoms not associated with the subject tract. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Mitigations could be installed to minimize or mitigate these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity is the EPA standard for NPDES permits for a common drainage serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites would be subject to NPDES permit restrictions and requirements.

2.8 White Rock "Y" Tract

2.8.1 Description

The White Rock "Y" tract (Figure 8) consists of approximately 540 ac (219 ha) of undeveloped land. It is adjacent to New Mexico State Route 4 and a portion of Bandelier National Monument. It is located at the extreme southern end of LANL property. The White Rock "Y" tract area is adjacent to Los Alamos Canyon to the east, and Mortandad, and Sandia canyons to the west.

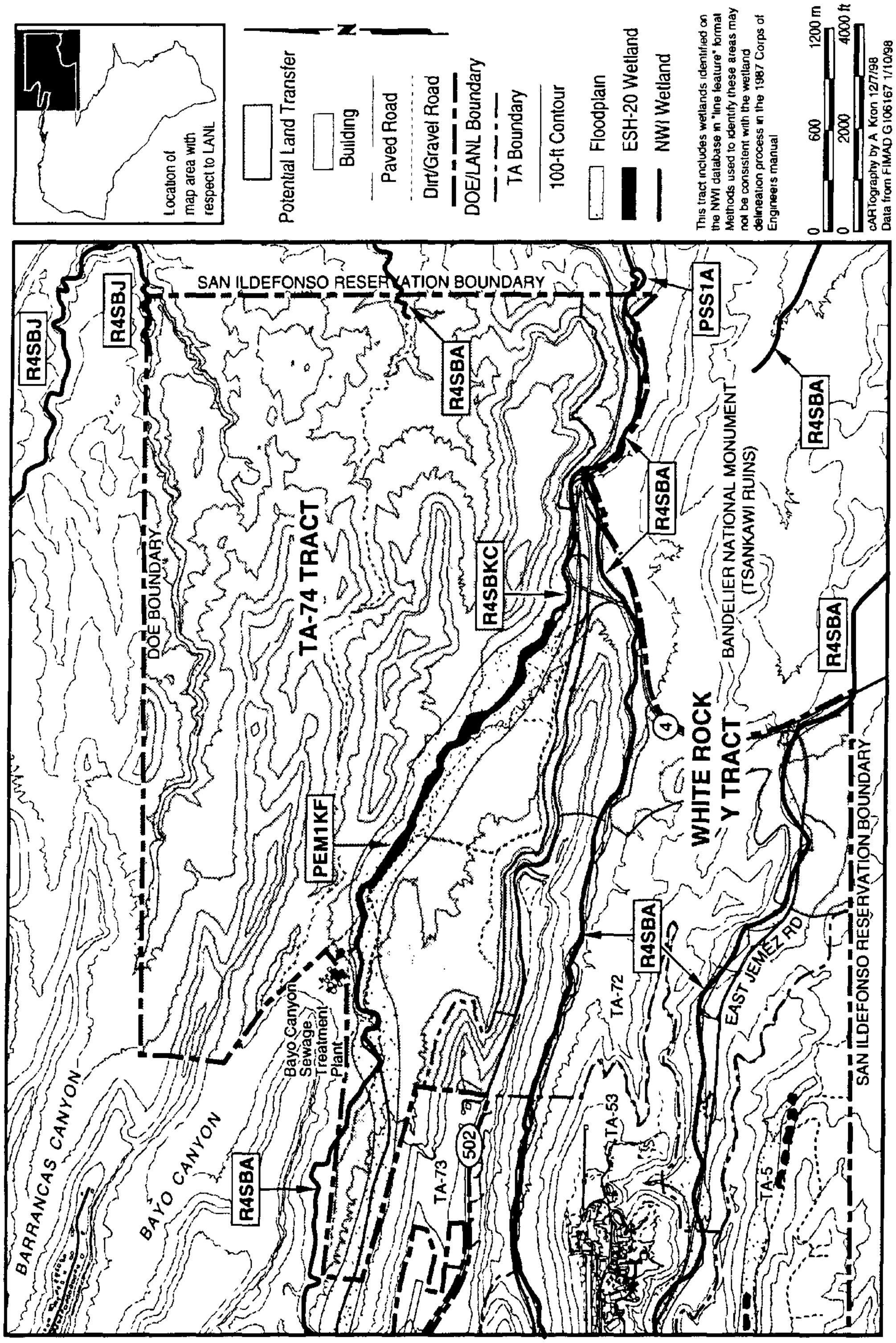

Figure 8. Overview and surface water features (floodplains and wetlands) for proposed land tract TA-74 and White Rock “Y”.

2.8.2 Proposed Use

The White Rock "Y" tract has been identified for cultural preservation use or as an area for natural areas, transportation, and utility use. The bounding land use is natural areas, transportation, and utility use for the purposes of this analysis. The bounding use for the White Rock "Y" land tract includes no development.

2.8.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

Los Alamos Canyon and its perennial stream and floodplain cross the White Rock "Y" land tract. Additionally, the ephemeral Sandia Canyon stream and portions of its floodplain are present in the White Rock "Y" land tract.

Tract Wetlands

Wetlands in the White Rock "Y" land tract consist primarily of severely disjointed segments separated by non-wetland vegetation and exposed rock. These linear wetlands range in width from a few feet to perhaps 10 ft (3 m). Individual segments of wetland plant species range from sparse to moderately dense. White Rock "Y" wetlands are categorized by the NWI process as riverine (R4SBA) in "line feature" format. A total of approximately 19,373 ft (5,905 m) of this category of wetlands exists the White Rock "Y" land tract. These wetlands are primarily riparian (stream associated) in nature and the vegetation is dominated by willow. These riparian wetlands function primarily as sediment traps and also provide valuable diversity of habitat for resident animals and migratory birds. Small quantities of water, sufficient for requirements of resident or migratory species may be present during dry portions of the year, depending upon precipitation, evaporation, and other natural processes. Methods used to identify these areas may not be consistent with the wetland delineation process in the 1987 Corps of Engineers Wetlands Delineation Manual.

Nearby or Adjoining Wetlands

Wetlands are present in both Sandia Canyon, to the west of the White Rock "Y" land tract and upstream in Los Alamos Canyon. As these wetlands are upstream of the White Rock "Y" land tract, no impacts to these resources are anticipated as a result of conveyance and transfer activities. Wetlands present in Los Alamos Canyon are described in Section 2.2.3 addressing the DOE LAAO land tract.

Summary of Impacts

Direct impacts on floodplain or wetland values have not been identified for the White Rock "Y" tract. No potential for loss of life or property has been identified with respect to floodplain in the tract. Floodplain values in the White Rock "Y" have been impacted by previous actions such as highway and utility corridors. Any additional construction actions taken in this floodplain could further erode floodplain values. Development actions taken in the White Rock "Y" floodplain for transportation and utility use could result in loss of floodplain values from land disturbance. These impacts would be expected to be minor and short term. Mitigations could be installed to eliminate or minimize these impacts.

Secondary indirect impacts (off tract lands) resulting from future development of the White Rock "Y" tract for installation of utilities or roadways could result in impacts to floodplains and wetland resources in canyon bottoms not associated with the subject tract. These minor secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Floodplain values potentially impacted by future utility development in the White Rock "Y" land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Wetland values potentially impacted by future utility development in the White Rock "Y" land tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities. Mitigations could be installed to eliminate or minimize these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 ($100m^3$) of storage capacity is the EPA standard for NPDES permits for a common drainage serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements.

2.9 TA-74 Tract

2.9.1 Description

The TA-74 tract (Figure 8) is approximately 2,715 ac (1,099 ha) north and east of the Los Alamos townsite partially within Bayo/Pueblo Canyon confluence and extends into remote locations. TA-74 is adjacent to New Mexico State Route 4. It is mostly undeveloped and covered with natural vegetation, including ponderosa pines and shrubs.

2.9.2 Proposed Use

The TA-74 tract has been identified for cultural preservation or natural areas and utility use. For the purposes of this analysis, the natural area and utility use is the bounding use.

2.9.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

Floodplains exist for both Bayo and Pueblo Canyons in the TA-74 tract. McLin (1992) reports a floodplain in the northeast portion of the TA-74 tract in addition to the centrally located floodplain below the Los Alamos County Waste Water Treatment Facility.

Tract Wetlands

Extensive stretches of NWI riverine and palustrine wetlands are a dominant visual feature of the TA-74 area, occupying up to 30 percent of the canyon bottom. This finding was confirmed by field observation in the 1998 field season. The riverine element of these wetlands has vegetation dominated by willow. Other species that may occur include cottonwood, Rocky Mountain maple or box elder, and water birch. Species of wet grasses may also be present.

More extensive global positioning system mapping of the wetlands in TA-74 has been completed. Approximately 10.7 ac (4.3 ha) of wetlands were identified within the TA-74 tract. Plant species in the wetland understory confirmed during this process included those noted in Table 4, including wetland indicator status for each species. It is important to note that the hydrology supporting this wetland receives a major contribution from the Los Alamos County Waste Water Treatment Facility located off the tract at the base of the mesa separating Bayo and Pueblo canyons (Figure 8). Palustrine (PSS1A) wetlands are present. As described in Section 2.2.3, these wetlands are dominated by wetland grasses and rushes with small areas of cattails present.

These riparian wetlands function primarily as sediment traps and also provide valuable diversity of habitat for resident animals and migratory birds. Small quantities of water, sufficient for requirements of resident or migratory species may be present during dry portions of the year, depending upon precipitation, evaporation, and other natural processes A total of approximately 13,518 ft (4,120 m) of this category of wetlands exists in the TA-74 land tract. Methods used to identify these areas may not be consistent with the wetland delineation process in the 1987 Corps of Engineers Wetlands Delineation Manual.

Table 4[1]. Understory Plant Species Confirmed in the TA-74 Wetland

Species Code	Species Name	Common Name	Relative Occurrence	Wetland Plant[2] Indicator Status
AGAL (AGG12)	*Agrostis alba auct*.non L. *Argostis gigantea* Roth	redtop	Occasional	FacW+
ECCU	*Echinochioa cus-galli* (L.) Beauv.	barnyard grass	Predominant vegetation	FacW
JUIN (JUIN2)	*Juncus interior* Wieg.	inland rush	Occasional	FacW
RUCR	*Rumex crispus* L.	curlyleaf dock	Abundant	FacW
URTI (URDIG)	*Urtica dioica* ssp. Gracillis (Alt.) Seland	stinging nettle	Abundant	FacW
TYLA	*Typha latifolia* L.	cattail	Rare	Obligate
XAST	*Xanthium strumarium* L.	cocklebur	Rare	Fac + to Fac-

1. Species list composed during the 1998 field season.
2. Wetland Plant Indicator Status (Reed, 1988)
   - FAC = Facultative plants are equally likely to occur in wetlands or nonwetlands.
   - ECO = Economic
   - FACU = Facultative upland plants usually occur in nonwetlands.
   - NW = Non-weedy
   - COL = Colonizing
   - FACW = Facultative wetland plants usually occur in wetlands.
   - OBL = Obligate wetland plants occur almost always in wetlands.

Nearby or Adjoining Wetlands

No wetlands have been identified in land tracts nearby the TA-74 land tract.

Summary of Impacts

Direct impacts or effects on floodplain or wetland values have not been identified for the TA-74 land tract. No potential forms of life on property has been identified with respect to floodplains on the tract.

Primary indirect impacts (on tract lands) resulting from future development of this tract for utility use could result in partial or complete loss of wetlands and their associated values as a direct result of construction activities (removal of wetland areas or impact from vehicle activity) or by indirect effects (such as runoff).

Development in this tract could result in a potential for loss of property if within the floodplain area. Actions taken in the TA-74 wetlands could adversely impact survival, quality, and natural and beneficial values of the wetlands. Wetland values are described in the first paragraph of Section 2.0 of this assessment. Wetland values potentially impacted by future utility development in the TA-74 land tract include food production, nesting or resting habitat, sediment retention, water quality improvement, and experiential or education use. Mitigations could be installed to minimize or eliminate these impacts.

Secondary indirect impacts (off tract lands) resulting from future development of the TA-74 land tract for utility use could result in minor impacts to floodplain and wetland values in canyon bottoms not associated with the subject tract. These minor secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract, and from increases in sewage treatment effluents. Floodplain values potentially impacted by future utility development in the TA-74 land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Wetland values potentially impacted by future utility development in the TA-74 land tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities. Mitigations could be installed to minimize or eliminate these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 (100 m^3) of storage capacity is the EPA standard for NPDES permits for a common drainage area serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements; sewage plant effluents would similarly require permitting, as appropriate.

2.10 White Rock Tract

2.10.1 Description

The White Rock tract consists of approximately 100 ac (40 ha) of undeveloped lands immediately adjacent to New Mexico State Route 4. State Route 4 separates the tract from the City of White Rock (Figure 9). It borders a portion of the San Ildefonso Indian Reservation Sacred Area. LANL’s current low-level waste landfill facility (TA-54) is adjacent to this tract. Cedro Canyon to the east and Pajarito Canyon to the west are adjacent to this tract. Canada del Buey passes through this tract and continues into the town of White Rock. The floodplain in this area is conveyed under State Route 4 via a culvert. A water pump station is located near the eastern terminus of the tract and the Los Alamos Chamber of Commerce operates a small visitor center on the south side adjacent to New Mexico State Route 4.

2.10.2 Proposed Use

The White Rock tract has been identified for cultural preservation and commercial development or commercial and residential use. The use of the tract for commercial and residential use is the bounding

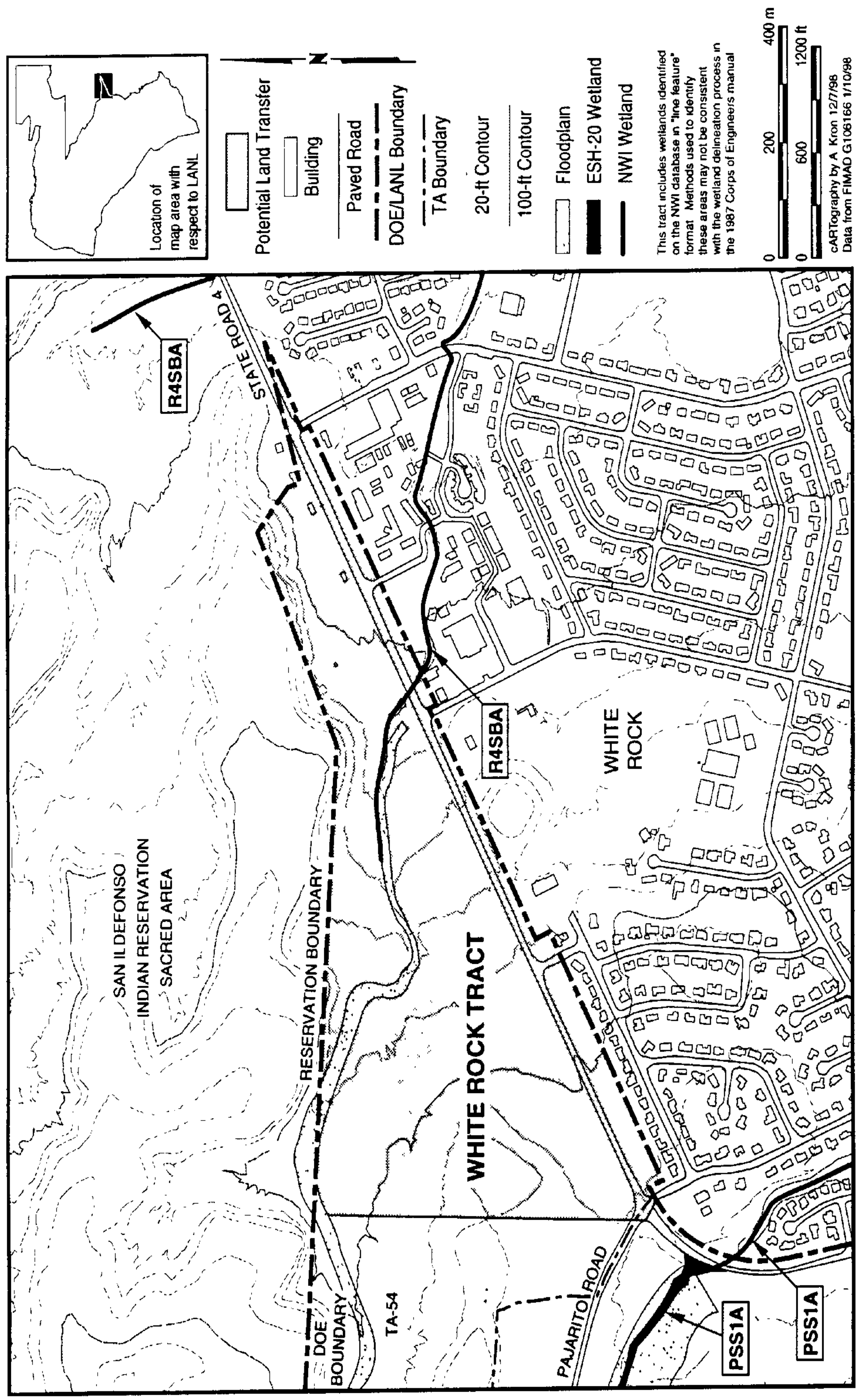

Figure 9. Overview and surface water features (floodplains and wetlands) for proposed land tract White Rock.

use for this analysis. The bounding use assumes all land area with less than a 20 percent slope will be incorporated in that use, if the use is commercial, industrial, or residential. Uses for cultural preservation or natural areas assume no development will occur.

2.10.3 Floodplains and Wetlands Description and Impacts from Proposed Conveyance and Transfer Action

Floodplains

Canada del Buey and its associated floodplain pass through the White Rock land tract. Potential for effects on off-tract resources and values exists. McLin (1998) modeled stormwater flows for the White Rock tract. Values for existing conditions (no human-made impervious surfaces) and for several potential impervious surface levels (percentages of the tract) are presented in Table 5.

Table 5. Surface Water Flow from White Rock Land Tract Assuming Various Levels of Impervious Surface.

Percent of Tract Impervious	0 percent (existing conditions)	10 percent	20 percent	50 percent	70 percent	100 percent
Peak Q water flow (cfs/cms)	26/0.7	35/1.0	45/1.3	74/2.1	94/2.7	123/3.5
24-hr runoff volume (ac-ft)	1.98	3.97	5.95	7.93	9.92	11.90

Tract Wetlands

Wetlands segments in the White Rock land tract consist primarily of extremely disjointed segments separated by expanses of non-wetland vegetation and exposed rock. These linear wetlands range in width from a few feet to perhaps 10 ft (3 m). Individual segments of wetland plant species range from sparse to moderately dense. These riparian wetlands function primarily as sediment traps and also provide valuable diversity of habitat for resident animals and migratory birds. Small quantities of water, sufficient for requirements of resident or migratory species may be present during dry portions of the year, depending upon precipitation, evaporation, and other natural processes Wetlands identified from the USFWS NWI were in “line feature” format and categorized as riverine (R4SBA). A total of approximately 957 ft (292 m) of this category of wetlands exist in the White Rock tract. Methods used to identify these areas may not be consistent with the wetland delineation process in the 1987 Corps of Engineers Wetlands Delineation Manual.

Nearby or Adjoining Wetlands

Pajarito Canyon, located south and west of the tract, contains wetlands within the stream channel (Figure 9). These adjoining wetlands should not be subjected to direct or indirect impacts as a result of development activities in the White Rock land tract due to their upstream location and associated spatial separation from the tract.

Summary of Impacts

Direct impacts on floodplain and wetland resources have not been identified for the White Rock tract. No potential for loss of life or property have been identified with respect to floodplain in this tract.

Primary indirect impacts (on tract) resulting from commercial development in the White Rock land tract could eliminate floodplain values in the portion of the floodplain within the tract. Development on this site may require changes to the culvert under State Route 4 that conveys the Canada del Buey floodplain under the highway. A potential exists for adverse effects on lives and property subsequent to development of this land tract. Mitigations could be installed to eliminate these impacts.

Secondary indirect impacts (off tract lands) resulting from future development of the White Rock land tract for commercial use could result in impacts to floodplain and wetland resources in canyon bottoms not associated with the conveyance and transfer tracts. These secondary indirect impacts are anticipated to come from both changes in timing of stormwater runoff and increases in stormwater runoff from increased impermeable surfaces within the tract. Floodplain values potentially impacted by commercial development in the White Rock land tract include alteration of flood flow retention times, redistribution of sediments, and stream channel migration. Wetland values potentially impacted by development in the White Rock land tract include alteration of downstream wetland food production, nesting or resting habitat, sediment retention time changes, and loss of experiential or educational opportunities. Mitigations could be installed to minimize or eliminate these impacts.

At a minimum, best management practices for runoff control, such as silt barriers and stormwater retention ponds, should be in place to mitigate runoff effects during construction or development efforts. These best management practices should incorporate considerations of the NPDES permit program and EPA requirements for a SWPP Plan on projects where more than 5 ac (2 ha) will be disturbed. A stormwater retention pond providing 3,600 ft^3 ($100m^3$) of storage capacity is the EPA standard for NPDES permits for a common drainage serving an area with 10 or more disturbed acres (4 ha or more). Following construction, stormwater runoff from developed sites may be subject to NPDES permit restrictions and requirements.

3.0 Mitigations to the Proposed Conveyance and Transfer Action

Floodplains are present in six of the ten tracts proposed for conveyance or transfer: Rendija Canyon, TA-21, Airport, White Rock “Y,” TA-74, and White Rock land tracts. Impacts to floodplains are not expected for proposed uses such as cultural preservation or natural areas which do not involve significant development. Mitigation actions associated with activities in floodplains could be evaluated against requirements of the Los Alamos Code Ordinance NO. 85-70 “An Ordinance Repealing Chapter 15.16 of the Los Alamos County Code Adopting a New Chapter 17.70 Pertaining to Flood Damage Prevention.” This statute addresses development in floodplains on County lands. Similar county code ordinances are applicable to land within Santa Fe County. Mitigation to impacts associated with commercial, industrial, and residential development will require on-site efforts during and after development. These mitigation actions may include avoiding construction in all areas of floodplains or developing buffer areas around floodplains. Specific terms in the conveyance and transfer documents could establish the legal requirements for these mitigation actions.

Wetlands are present in Rendija Canyon, TA-21, Airport, White Rock “Y,” TA-74, and White Rock land tracts. Potential wetland impacts could be evaluated against requirements of the Clean Water Act 404 permit process, implementation of SWPP measures and NPDES permitting requirements.

Impacts to off-site resources could be mitigated by appropriate management of stormwater runoff during construction and operation of new facilities or activities. These mitigation actions could include elimination of construction activities in wetland areas or establishing buffer areas around wetlands to reduce or eliminate impacts. Specific terms in the conveyance and transfer documents could establish the legal requirements for these mitigation actions.

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APPENDIX E CULTURAL RESOURCE ASSESSMENT

This appendix contains detailed information on the cultural resources that may be impacted by the conveyance or transfer of these tracts and the contemplated land uses. It provides a discussion of the studies that have been conducted to identify cultural resources, a description of the recorded cultural resources on each tract, background information on cultural resource types, an overview of the past and continued human use of the area, and a discussion of the traditional cultural property (TCP) consultation process.

APPENDIX E CULTURAL RESOURCE ASSESSMENT

E.1 Introduction

This appendix provides additional information used in assessing the potential impacts to cultural resources occurring as a result of the transfer or conveyance of land parcels at LANL. It provides background on cultural resource studies that have been conducted in the LANL area and the methods used to identify cultural resources. A more detailed cultural chronology is provided to supplement the discussion in Chapter 3, Section 3.2.8 of the CT EIS. This chronology, in table form, summarizes the long history of human use of the LANL area. In addition, the types of resources that have been recorded in the region of influence (ROI) are described in greater detail.

E.2 Previous Cultural Resource Studies

Cultural resource studies of the LANL area include prehistoric resource studies, historic resource studies, and studies of TCPs. Prehistoric resource studies include reconnaissance, survey, and excavation of archaeological resources. Historic resource studies also include inventories of archaeological resources, as well as research into buildings and structures that are associated with historic people or events or are architecturally important. TCP studies include research and consultation to identify places of ongoing traditional use or of cultural or religious significance to contemporary groups. A more detailed review of previous studies is presented in Appendix E of the LANL SWEIS (DOE 1999c).

A number of previous cultural resource inventories have been conducted at LANL that include all or portions of the tracts considered for conveyance or transfer. Most of these studies have been conducted in the past 10 years in compliance with Section 106 of the *National Historic Preservation Act* (NHPA) for specific undertakings related to construction, decontamination and demolition, environmental studies, and environmental restoration. To provide information for the CT EIS, all 10 proposed tracts have now been completely inventoried for prehistoric and historic resources.

As part of the LANL SWEIS study, a TCP study was conducted that involved consultations with 19 Native American tribes and two Hispanic communities to identify cultural resources in the LANL region important to them. Contacts were made initially with 23 Native American tribes; however, four chose not to participate in the consultations. All of the consulting groups stated that they had at least some TCPs present on or near LANL; however, specific locations were not identified. Legal counsel for San Ildefonso Pueblo has indicated that TCPs are present on four of the tracts. Consultation with potentially interested tribes is not included in the results of this CT EIS. However, extensive consultations will be completed prior to conveyance and transfer of any proposed tracts (see Chapters 16 and 17).

E.3 Research Methods: Identification of Cultural Resources

E.3.1 Prehistoric and Historic Resources

Information for this CT EIS regarding known prehistoric and historic resources on tracts considered for transfer or conveyance was obtained from several sources. The principal source of information was the LANL Cultural Resource Management Team (CRMT), which maintains comprehensive hardcopy records and electronic databases of cultural resources located on LANL lands. Results of CRMT surveys of the tracts were reviewed and utilized for impact analyses (DOE 1998d).

E.3.2 Traditional Cultural Properties

The LANL CRMT also was able to provide some information on TCPs located within or near the 10 land tracts. This information was obtained by them during previous environmental studies through consultations with nearby tribes. Records of the LANL SWEIS ethnographic research and consultations were reviewed for this CT EIS to determine any previously recorded concerns for TCPs located in or near the land tracts.

As stated earlier, consultations with Native American tribes were not completed for the CT EIS; however, consultations will be completed prior to conveyance and transfer of any proposed tracts (see Chapters 16 and 17). These consultations will be conducted to identify the presence and locations of TCPs within the ROI, to assess potential direct and indirect impacts to these TCPs, and to provide recommendations for avoiding or mitigating any potential adverse impacts. As with the LANL SWEIS, 23 tribes are identified for consultation. These tribes included:

- Hopi Tribe
- Jicarilla Apache Tribe
- Mescalero Apache Tribe
- Navajo Nation
- Pueblo of Acoma
- Pueblo of Cochiti
- Pueblo of Isleta
- Pueblo of Jemez
- Pueblo of Laguna
- Pueblo of Nambe
- Pueblo of Picuris
- Pueblo of Pojoaque
- Pueblo of Sandia
- Pueblo of San Felipe
- Pueblo of San Ildefonso
- Pueblo of San Juan
- Pueblo of Santa Ana
- Pueblo of Santa Clara
- Pueblo of Santo Domingo
- Pueblo of Taos
- Pueblo of Tesuque
- Pueblo of Zia
- Pueblo of Zuni

The consultation process involves one to three stages, dependent upon the response of the individual tribes.

E.3.2.1 Stage 1: Initial Consultation with Potentially Interested Tribes

This stage has been completed. It involves identifying the appropriate contact, usually the director of the tribal environmental or cultural resources department, at each of the 23 tribes. Two letters have been sent to this contact, as well as to the governor/chairman/president of each tribe. The letters describe the CT EIS and the effort underway to identify TCPs, asks if the tribe has concerns for TCPs in the 10 land tracts, and offers to provide the tribe with a project briefing and a tour of the land tracts at their convenience.

E.3.2.2 Stage 2: Continued Consultation with Interested Tribes

Consultation will continue with those tribes who express a concern for TCPs potentially located within the 10 land tracts. Each interested tribe will design the culturally appropriate methods used to continue the consultation with them. These methods will include review of archaeological and environmental information pertaining to the 10 land tracts; field visits to the land tracts; and interviews and meetings with tribal representatives, leaders, knowledgeable individuals, and resource specialists. Efforts will be made to locate and identify TCPs, document concerns for potential impacts to these resources, and document suggestions for measures to mitigate any potential adverse impacts. Some tribes may conduct interviews with tribal members themselves or prepare reports of their findings for submission to the DOE. All information received from the tribes will be protected with strict confidentiality. Official procedures to protect the information will be developed and followed throughout the consultation process.

E.3.2.3 Stage 3: Review of Consultation Results

Upon completion of consultation with each tribe, the tribe will be given the opportunity to review the results of the consultation. This review process will be limited to only the reference materials pertaining to that particular tribe. Review comments will be addressed and the results revised to reflect relevant comments.

E.4 Cultural Overview

Archaeological investigations in the vicinity of LANL indicate human use of the area for thousands of years. A variety of chronological schemes have been proposed as a framework to discuss the cultural history of the region. In 1954, Fred Wendorf defined five major periods for the northern Rio Grande Valley: Preceramic, Developmental, Coalition, Classic, and Historic. These period classifications, with some modifications, are still in use. The Preceramic period has been subdivided into Paleo-Indian and Archaic, based upon changes in settlement patterns and subsistence over time as reflected by material culture. The Historic period includes both Native American sites where people abandoned their homelands and changed their ways of life in response to Euro-American and other influences, and sites that reflect the European and American settlement of the Rio Grande Valley. This chronology is summarized in Table E.4-1. The number of known sites assigned to each cultural period by tract is presented in Table E.4-2. A detailed description of the chronology and culture periods is available in Appendix E of the LANL SWEIS (DOE 1999c).

Table E.4-1. Chronological Framework Used for the LANL Cultural ROI

TIME PERIOD	DATES	CHARACTERISTICS OF PERIOD	LANL CULTURAL RESOURCES
Paleo-Indian	10,000 to 4000 B.C.	Hunter/gatherers with an emphasis on large game; use of lance-shaped projectile points.	Occasional surface finds of projectile points
Archaic	4000 B.C. to A.D. 600	Hunter/gatherers with more diverse subsistence strategy; increased plant collection, smaller (dart) projectile points, wide range of stone tools and debris and hearths found on sites. Cave and rock shelters also used.	Lithic scatters, rock features. Possible buried sites.
Developmental	A.D. 600 to 1100	Increased sedentism and reliance on agriculture; shift in dwelling size and complexity from pithouses to multiple rooms and adobe and masonry structures; ceramics and milling tools common, smaller (arrow) points used.	Some pithouse, adobe and crude masonry structures close to the Rio Grande in the vicinity of Chaquihui Mesa and Lower Water Canyon.
Coalition	A.D. 1100 to 1325	Increased agricultural focus, larger communities—typically 30 rooms but later sites larger with plazas, increased use of adobe; refinement of ceramics.	Increased site density. Most pueblo ruins recorded at LANL date to this period. Sites are distributed widely, primarily on the mesa tops.
Classic	A.D. 1325 to 1600	Increased agricultural focus with ditch irrigation systems, multiple story masonry dwellings and associated one- or -two-room isolated structures. Droughts during the Late Classic led to abandonment of many Pueblos.	Consolidation of populations at Navawi, Otowi, Tsankawi, and Tsirege (Tsirege and Otowi are located on DOE lands). Abandonment of settlements on the plateau by A.D.1600.
Spanish Colonial	A.D. 1600 to 1849	Population loss among Native groups; Spanish and (later) Mexican rule; Pueblo groups given land grants. Spanish and American goods traded in.	Seasonal use probable, but not documented.
Early U.S. Territorial/ Statehood	A.D. 1849 to 1942	U.S. takes control, railroad arrives, increase in population and in mining, homesteading, and ranching activities.	Structural remains, agricultural and ranching features.
Nuclear Energy	A.D. 1943 to Present	Los Alamos Science Laboratory established for research and development of nuclear weaponry during WW II; continuing through the Cold War. Considerable new construction and population increase in Los Alamos area.	Historic structures.

Table E.4-2. Cultural Sites Dating to the Cultural Periods By Tract

Land Tract	CULTURAL PERIODS										TOTAL
	Paleo-Indian	Archaic	Developmental	Coalition	Classic	Unknown Prehistoric	Spanish Colonial	U.S. Territorial, Statehood	Nuclear Energy	Unknown Historic	
Rendija Canyon		2		7	23	18		3		2	55
DOE LAAO									2		2
Miscellaneous Site 22											0
Miscellaneous Manhattan Monument									1		1
DP Road				1					2		3
Technical Area 21				1		1		1	40	1	44
Airport		1		2					3		6
White Rock Y	1	5		21	15	9		3	1	1	56
Technical Area 74		4		54	22	29		2	1		112
White Rock				4					1		5
TOTAL	1	12	0	90	60	57	0	9	51	4	284

Note: Some cultural sites were used during multiple cultural periods. The totals show the number of cultural periods represented, not the number of sites. The number of sites by tract can be found in the individual tract discussions, Chapters 5 through 14 of this CT EIS.

E.5 Description of Resources in the Region of Influence

This section describes the kinds of resources recorded in the tracts considered for transfer or conveyance. Certain resource types, such as buried archaeological sites or unidentified TCPs, are not likely to be identified during survey, so there is a potential for undiscovered resources on these tracts.

E.5.1 Prehistoric Resources

A total of 190 prehistoric archaeological sites have been recorded within the tracts considered for transfer. Preliminary eligibility evaluations have been made for all of these sites, with 140 sites evaluated as eligible for inclusion in the National Register of Historic Places (NRHP). There are 32 sites that are considered potentially eligible, and 18 have been evaluated as not eligible for nomination to the NRHP. Table E.5.1-1 summarizes the types of resources found on prehistoric sites located in each tract. These resource types are defined further in the following paragraphs.

Table E.5.1-1. Prehistoric Archaeological Resources by Tract

	PREHISTORIC RESOURCE TYPES									
Land Tract	**Simple Pueblos**	**Complex Pueblos**	**Rock Shelters, Cavates**	**Rock Art**	**Water Control, Game Traps**	**Trails, Steps**	**Garden Plots**	**Masonry Features, Rubble**	**Artifact Scatters, Rock Rings**	**TOTAL**
Rendija Canyon	37				1			5	5	48
DOE LAAO										0
Miscellaneous Site 22										0
Miscellaneous Manhattan Monument										0
DP Road			1							1
Technical Area 21	1		1							2
Airport	1								1	2
White Rock Y	8	1	7	2			2		18	38
Technical Area 74	51	4	11	2	1	3	8	4	17	101
White Rock	4				2				1	7
TOTAL	102	5	20	4	4	3	10	9	42	199

Note: An archaeological site may have multiple types of resources present on it. The totals represent the number of resource types, not the number of sites. The number of sites by tract can be found in the individual tract discussions, Chapters 5 through 14 of the CT EIS.

E.5.1.1 Simple Pueblos

One hundred two simple Pueblos were identified on the tracts considered for transfer or conveyance. Simple Pueblos include single-resident or small-scale multiple-resident units, associated features, and artifact scatters.

E.5.1.2 Complex Pueblos

Five complex Pueblos were identified on the tracts considered for transfer or conveyance. Complex Pueblos include multiple residential structures or units with public areas or structures such as plazas, towers, or kivas.

E.5.1.3 Rock Shelters and Cavates

Twenty rock shelters and cavates were identified on the tracts considered for transfer or conveyance. Rock shelters are naturally formed overhangs or indentations in a rockface that have been used for human shelter. Rock shelters may be modified with structural elements. Cavates are habitation rooms carved out of volcanic tuff or other soft material.

E.5.1.4 Rock Art

Four rock art sites were identified on the tracts considered for transfer or conveyance. Rock art includes petroglyphs, which are designs scratched, pecked, or scraped into a rock surface and pictographs, which are designs drawn in pigment on a rock surface.

E.5.1.5 Water Control Features and Game Traps

Four water control features and game traps were identified on the tracts considered for transfer or conveyance. Water control sites include small prehistoric features for the control or collection of water, such as irrigation ditches, cisterns, and retention dams. Game traps include a variety of features related to hunting by driving game over a cliff or into an enclosed area.

E.5.1.6 Trails or Steps

Three trails or stair-step resources were identified on the tracts considered for transfer or conveyance. Trails and steps show evidence of human use or modification for passage across the land or access to different levels.

E.5.1.7 Garden Plots

Ten garden plots were identified on the tracts considered for transfer or conveyance. Garden plots are indicated by evidence of terracing or boundaries.

E.5.1.8 Masonry Features and Rubble

Nine masonry features or rubble sites were identified on the tracts considered for transfer or conveyance. Masonry features and rubble sites are poorly defined or undefined rock alignments or concentrations of material that may represent prehistoric structural or feature remains.

E.5.1.9 Artifact Scatters and Rock Rings

Forty-two artifact scatters and rock rings were identified on the tracts considered for transfer or conveyance. Artifact scatters contain no formal habitation structures and include lithic debris from chipped stone manufacture or use, groundstone tools, or ceramic sherds. Rock ring sites contain simple rock rings, hearths, or concentrations of fire-cracked rock.

E.5.2 Historic Resources

A total of 64 historic sites have been recorded within the tracts considered for transfer or conveyance. Preliminary eligibility evaluations have been made for all, with 5 sites evaluated as eligible for inclusion in the NRHP. There are 55 sites that are considered potentially eligible, and 4 have been evaluated as not eligible for nomination to the NRHP. Table E.5.2-1 summarizes the types of resources found on historic sites located in each tract. These resources are described further in the following paragraphs.

Table E.5.2-1. Historic Resources by Tract

	HISTORIC RESOURCE TYPES					
Land Tract	**Homestead, Ranching, Agriculture Features**	**Historic Artifact Scatters**	**Historic Trails**	**Historic Native American Resources**	**LANL Buildings, Structures, Objects**	**TOTAL**
Rendija Canyon	2		1	2		5
DOE LAAO					2	2
Miscellaneous Site 22						0
Miscellaneous Manhattan Monument					1	1
DP Road					2	2
Technical Area 21	1		1		40	42
Airport					3	3
White Rock Y	3		1		1	5
Technical Area 74	1		1		1	3
White Rock					1	1
TOTAL	7	0	4	2	51	64

Note: A historic site may have multiple types of resources present. The totals represent the number of resource types, not the number of sites. The number of sites by tract can be found in the individual tract discussions, Chapters 5 through 14 of the CT EIS.

E.5.2.1 Homestead, Ranching, and Agricultural Features

Seven homestead, ranching, and agricultural resources were identified on the tracts considered for transfer or conveyance. Homestead, ranching, and agricultural resources include historic era homestead and ranch structural remains and associated outbuildings, fences, roads, equipment, agricultural fields, and other features and refuse scatters.

E.5.2.2 Artifact Scatters

No historic artifact scatters were identified on the tracts considered for transfer or conveyance. Historic artifact scatters are sites that are not directly associated with ranches or homesteads that contain historic era refuse such as cans, bottles, or other objects.

E.5.2.3 Historic Trails

Four historic trails were identified on the tracts considered for transfer or conveyance. These trails often are still used for recreational purposes.

E.5.2.4 Historic Native American Resources

Two historic resources used by Native Americans were identified on the tracts considered for transfer or conveyance. Both of these resources are rock rings used in the construction of tipis or wickiups.

E.5.2.5 Buildings, Structures, and Objects

Fifty-one LANL buildings, structures, and objects were identified on the tracts considered for transfer or conveyance. LANL buildings, structures, and objects may be architecturally distinctive or associated with historic events such as the Manhattan Project, World War II, the development of nuclear energy, and the Cold War.

E.5.3 Traditional Cultural Properties

A TCP is a place or object that is significant to a particular living community. This significance is "derived from the role the TCP plays in the community's historically rooted beliefs, customs, and practices" (Parker and King 1990). TCPs are associated with the cultural practices and beliefs that are based in a community's history or important in maintaining the cultural identity of the community. TCPs are used within social, spiritual, political, and economical contexts, and thus, are essential to the preservation and viability of a culture. TCPs are not limited to ethnic minority groups; rather, Americans of every ethnic origin have properties to which they ascribe traditional cultural value. In northern New Mexico, Hispanic culture and Native American groups in particular have maintained traditional communities, practices, beliefs, and subsistence patterns.

Several general types of TCPs have been identified by Native American and Hispanic cultures in northern New Mexico. These traditional cultures have had many generations of interaction with each other and often have overlapping subsistence, artistic, and religious practices with unique cultural importance attached to similar kind of sites. TCPs located in and near LANL are divided into five general categories. Each of these categories represents specific cultural and physical sensitivity and susceptibility to adverse impacts. A detailed description of the categories can be found in Appendix E of the LANL SWEIS (DOE 1999c). These categories include:

- **Ceremonial and Archaeological Sites:** Ceremonial and archaeological sites include Native American shrines, ancestral villages, petroglyphs, places where religious ceremonies are conducted, and Hispanic shrines and moradas. All prehistoric archaeological sites are also considered sacred according to certain Pueblo groups.
- **Natural Features:** A variety of natural features in the landscape such as mountain peaks, lakes, springs, or distinctive rock formations are considered TCPs by traditional cultures in the LANL area.
- **Ethnobotanical Gathering Sites:** Native Americans and traditional Hispanic communities use a variety of wild plants for food and medicine. Certain plants are also used in traditional ceremonies.
- **Artisan Material Gathering Sites:** The gathering of various raw materials used in the production of artistic and utilitarian items is important in the continuation of traditional arts among Native American and Hispanic communities. These materials include a variety of dye plants and minerals; plant fibers for weaving; woods for carving, construction, and drummaking; and clay for adobe construction and pottery making.
- **Traditional Subsistence Features:** Traditional subsistence features include community-maintained irrigation system (acequias), traditional trails, gathering and hunting areas, traditionally used fields, grazing areas, and firewood-gathering sites. Land grants by the Spanish and Mexican governments may be considered TCPs in that all of the parts (for example, individual holdings, commons, acequias, and village) are interrelated.

During the LANL SWEIS TCP study, 19 of the 23 Native American groups and two Hispanic groups indicated the presence of TCPs from all five categories within the LANL region. However, no specific locations or features were identified. The number of consultations indicating TCPs are summarized in Table E.5.3-1. No consultations were conducted for the CT EIS; however, consultations will be completed prior to conveyance and transfer of any of the proposed tracts. This decision was made based on the limited amount of time to prepare the CT EIS and the DOE's concern to conduct a thorough consultation. The Pueblo of San Ildefonso has indicated, in general terms, that TCPs are present on the Rendija Canyon, White Rock Y, TA 74, and White Rock Tracts.

Table E.5.3-1. Number of Consultations During the LANL SWEIS TCP Study Indicating TCPs on or near LANL Property

	CEREMONIAL AND ARCHAEOLOGY SITES	NATURAL FEATURES	ETHNO-BOTANICAL SITES	ARTISAN MATERIAL SITES	SUBSISTENCE FEATURES
Number of Consultations	15	14	10	7	8

Source: DOE 1999c

APPENDIX F CONTRACTOR DISCLOSURE STATEMENTS

This appendix contains disclosure statements, pursuant to 40 Code of Federal Regulations (CFR) 1506.5(c), provided by Tetra Tech, Inc., its subcontractors, and by DOE support contractors who prepared or reviewed the CT EIS. These disclosure statements specify that the contractors have no financial interest or other interest in the outcome of the project.

APPENDIX F CONTRACTOR DISCLOSURE STATEMENTS

Contract No.: DE-AM04-97AL77612
Task Order No.: DE-AT32-98AL78588

QUALIFICATION CRITERION NO.1

NEPA DISCLOSURE STATEMENT FOR THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE CONVEYANCE AND TRANSFER OF CERTAIN LAND TRACTS ADMINISTERED BY THE DEPARTMENT OF ENERGY AND LOCATED AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS AND SANTA FE COUNTIES, NEW MEXICO

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1506.5(c), which have been adopted by the Department of Energy (10 CFR 1021), require contractors who will prepare an Environmental Impact Statement (EIS) to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial or other interest in the outcome of the project" is defined for the purposes of this disclosure in Question 17 of the CEQ guidance "*Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*," (46 FR 18026 - 18038).

> "Financial or other interest in the outcome of the project" includes "Any financial benefit such as promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)."

In accordance with these requirements the offer and any proposed subcontractors hereby certify as follows: (check either (a) or (b) and list financial or other interest if (b) is checked).

(a) [X] Contractor has no financial or other interest in the outcome of the project.

(b) [ ] Offeror or any subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interest

1.

2.

3.

Certified by: Thomas [signature]
Signature

Thomas E. Magette
Name

Vice President, Tetra Tech
Title

July 14, 1999
Date

APPENDIX F CONTRACTOR DISCLOSURE STATEMENTS

Contract No.: DE-AM04-97AL77612
Task Order No.: DE-AT32-98AL78588

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(b) [ ] Offeror or any subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interest

1.

2.

3.

Certified by:

Albert M. Thomas

Signature

Albert M. Thomas, P.E.

Name

Vice President, Bohannan Huston, Inc.

Title

July 13, 1999

Date

APPENDIX F CONTRACTOR DISCLOSURE STATEMENTS

Contract No.: DE-AM04-97AL77612
Task Order No.: DE-AT32-98AL78588

QUALIFICATION CRITERION NO.1

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(b) ☐ Offeror or any subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interest

1.

2.

3.

Certified by:

Karen R. Marcotte
Signature

Karen R. Marcotte
Name

President, Consensus Planning, Inc.
Title

7/13/99
Date

APPENDIX F CONTRACTOR DISCLOSURE STATEMENTS

Contract No.: DE-AM04-97AL77612
Task Order No.: DE-AT32-98AL78588

QUALIFICATION CRITERION NO.1

NEPA DISCLOSURE STATEMENT FOR THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE CONVEYANCE AND TRANSFER OF CERTAIN LAND TRACTS ADMINISTERED BY THE DEPARTMENT OF ENERGY AND LOCATED AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS AND SANTA FE COUNTIES, NEW MEXICO

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1506.5(c), which have been adopted by the Department of Energy (10 CFR 1021), require contractors who will prepare an Environmental Impact Statement (EIS) to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial or other interest in the outcome of the project" is defined for the purposes of this disclosure in Question 17 of the CEQ guidance "*Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*," (46 FR 18026 - 18038).

> "Financial or other interest in the outcome of the project" includes "Any financial benefit such as promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)."

In accordance with these requirements the offer and any proposed subcontractors hereby certify as follows: (check either (a) or (b) and list financial or other interest if (b) is checked).

(a) [X] Contractor has no financial or other interest in the outcome of the project.

(b) [ ] Offeror or any subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interest

1.

2.

3.

Certified by:

Steven B. Treibel
Signature

Steven B. Treibel
Name

Los Alamos Technical Associates, Inc.
Contracts Manager
Title

7/14/99
Date

APPENDIX F CONTRACTOR DISCLOSURE STATEMENTS

Contract No.: DE-AM04-97AL77612
Task Order No.: DE-AT32-98AL78588

QUALIFICATION CRITERION NO.1

NEPA DISCLOSURE STATEMENT FOR THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE CONVEYANCE AND TRANSFER OF CERTAIN LAND TRACTS ADMINISTERED BY THE DEPARTMENT OF ENERGY AND LOCATED AT LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS AND SANTA FE COUNTIES, NEW MEXICO

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1506.5(c), which have been adopted by the Department of Energy (10 CFR 1021), require contractors who will prepare an Environmental Impact Statement (EIS) to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial or other interest in the outcome of the project" is defined for the purposes of this disclosure in Question 17 of the CEQ guidance "*Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*," (46 FR 18026 - 18038).

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In accordance with these requirements the offer and any proposed subcontractors hereby certify as follows: (check either (a) or (b) and list financial or other interest if (b) is checked).

(a) [X] Contractor has no financial or other interest in the outcome of the project.

(b) [ ] Offeror or any subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interest

1.
NA
2.

3.

Certified by:

Mark J. Gradkowski

Signature

Mark J. Gradkowski

Name

Vice President, MDM Services Corp.

Title

July 28,1999

Date

APPENDIX G HUMAN HEALTH

This appendix contains a primer on the human health effects of radioactive and chemical exposures. It is provided to supplement the discussion of human health in the CT EIS main text with general information and the findings of recent public health studies. The material in this appendix was taken directly from Appendix D of the 1999 LANL SWEIS. Only the section and table numbering was changed. References cited and sections and chapters discussed in this appendix refer to the Final LANL SWEIS and not this CT EIS.

G.1 PUBLIC HEALTH CONSEQUENCES: PRIMER AND RECENT STUDIES NEAR LANL

In this appendix, supplemental information is presented on the effects on human health of radioactive and chemical exposures. The information is presented in two sections: that addressing our general knowledge and understanding (section G.1.1) and that presenting in more detail the findings of the recent studies of public health in the community of Los Alamos, and New Mexico and U.S. studies (including Native Americans in New Mexico, Hispanic white and nonhispanic white populations throughout the U.S. (section G.1.2). The presentation in section G.1.1 is useful to the reader as a primer on human health effects of exposures to radioactivity or to chemicals. The summaries presented in section G.1.2 are the results of descriptive epidemiology studies. That is, they are analyses of disease incidence rates and causes of death using statistical analytical methodologies.

Exposure to toxic chemicals is regulated by other agencies, and DOE subscribes to and applies those regulations without change to its own activities. The Occupational Safety and Health Administration (OSHA) promulgates and enforces regulations for the protection of workers, and EPA regulates exposures to the public. Chapter 7 provides a detailed review of the regulatory requirements for the operation of LANL.

G.1.1 Primer on Human Health Consequences of Radiological and Chemical Exposures

Table G.1.1–1 summarizes the differences in consequences between exposures to radioactive materials and exposures to chemicals. More detailed information on the modes of exposure and potential effects of these exposures are given in the sections below.

G.1.1.1 *About Radiation and Radioactivity*

In the simplest sense, radiation is defined as energy propagated through space (NBS 1952). This definition covers a broad range, including visible light, radio and television transmissions, microwaves, and emissions from atomic and nuclear reactions and interactions. The method by which radiation interacts with matter is by transferring its energy to the atoms of the matter. The amount of energy transferred determines the effect that it will have on matter. The broad spectrum of radiation can be subdivided into two groups, ionizing and nonionizing. Ionization occurs when the radiation transfers enough energy to strip one or more electrons from the interacting atom. When ionization takes place in the body, it can cause chemical and physical changes that are of concern to human health. Radiation that does not have enough energy to strip electrons is called “nonionizing.”

Ionizing radiation is used in a variety of ways, many of which are familiar to us in our everyday lives. The machines used by doctors to diagnose and treat medical patients typically use x-rays, which is one form of ionizing radiation. The process by which a television displays a picture is by ionizing coatings on the inside of the screen with electrons. Most home smoke detectors use a small source of ionizing radiation to detect smoke particles in the room’s air.

Ionizing radiation is generated through many mechanisms. The two most common mechanisms are the electrical acceleration of atomic particles such as electrons, as in x-ray machines, and the emission of energy from nuclear reactions in atoms. This second process is termed “radioactive decay.” Atoms are made up of various combinations of particles called protons, neutrons, and electrons. In most cases, the numbers of neutrons and protons are balanced such that the atom will stay together

TABLE G.1.1–1.—*Comparison of Consequences of Radioactivity and Toxic Chemicals*

	RADIOACTIVE MATERIALS	TOXIC CHEMICALS
Threshold for effects?	Assume no threshold (stochastic effects).	Yes, and different thresholds for different effects.
Accumulative effects?	Assumed exposures accumulate over a lifetime, with no repair.	Typically, the body repairs itself between exposures; may build sensitive allergic reaction or interact with cells.
Sensory perception?	We do not feel, smell, or otherwise sense ionizing radiation.	Very low concentrations not sensed. Often an annoying odor and irritating effects at low concentrations. Some gases are visible when in high concentrations.
Carcinogenic?	All ionizing radiation is regulated as carcinogenic.	Only some chemicals are confirmed human carcinogens. Some others are suspected, and some are animal (mammal, or closer to human, primate) carcinogens.
Effects-exposure relationship?	Usually treated as linear at low doses, although this is a conservative simplification (BEIR V 1990).	Typically nonlinear and nonadditive. Thresholds exist. For some chemicals, effects can be treated as linear with exposures, but only over small ranges. Synergisms among chemicals are not understood.
Acute effects?	Acute deterministic effects are soon observed, but occur only above a threshold of about 50 rem (less for the eye).	Effects may be immediately observed for levels of exposures above the thresholds.
Entry paths of particulates into the body?	Radionuclides enter through inhalation, ingestion, and wounds. A few are absorbed through the skin.	Same routes, except a greater percentage of chemicals than of radionuclides are absorbed through the skin.
Target organs?	The chemistry of the radionuclide determines its residence time and location in the body.	Same as for radionuclides. Except, the body also metabolizes chemicals, sometimes into more toxic chemicals.
Penetrating?	Alpha and beta radiation do not penetrate skin. In contrast, dense materials are needed to shield against gamma and x-ray radiation.	About 20% of OSHA-regulated chemicals have skin as an import route of entry. Only corrosive chemicals penetrate protective gear rapidly.

forever. An atom formed with too many of either the neutrons or protons will attempt to change itself into a more stable form. To do this, the atom will emit an atomic particle, such as an electron, normally called a beta particle, or a "packet" of energy called a photon. This is the process of radioactive decay. The time that it takes for the atom to decay is characterized by a value called the half-life. This is the time it takes for a quantity of radioactive material to decay to one-half its original amount. In general, radioactive materials are identified by their half-lives and the type and energy of their emissions. In some cases, atoms may emit a highly energetic, ionized, helium atom, called an alpha particle. The energy carried away by these emissions is normally capable of creating a large number of ionizations in matter.

Besides ionization, other particles can often be emitted during interactions between radiation and matter, depending upon the type and energy of the interaction. Neutrons, protons, and some other more exotic particles are often emitted during various processes. Nuclear reactors use neutrons to break apart, or fission, particular isotopes of uranium and plutonium in order to release heat and more neutrons to continue the reaction. Large machines, often called "atom smashers," cause atoms at high energies to collide and break apart, releasing particles in order to study their nuclear structure. However, due to the design and operation of these types of facilities, it would be highly unlikely for these types of radiations to reach the public outside the boundaries of the facility.

When an individual is in the presence of an unshielded radiation source, this is referred to as being exposed. The amount of ionizing radiation that the individual receives during the exposure is referred to as dose. The measurement of radiation dose is called radiation dosimetry, and is done by a variety of methods depending upon the characteristics of the incident radiation. The units of measure for radiation doses are normally rads and rem. (Note that the term millirem [mrem] is also used often. A millirem is one one-thousandth of a rem.) The rad is a measure of the energy deposited in the body by the radiation, regardless of the type of emission. The rem is a measure of the biological effect, by including the effectiveness of the particular type and energy of the incident radiation for causing biological effects. This is due to the fact that some heavier or higher energy radiations, such as alpha particles or neutrons, can deposit their energy into much smaller volumes, and consequently, cause more intense damage through localized, chemical changes.

When an individual is exposed to an unshielded radiation source, this is called external radiation. If radioactive material is incorporated into the body and consequently decays, it is called internal radiation. The external radiation is measured as a value called the deep dose equivalent (DDE). Internal radiation is measured in terms of the committed effective dose equivalent (CEDE). More information about the CEDE is presented in the discussion about the processes by which radioactive material enters the body. The sum of the two contributions (DDE and CEDE) provides the total dose to the individual, called the total effective dose equivalent (TEDE). Often the radiation dose to a selected group or population is of interest, and is referred to as the collective dose equivalent, with the measurement units of person-rem.

G.1.1.2 *About Radiation and the Human Body*

Ionizing radiation affects the body through two basic mechanisms. The ionization of atoms can generate chemical changes in body fluids and cellular material. Also, in some cases the amount of energy transferred can be sufficient to actually knock an atom out of its chemical bonds, again resulting in chemical changes. These chemical changes can lead to alteration or disruption of the normal function of the affected area. At low levels of exposure, such as the levels experienced in occupational or environmental settings, these chemical changes are very small and ineffective. The body has a wide variety of mechanisms that repair the damage induced. However, occasionally, these changes can cause irreparable damage that could ultimately lead to initiation of a cancer, or changes to genetic material that could be passed to the next generation. The probability for the occurrence of health effects of this nature depends upon the type and amount of radiation received, and the sensitivity of the part of the body receiving the dose.

At much higher levels of exposure, at least 10 to 20 times higher than the legal limits for occupational exposures, the body is unable to recover from the large amount of chemical changes occurring during the exposure. At these levels, damage is much more immediate, direct, and observable. Health effects range from reversible changes in the blood to vomiting, loss of hair, temporary or permanent sterility, and other changes leading ultimately to death at exposures above about 100 times the regulatory limits. In these cases, the severity of the health effect is dependent upon the amount and type of radiation received. Exposures to radiation at these levels are quite rare, and, outside of intentional medical procedures for cancer therapy, are always due to accidental circumstances.

For low levels of radiation exposure, the probabilities for induction of various cancers or genetic effects have been extensively studied by both national and international expert groups. The problem is that the potential for health effects at low levels is extremely difficult to determine without extremely large, well-characterized exposed populations. Therefore, only particular groups with fairly high exposures, such as atomic bomb survivors, radiation accident victims, and some groups receiving large medical exposures, can be studied to evaluate the probabilities. Unfortunately, the levels and rates of exposures, and the conditions under which they occurred, are very different from those in which the normal population is exposed to background radiation or to normal operational releases from nuclear operations. Therefore, expert groups must make significant approximations and assumptions in order to apply the study results to the lower levels of exposure. This is done in a manner that attempts to ensure that the resulting risk factors are conservative estimates of the actual probabilities. In other words, it is unlikely that the actual risks are greater than the estimates, while it is fairly likely that the actual risk is smaller than the estimate.

There is another type of study, referred to as an epidemiology study, that attempts to estimate the risk factors in populations with much lower doses than mentioned above. These studies are even more difficult to perform. There are two types of epidemiology studies: descriptive (based on statistical analyses of death and disease incidences) and analytical (case studies and observational analysis within a community or work force). The studies summarized in section G.1.2, are descriptive. The risk factors for radiation-induced cancer at low levels of exposure are very small, and it is extremely important to account for the many nonradiation related mechanisms for cancer induction, such as smoking, diet, lifestyle, and chemical exposures. These multiple factors also make it difficult to establish cause-and-effect relationships that could attribute high or low cancer rates to specific initiators. As a consequence, the results of such studies have not been generally accepted within the scientific community and are not currently used as the primary basis for establishing the risk factors.

Risk factors are estimated for a large number of fatal and nonfatal cancers, for hereditary effects, and a few other identified radiation-induced health effects. Table G.1.1.2–1 lists the fatal cancer risk factors used in this SWEIS, which are based upon the recommendations of a recognized authoritative international expert group, the International Commission on Radiological Protection (ICRP). The other, smaller risk factor in the table for nonfatal cancer and hereditary effects may be similarly applied by interested readers.

In keeping with the previous discussion of the difficulties in determining the risk factors used in this document, it is worthwhile to discuss the level of confidence that is associated with those factors. The ICRP, in the recommendation that established the risk factors used here, stated that, "The nominal values of fatal cancer risk, which form the basis of the detriment following radiation exposure, are not to be regarded as precise and immutable. They are, unfortunately, at this time still subject to many uncertainties and to many assumptions involving factors which may be subject to change. ...It is hoped, and indeed expected, that these uncertainties will diminish in the future as the accumulated experience in exposed populations such as the Japanese survivors increases and as more information develops from a broader variety of human experiences" (ICRP 1991). The Committee on the Biological Effects of Ionizing Radiations (BEIR), which developed the risk factors that the ICRP recommends, also discussed the uncertainty of the factors: "Finally, it must be recognized that derivation of risk estimates for low doses and dose rates through the use of any type of model involves assumptions that remain to be validated. ...Moreover, epidemiologic data cannot rigorously exclude the existence of a threshold in the millisievert (1 millisievert = 100 millirem) dose range. Thus the background radiation cannot be ruled out. At such low doses and dose rates, it must be acknowledged that the lower limit of the range of uncertainty in the risk estimates extends to zero" (BEIR V 1990).

Given these concerns, the reader should recognize that these risk factors are intended to provide a conservative estimate of the potential impacts to be used in the decision-making process, and are not necessarily an accurate representation of actual anticipated fatalities. In other words, one could expect that the stated impacts from an activity or accident form an envelope around the situation, and that actual consequences could be less, but probably would not be worse.

When considering the risks from exposure to ionizing radiation, it is important to remember that we are always being exposed to the radiation in the environment around us. Natural background radiation is the collective term for all of the sources that occur naturally, such as cosmic radiation and naturally occurring radioactive materials, such as potassium, uranium, thorium, radium, and others. These sources contribute an average of 0.3 rem per year to each individual. Manufactured radiation sources contribute another 0.06 rem per year on

TABLE G.1.1.2–1.—*Risk Factors for Cancer Induction and Heritable Genetic Effects from Exposure to Ionizing Radiation*

EXPOSED POPULATION[a]	FATAL CANCER[b]	NONFATAL CANCER	HEREDITARY EFFECTS (SEVERE)[d]	TOTAL DETRIMENT
Adult Workers	0.0004[c]	0.00008	0.00008	0.00056
Whole Population	0.0005[c]	0.0001	0.00013	0.00073

[a] The distinction between the worker risk and the general public risk is attributable to the fact that sensitivities vary with age, general health, and other factors that contribute more to the general population than to the worker population.
[b] When applied to an individual, units are lifetime probability of excess cancer fatalities per rem of radiation dose. When applied to a population of individuals, units are excess numbers of fatal cancers per person-rem of radiation dose.
c This is the source of the 4×10^{-4} worker and 5×10^{-4} public risk factors used in this SWEIS.
[d] Heritable genetic effects as used here apply to populations, not individuals. For the other columns, the units would change accordingly, in terms of number of effects per unit dose.
Source: ICRP 1991

the average, with the majority coming from medical procedures. Fallout from the atmospheric testing of nuclear weapons currently contributes less than 0.001 rem per year to our doses (NCRP 1987).

G.1.1.3 *About Radioactive Material Within the Body*

Typically, radioactive material that is released into the environment is in the form of very fine particulates, gases, or liquids. That is usually because these forms are the hardest to contain in a facility. This material is easily carried into and spread around the air, soil, and water. As these materials move through the environment, it is possible for them to be taken into the body, through breathing, eating, or drinking. During normal operations of a facility, every effort is made to minimize these releases to levels well below natural background. During accidents, it is possible that higher levels may be released; but, the facilities are designed and operated to control these releases as much as possible.

Radioactive material normally enters the body through one of three mechanisms. When the material is in the air, it is inhaled into the lungs, where a fraction will be trapped, depending upon the size of the particles. When it is ingested by eating or drinking, or by clearing of the respiratory tract, it passes through the stomach and into the gastrointestinal tract. Under the right conditions, it can also be absorbed through the skin or enter through open wounds.

Once in the body, the fate of the material is determined by its chemical behavior. Some material will be dissolved into bodily fluids and transferred into various organs of the body. Remaining material may either be retained at its point of entry, such as in the lungs, or pass through the body rapidly, as in the gastrointestinal tract. The effect of material in the body is characterized by the type of radiation it delivers and the organs in which it tends to collect. The rate at which the material is removed from the body is represented by a value called effective biological half-life (the time it takes for the activity in the body to be reduced to one-half as a consequence of radioactive decay and biological turnover of the radionuclide).

When radioactive material is in the body, it irradiates the living tissue around it. Some radiation types, like beta and alpha particles, are much more effective at causing changes when inside the body than when outside. This is because these types of radiation cannot effectively penetrate the dead layer of the skin from an external source. As mentioned above, the radiation dose from material inside the body is called the CEDE. Remember that the dose from an external source stops when you walk away or are shielded from it. But you cannot walk away from an internal source. Therefore, the CEDE is designed to determine the risk commitment from the intake. It is the dose that will be received over the next 50 years from the material in the body. Because of the assumptions that doses are cumulative and their effects are not repaired, this means that the lifetime risk from an internal source in rem CEDE can be directly compared to the risk from an external source in rem DDE.

G.1.1.4 *About the Material of Interest at LANL*

LANL has a large involvement in nuclear science and applications. Therefore, there are many types of radioactive material and radiation sources in use. However, many of the uses require only very small amounts of material. Note that all radioactive materials are considered in this SWEIS; but, there are three types that tend to dominate the human health effects and DOE accident scenarios. This is due to either their particular radioactive and biological characteristics, the quantities of material being used, or the potential for dispersion in an accident. These materials are plutonium, uranium, and tritium.

Plutonium is a man-made element that has several applications in weapons, nuclear reactors, and space exploration. There are several types of plutonium atoms, called isotopes, which are distinguished by the different numbers of neutrons in their nucleus. (Note that isotopes of a particular atom all behave the same chemically.) In most cases, the isotopes of plutonium of interest here decay by alpha particle emission with radioactive half-lives ranging from tens to thousands of years. There is nothing unique about plutonium as a health risk compared to other radioactive materials. It is only that once incorporated into the body, it tends to stay for a very long time and deposits a lot of localized energy due to its alpha particles.

Uranium is a naturally occurring radioactive element. The discovery that an atom of uranium could be fissioned with neutrons was the starting point of the Nuclear Age. Uranium-235 is one of several fissile materials that fission with the release of energy.

Various applications require the use of different isotopes of uranium. Because isotopes cannot be chemically separated, processes have been developed to enrich uranium to various isotopic ratios. Enriched uranium is uranium that is enhanced in the isotope uranium-235 above its natural ratio of 0.72 percent. Highly enriched uranium (HEU) is where the uranium-235 content is 20 percent or greater. Depleted uranium (DU) is where the content of uranium-235 is below its natural value. Obviously, natural uranium is where the material is in its natural isotopic ratios.

Most uranium isotopes of interest here have very long half-lives and are alpha emitters. Their half-lives are much longer than the plutonium isotopes, and as a result uranium is generally of lower radiological concern than plutonium. However, its actual radiological concern varies with its enrichment. As a heavy metal, uranium also can be chemically toxic to the kidneys. Depending upon the enrichment and chemical form, either chemical or radiological considerations will dominate.

Tritium is a radioactive isotope of hydrogen. It is generated at low levels in the environment by interactions of cosmic radiation with the upper atmosphere, but for practical applications it is normally produced in a nuclear reactor. Tritium has a half-life of around 12 years and decays by emitting a low energy beta particle. Because tritium is an isotope of hydrogen, it can be incorporated into the water molecule, forming tritiated water. In the environment, tritium is most often found either in its elementary form as a gas, or as water. Tritiated water is a significant concern to the human body because the body is composed mostly of water. This actually is a mixed blessing. Tritiated water will easily and rapidly enter the body and irradiate it rather uniformly; however, it also is removed from the body rather quickly, being easily displaced with regular water and with a biological half-life of about 12 days under normal conditions.

G.1.1.5 *How DOE Regulates Radiation and Radioactive Material*

Radiation doses to workers and the public and the release of radioactive materials are regulated by DOE for its contractor facilities. Under the conditions of the *Atomic Energy Act* (as amended by the *Price-Anderson Amendments Act of 1988),* DOE is authorized to establish federal rules controlling radiological activities at DOE sites. The act also authorizes DOE to impose civil and criminal penalties for violations of these requirements. Some activities are also regulated through a DOE Directives System that uses contractual means to regulate the contractor activities.

Occupational radiation protection is regulated by the *Occupational Radiation Protection Rule*, Title 10 of the Code of Federal Regulations, Part 835 (10 CFR 835). Environmental radiation protection is currently regulated contractually with DOE Order 5400.5, which is in the process of being converted to a rule. There is a process by which these regulations are developed. The EPA, working with other agencies such as DOE and the NRC, develops a federal guidance document that is signed by the President (52 *Federal Register* [FR] 2822–2834). This document is based upon the recommendations of the National Council on Radiation Protection and Measurements (NCRP), and considers recommendations of international expert groups such as the ICRP. This federal guidance then becomes the basis for all federal regulations for radiation protection, including DOE's and also U.S. Nuclear Regulatory Commission (NRC) rules. This process ensures a common, scientifically based approach to all radiation protection in the U.S.

G.1.1.6 *About Chemicals and Human Health*

The characteristics and consequences of exposures to chemicals are quite different from those of exposure to ionizing radiation. Table G.1.1–1 summarizes the differences.

For noncarcinogens, there are threshold concentrations that must be exceeded for observable adverse effects to happen; whereas, for ionizing radiation it is assumed that the integrated (accumulated) exposure determines the likelihood of observable effects.

The threshold values for effects from toxic chemicals vary somewhat among individuals, but values can be determined that represent most of the more vulnerable people among the general population. The several different effects from a chemical each have different thresholds. For instance, there may be different concentrations that produce odor, irritation, effects that last only a short time, permanent effects, and death. Older and ill people, and those with a particular sensitivity such as respiratory problems, are more vulnerable and will have lower thresholds for effects.

Using human inhalation of chlorine in illustration, 0.2 to 0.4 parts per million (parts of chlorine per million parts of air) is the odor threshold; 1 to 3 parts per million for periods less than an hour produce burning eyes, scratchy or irritated throat, and headache; 15 parts per million is the lowest concentration observed to cause respiratory distress; no deaths were observed in any animals exposed to 50 parts per million for 30 minutes; and 210 parts per million has been estimated to be the 30-minute LC50 for humans, although 50 parts per million might cause death in some vulnerable individuals. (The 30-minute LC50 is defined as the concentration that produces 50 percent fatalities among individuals exposed for 30 minutes.)

The ability to resist a potential effect and to recover from that effect clearly depends upon a person's health and age. For the population of workers, presumed to have few individuals who are especially vulnerable, regulatory agencies set permissible exposure limits and average concentrations for the 8-hour and 10-hour work day. Lower values than these would be appropriate to public exposures; whereas, higher values are deemed acceptable for military personnel under military exigencies.

Again using inhalation of chlorine gas in illustration, the OSHA permissible exposure limit is a time-weighted average (TWA) over the 8-hour work day of 0.5 parts per million[1]. There also is an OSHA short-term exposure limit of a 1-part-per-million 15-minute TWA that should not be exceeded at any time during the work day. The immediately dangerous to life and health (IDLH) value is 30 parts per million; this is the concentration from which a

1. The definition of the TWA is the sum of all the instantaneous air concentrations over the 8 hours, averaged by dividing by the 8 hours.

worker could escape within 30 minutes without a respirator and without escape-impairing or irreversible effects.

This SWEIS analysis uses the TWA as a convenient measure for screening the chemical inventory at LANL, and then uses Emergency Response Planning Guidelines (ERPGs) or their surrogate Temporary Emergency Exposure Limits (TEELs) for bounding the consequences to persons exposed to a release to the atmosphere. ERPGs are provided by the American Industrial Hygiene Association (AIHA) for planning for emergencies, rather than for determining consequences. ERPG–1, ERPG–2, and ERPG–3 are defined and described in detail in appendix G, Accident Analysis. They are intended to provide protection for most members of the public, and so their exposure time (up to one hour) and their concentrations are directly related to effects (no safety factor of ten was applied).

Again using chlorine in illustration, the ERPG–2 is 3 parts per million, the concentration at which nearly all individuals could be exposed without irreversible or other serious health effects or impairment of ability to take protective actions. The ERPG–3 is 20 parts per million, below which nearly all individuals could be exposed without life-threatening effects.

Only for some chemicals and only for a limited extent, effects are directly related to the product of the concentration and length of exposure (“Haber’s Law”). Chlorine is not such a chemical. When attempting to apply an existing guideline to a different exposure period than for which the guideline applies, toxicologists must be consulted, and they will consider actual effects data.

G.1.1.7 *How Toxic Chemicals Affect the Body*

Some toxic chemicals can have direct effects upon the eyes and the skin through contact and can enter the body by absorption through the skin. These are considered in the derivation of guides and limits for airborne concentration. Toxic chemicals also can enter the body via ingestion (eating and drinking). All the LANL accidents considered in the SWEIS that pose significant risk to the public produce their exposure through airborne releases, and so airborne concentrations guides and limits are used in the screening and consequence analyses.

After intake, the chemical may follow primarily one or more routes within the body, involving the respiratory system and digestive system, the blood circulatory system, and the urinary tract. The route and residence time before excretion is strongly determined by the chemical’s solubility, and if particulate, by its particle size. The chemical may be metabolized, usually in the liver, into other chemicals that are either more or less toxic. For carcinogens, the principal target organs (i.e., where the effects primarily occur) are the respiratory tract, urinary bladder, and to a lesser extent the bone marrow, gastrointestinal tract, and liver.

G.1.1.8 *About Chemical Carcinogens*

Some chemicals are regulated as carcinogens because they or their metabolites may cause cancer. There are limited data on chemical carcinogens for humans, and there are problems with applying the results of animal studies to humans. Therefore, these chemicals are classified as known human carcinogens, potential or suspected carcinogens, and chemicals that cause cancer in animals. Exposure to chemical carcinogens is treated in the same manner as cumulative exposure to ionizing radiation; that is, exposures are assumed to be additive in producing cancer.

Some chemicals are carcinogenic at concentrations that do not produce observable effects from acute (short-term) exposures. For these, the airborne exposure limits and guidelines are based on their carcinogenicity. Some chemicals may produce an irreversible change to cells (tumor initiation), which then may be submitted to chemicals that are promoters of cancer. Such promoters must be given repeatedly to be effective. For this reason, chemical carcinogens are regarded as additive to one another, and individual chemicals are regulated at 1/100 of the exposure level regarded as hazardous, perhaps to account for the conservative possibility of having 100 such chemicals in one's environment.

The carcinogenic effects of certain chemicals are similar to those of ionizing radiation and have been noted in virtually every organ, depending on the chemical, the species, and conditions of exposure. The cancers induced by chemicals and by ionizing radiation cannot be distinguished from cancers induced by other causes. Therefore, the effects of chemicals and ionizing radiation are inferred only on a statistical basis, and must inferred from exposures at higher doses and dose rates. The choice of model has a large influence on the estimated excess cancer risk. The extrapolation is made by assuming an uncertain and controversial no-threshold, linear mathematical relationship between dose and resultant effects. This model is usually thought likely to overestimate the risk at low doses, and so is often said to estimate the "upper limit" of risk (NCRP 1989).

Chemicals vary widely in their capacity to induce cancer. There are even fewer data on the carcinogenic effects for chemicals than for radiation. With most chemicals, assessment of risks for humans must be based on extrapolation from laboratory animals or other experimental systems. Hence, the risk assessment for chemicals has even more uncertainty than risk assessment for ionizing radiation (NCRP 1989). Ultimately, the desired certainty in risk assessment at low-level exposures to chemicals and radiation will require better understanding of their effects at all stages of carcinogenesis.

The EPA, in setting standards for compliance with the *Clean Air Act*, is required by judicial decision and the *Clean Air Act* to determine a "safe" level with an "ample margin of safety to protect public health" without consideration as to cost or technology feasibility (Bork 1987). After that level is determined, costs and feasibility can be considered in setting the standard. Although this decision applied specifically to vinyl chloride and the *Clean Air Act*, it aids in understanding the EPA challenge faced in determining what is "safe," "adequate," or "acceptable" when setting standards for protection of workers, public, and environment. In the attempt to provide an objective context for evaluating the risks posed by LANL operations, the SWEIS authors have searched for authoritative statement on acceptable risk levels. A few such statements and inferences can be found in ICRP, NCRP, EPA, and OSHA documents.

EPA regulations provide goals for environmental remediation (cleanup). The EPA goals "for acceptable exposure levels to known or suspected carcinogens are generally concentration levels that represent an excess upper bound lifetime cancer risk between 10^{-4} and 10^{-6}. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals" when existing and relevant requirements are not available or sufficiently protective because there are multiple contaminants or pathways. When the combined risk from multiple contaminants exceed 10^{-4}, then factors such as detection limits and uncertainties may be considered in determining the cleanup level to be attained (40 CFR 300.430). Note that this is the lifetime risk to an undetermined public population group.

OSHA (OSHA 1997) expressed that its proposed worker permissible exposure limit for methylene chloride of 25 parts per million (average for 8 hours per day) would entail an employment lifetime risk of 3.62 x 10^{-3}, and that this was "clearly well above any plausible upper boundary of the significant risk range defined by the Supreme Court and used by OSHA in its prior rulemaking." OSHA noted that typical lifetime occupational risk for all manufacturing industries is 1.98 x 10^{-3}, and that the risk in occupations of relatively low risk, like retail trade, is 8.2 x 10^{-4}. Note that worker risk is generally accepted at a higher level than public dose because it is an accepted risk of employment. This is compatible with the EPA upper bound lifetime public cancer risk of between 10^{-4} and 10^{-6}.

G.1.1.9 *Radionuclides and Chemicals of Interest at LANL*

LANL has used, uses, and will use a wide variety of chemicals because of its research mission. LANL has a chemical database that tracks the quantity and location of chemicals on site. About 51 of the chemicals tracked in the database are carcinogenic. A large number of the chemicals tracked in the database are toxic; that is, they are able to produce harm to humans. The analysis of the consequences to the public from chemical emissions under normal operations of LANL is provided in chapter 5, sections 5.2.4 and 5.2.6 of the LANL SWEIS. Methodology is provided in section 5.1.4 and 5.1.6 of the LANL SWEIS. Those of risk to the public, should they be accidentally released to the atmosphere, were determined by screening the entire database. Details on the accidental release screening and its results are presented in appendix G, Accident Analysis of the LANL SWEIS.

G.1.2 Supplemental Information on Public Health: U.S., New Mexico, and the Local LANL Community

The information presented below is supplemental to the information presented in chapter 4, section 4.6. It is presented to provide the context of the human health analysis provided in chapter 5, which estimates potential consequence to public health.

The population of Los Alamos County has grown primarily by immigration. The average annual fertility rate has remained at approximately 48/1,000 women across all races (DOC 1990 and Athas and Key 1993), which would produce annual growth of only 2.4 percent if there were no deaths. However, the growth rate has been approximately 25 percent between 1950 and 1960, more than 16 percent between 1960 and 1970 as well as between 1970 and 1980, and approximately 3 percent between 1980 and 1990.

Several studies have been conducted in the community due to concerns expressed within the community concerning the rates of some cancers. While these are summarized in section 4.6 of the SWEIS, additional information is presented here in order to meet the request of many during the scoping meetings for presentation of these results in the SWEIS.

These studies are largely descriptive; that is, they use statistical analyses to identify patterns of disease or death in a community. The thyroid cancer study (Athas 1996) reported below is a mixture of descriptive and analytical approaches (based on case studies and observational analyses). All epidemiological studies are subject to limitations in attempting to determine cause and effect relationships. Some of these limitations are:

- Small population sizes in the community to be studied

- Relatively few total numbers of cases of the specific disease or cancer to be studied
- High mobility in the population to be studied (if a large portion of the community has been in the community for shorter periods of time than that necessary to detect chronic disease, results are inconclusive)
- Disease etiology—one may have received the causative exposure decades before its diagnosis; households in the U.S. move on average every 3 years; in Los Alamos County in 1980, 45 percent of residents had been in the same home for 5 years; earlier census data showed lesser periods of time in the same residence
- Comparability—for instance, the makeup of Los Alamos County is quite dissimilar from its surrounding counties in ethnic distribution and in socioeconomic and occupational conditions
- Natural variability in disease incidence within the human population from any and all sources
- Increased technology efficiency used in disease detection, therefore, causing apparent increases in rates of incidence of the better-detected disease
- More than one causal agent suspected or known to cause the disease being studied, including lifestyle choices such as smoking and dietary patterns
- Disease cause from multiple sources in the same community
- Methodology limitations such as multiple comparison across differing time periods, across studies made for different purposes, consideration of all combinations across the study time frame, etc.

G.1.2.1 *Public Health: United States*

Heart disease remains the leading cause of death in the U.S. (Table G.1.2.1–1). There has been a significant decrease in mortality in the U.S. attributable to heart disease and cerebrovascular disease over the last 20 years. Cancer remains the second leading cause of death.

Table G.1.2.1–2 identifies the lifetime risk of dying from cancer for men and women by cancer type. Over all cancer types, the lifetime risk of dying from cancer is approximately 24 percent for men and 21 percent for women.

Cancer incidence and mortality trends have changed over the last 20 years (Table G.1.2.1–3). Melanoma of the skin, for example, has increased in both incidence and mortality rate, as has brain and other nervous system

TABLE G.1.2.1–1.—*Leading Causes of Death in U.S.: Percent of All Causes of Death (1973 Versus 1993)*

CAUSE OF DEATH	PERCENT OF ALL CAUSES (1973)	PERCENT OF ALL CAUSES (1993)
Heart Disease	38.4	32.8
Cerebrovascular	10.9	6.6
Cancer	17.1	23.4
Pneumonia and Influenza	3.2	3.7
Chronic Lung Disease	1.5	1.2
Accidents	5.9	4.0
All Other Causes	22.5	28.4

Source: Ries et al. 1996

TABLE G.1.2.1–2.—*Lifetime Risk (Expressed as Percent) of Dying from Cancer: SEER[a] Areas (1973 Through 1993), All Races*

TYPE OF CANCER	MEN	WOMEN
All Types	23.77	20.66
Oral and Pharynx	0.45	0.24
Esophagus	0.65	0.23
Stomach	0.81	0.53
Colon and Rectum	2.54	2.54
Liver and Bile Duct	0.52	0.33
Pancreas	1.11	1.21
Larynx	0.25	0.07
Lung and Bronchus	7.11	4.35
Melanomas of Skin	0.31	0.20
Breast	0.03	3.54
Cervix Uteri	—	0.27
Corpus and Uterus	—	0.53
Ovary	—	1.12
Prostate	3.62	—
Testis	0.02	—
Urinary Bladder	0.69	0.34
Kidney and Renal Pelvis	0.49	0.33
Brain and Other Nervous	0.51	0.41
Thyroid	0.04	0.07
Hodgkin's Disease	0.06	0.05
Non-Hodgkin's Lymphoma	0.90	0.85
Multiple Myeloma	0.47	0.43
Leukemias	0.93	0.74

[a] SEER is the NIH/NCI Surveillance, Epidemiology, and End Results Program.
Source: Ries et al. 1996

cancers. Leukemia incidence and mortality rates have decreased.

G.1.2.2 *Comparison of Cancer Mortalities Between the U.S. and New Mexico*

A comparison of cancer mortality rates between the U.S. as a whole and New Mexico is given in Table G.1.2.2–1. These comparisons were made for 1989 through 1993 based on the National Institute of Health/National Cancer Institute (NIH/NCI) Surveillance, Epidemiology, and End Results (SEER) Program (Ries et al. 1996). For most cancers, differences were insignificant.

However, New Mexico had significantly higher mortality from thyroid cancer. (The reader is referred also to Athas 1996 for the local Los Alamos County study of thyroid cancer presented below.) New Mexico deaths due to thyroid cancers ranked 4th among the states. Thyroid cancers are associated with some types of radiological processes and research applications, principally those that could result in emitted radio-iodine. LANL has historically not used more than research amounts of radio-iodine. Radio-iodine emissions from LANL have been measured and have continually been very low (chapter 4, section 4.4 and the tables of emissions estimated for key LANL facilities, in chapter 3, section 3.6 discuss this further).

New Mexico had statistically lower rates of cancer mortalities for several cancers (Table G.1.2.2–1) relevant to the Los Alamos cancer studies, specifically, brain and other nervous system cancers and breast cancer.

G.1.2.3 *Cancer Incidence and Mortality Among Ethnic Groups Relevant to the LANL Area*

While the Native American population within Los Alamos County remains less than 3 percent (DOC 1990), the populations down gradient (with respect to air emissions and water flow) in the adjacent Santa Fe County Area are

TABLE G.1.2.1–3.—*Trends in Cancer Incidence and Mortality for Selected Cancers (1973 Through 1993), All Races, Both Sexes*

DECREASING INCIDENCE; DECREASING MORTALITY	INCREASING INCIDENCE; DECREASING MORTALITY	INCREASING INCIDENCE; INCREASING MORTALITY
Oral Cavity and Pharynx	Ovary	Total Cancers
Stomach	Testis	Esophagus
Colon and Rectum	Urinary Bladder	Liver and Bile Duct
Pancreas	Thyroid	Lung and Bronchus
Larynx		Melanoma of Skin
Cervix Uteri		Breast
Corpus and Uterus		Prostate
Hodgkin's Disease		Kidney and Renal Pelvis
Leukemia		Brain and Other Nervous
		Non-Hodgkin's Lymphoma
		Multiple Myeloma

Source: Ries et al. 1996

TABLE G.1.2.2–1.—*Comparison of Cancer Mortality Rates for the United States and New Mexico (1989 Through 1993), All Races, Both Sexes (Rate per 100,000 Population, Age Adjusted to 1970 U.S. Standard Population)*

TYPE OF CANCER	U.S. RATE	NEW MEXICO RATE	RANKING (AMONG STATES)	COMPARISON U.S. VS. NEW MEXICO
Breast	26.8	23.4	49th	NM < U.S.
Colon and Rectum	18.4	14.2	50th	NM < U.S.
Esophagus	3.5	2.4	49th	NM < U.S.
Hodgkin's Disease	0.6	0.6	25th	NSD
Larynx	1.4	1.2	34th	NSD
Leukemia	6.4	6.1	40th	NSD
Liver and Bile Duct	3.0	3.2	15th	NSD
Lung and Bronchus	49.9	35.0	49th	NM < U.S.
Melanomas of Skin	2.2	2.1	49th	NSD
Non-Hodgkin's Lymphoma	6.4	5.6	46th	NSD
Brain and Nervous	4.2	3.5	48th	NM < U.S.
Stomach	4.6	5.0	12th	NSD
Testis	0.3	0.2	43rd	NM < U.S.
Urinary Bladder	3.3	2.7	47th	NM < U.S.
Oral/Pharynx	2.9	2.6	32nd	NSD
Pancreas	8.4	8.1	40th	NSD
Thyroid	0.3	0.4	4th	NM > U.S.
Prostate	26.4	23.2	49th	NM < U.S.
Ovary	7.8	6.7	47th	NSD
Kidney and Renal Pelvis	3.5	3.4	36th	NSD
Multiple Myeloma	3.0	3.0	30th	NSD
Corpus and Uterus	3.4	3.0	43rd	NSD
Cervix Uteri	2.9	2.7	33rd	NSD

Sources: SEER Database and Ries et al. 1996
NSD = No significant difference

dominantly Native American (San Ildefonso Pueblo).

Table G.1.2.3–1 summarizes the findings regarding the top five cancers (both incidence and mortality) among nonhispanic whites (U.S.), Hispanic whites (U.S.), and Native Americans (New Mexico). The Native American cancer incidence and cancer mortality rates are lower than either of the other examined populations for both men and women. This is the case for all cancer types, not just the top five cancers with respect to incidence and mortality rate.

Among men, lung and prostate cancer dominate incidence and mortality. Among women, breast and lung cancer dominate cancer incidence and mortality. A fairly rare cancer, gall bladder, is the leading cause of cancer mortality among New Mexican Native American women. However, because there were so few cases, and the uncertainty level thus associated with the observation is so high, it is inappropriate to draw conclusions even regarding gall bladder cancer incidence in this population of women.

G.1.2.4 *Supplemental Information on Recent Studies of Los Alamos County Cancer*

Objectives

The primary objective of the study was to review Los Alamos County incidence rates for brain and nervous system cancer and other major cancers during the 21-year time period 1970 to 1990 (Athas and Key 1993). Secondary objectives were to review mortality rate data for select cancers of concern and to review Los Alamos County mortality data relating to benign brain and nervous system tumors.

Specific aims developed for incidence study were as follows:

- To calculate age-adjusted cancer incidence rates for Los Alamos County and a New Mexico state reference population using data of the New Mexico Tumor Registry (NMTR)
- To compare Los Alamos County cancer incidence rates to (1) incidence rates calculated for a New Mexico state reference population, and (2) national rates obtained from the SEER Program of the National Cancer Institute
- To determine if any of the Los Alamos County cancer incidence rates were elevated in comparison to rates observed in the reference population

The study protocol specified that statistical tests would be used to determine whether any of the Los Alamos County rates were elevated in comparison to the reference populations. Early in the course of the study, however, it became apparent that the small number of cases for virtually all of the Los Alamos County cancers reviewed would make the finding of statistical significance unlikely for small to modest elevations in a rate. Consequently, the analysis of the Los Alamos County incidence data was expanded to include not only statistical considerations but other types of information such as temporal patterns of cancer occurrence, prevalence of established risk factors, case characteristics, and tumor cell types. Cancers of concern were: oral cavity and pharynx, digestive system, respiratory system, melanoma of the skin, female breast, female genital system, urinary system, male genital system, lymphoreticular system, childhood cancers (ages 0 to 19 years) thyroid, and brain and nervous system cancers.

Following a review of tabulated incidence rate data for 23 major cancers, nine were selected for additional review and evaluation: liver and intrahepatic bile duct cancer, non-Hodgkin's lymphoma, leukemia, melanoma of skin, ovarian cancer, breast cancer, childhood cancers, thyroid cancer, and brain and nervous

TABLE G.1.2.3–1.—*The Five Most Frequently Diagnosed Cancer and the Five Most Common Types of Cancer Death (1988 Through 1992) Among White Non-Hispanics (all U.S.), White Hispanics (all U.S.), Native Americans (New Mexico)*

POPULATION GROUP	CANCER INCIDENCE[a]		CANCER MORTALITY[a]	
	CANCER TYPE (RATES/100,000 POPULATION, AGE ADJUSTED TO 1970 U.S. STANDARD)			
	MEN	WOMEN	MEN	WOMEN
White, Non-Hispanic	Prostate (137.9)	Breast (115.7)	Lung (74.2)	Lung (32.9)
	Lung (79.0)	Lung (43.7)	Prostate (24.4)	Breast (27.7)
	Colon/Rectum (57.6)	Colon/Rectum (39.2)	Colon/Rectum (23.4)	Colon/Rectum (15.6)
	Bladder (33.1)	Corpus Uteri (23.0)	Pancreas (9.8)	Ovary (8.2)
	Non-Hodgkin's Lymphoma (19.1)	Ovary (16.2)	Leukemia (8.6)	Pancreas (7.0)
White, Hispanic	Prostate (92.8)	Breast (73.5)	Lung (33.6)	Breast (15.7)
	Lung (44.0)	Colon/Rectum (25.9)	Prostate (15.9)	Lung (11.2)
	Colon/Rectum (40.2)	Lung (20.4)	Colon/Rectum (13.4)	Colon/Rectum (8.6)
	Bladder (16.7)	Cervix (17.1)	Stomach (8.8)	Pancreas (5.4)
	Stomach (16.2)	Corpus Uteri (14.5)	Pancreas (7.4)	Ovary (5.1)
Native American, NM	Prostate (52.5)	Breast (31.6)	Prostate (16.2)	Gallbladder (8.9)[b]
	Colon/Rectum (18.6)	Ovary (17.5)	Stomach (11.2)[b]	Breast (8.7)[b]
	Kidney (15.6)	Colon/Rectum (15.3)	Liver (11.2)[b]	Cervix (8.0)[b]
	Lung (14.4)	Gallbladder (13.2)	Lung (10.4)[b]	Pancreas (7.4)[b]
	Liver (13.1)[b]	Corpus Uteri (10.7)	Colon/rectum (8.5)[b]	Ovary (7.3)[b]

[a] NIH/NCI SEER Program statistics from several regions around the U.S.
[b] Statistics calculated with extremely high uncertainty because they are based on fewer than 25 cases. Other rates (not footnoted) were calculated from larger total numbers of cases and, therefore, have less uncertainty associated with them.
Source: Miller et al. 1996

system cancer. The majority of these cancers were chosen on the basis of incidence rates, which were higher in Los Alamos County in comparison to the reference populations. Childhood cancer was chose for further review based on mortality rate data showing an apparent excess of childhood cancer deaths in Los Alamos County. Leukemia and liver cancer where chosen as cancers of concern specifically to examine tumor cell types. Cancers not chosen for further review included major sites in the respiratory, digestive, and urinary systems.

Incidence Data: Data Sources

Information regarding newly diagnosed cancers among Los Alamos County residents and New Mexico non-Hispanic Whites was compiled from records collected since 1969 by the NMTR at the University of New Mexico Cancer Center. Cancer is a reportable disease in New Mexico by regulation of the New Mexico Department of Health (NMDOH). Since the late 1960's, NMTR has been the repository of the confidential medical record abstracts and computerized masterfile for cancer in New Mexico. NMTR has been a part of the SEER Program since that program began in 1973.

Cancer Incidence Findings (1970 to 1990)

All Cancers. Figure G.1.2.4–1 shows that the Los Alamos County incidence rates for "all cancers" fluctuated considerably; but the rates generally were comparable to or lower than rates observed in the state and national reference populations.

Liver and Intra-Hepatic Duct Cancer. Seven cases of primary liver and intra-hepatic bile duct cancer occurred in Los Alamos County. Four of the seven cases (57 percent) were diagnosed between 1981 and 1982. Los Alamos County incidence rates were highly variable as a result of the small number of cases and the clustered temporal distribution of cases. No cases were reported up until the early 1980's, at which time the four cases diagnosed in 1981 to 1982 caused a marked elevation in the Los Alamos County rates in comparison to the state and national reference rates (Figure G.1.2.4–2). Los Alamos County rates subsequently diminished to a level consistent with the reference rates.

Non-Hodgkin's Lymphoma. Los Alamos County consistently experienced a small to modest elevation in incidence compared to the reference populations (Figure G.1.2.4–3). The magnitude of the elevated Los Alamos County incidence varied widely up to a two-fold higher than expected level. None of the Los Alamos County lower confidence limits excluded the reference rates. Incidence in the Los Alamos County non-Hispanic White population was consistently higher than that observed in the total county population. All Los Alamos County rates were based on 14 or fewer cases. For the most recent five-year time period (1986 to 1990), the rate for non-Hispanic Whites in Los Alamos County was 57 percent greater than the state reference rate.

Leukemia. The incidence of leukemia in Los Alamos County generally was the same or lower than that observed in the reference populations (Figure G.1.2.4.–4). Wide fluctuations in the Los Alamos County rates occurred as a result of low case numbers. All Los Alamos County rates were based on nine or fewer cases. For the most recent 5-year time period (1986 to 1990), the Los Alamos County rate equalled the state reference rate.

Melanoma. The incidence of melanoma consistently was around 50 percent higher in New Mexico non-Hispanic Whites compared with SEER Whites. Melanoma incidence steadily increased in both reference populations. Incidence rates in Los Alamos County were higher than the state reference rates over most of the 21-year study time period (Figure G.1.2.4–5). Early time periods were characterized by a small elevation in the Los Alamos County incidence; whereas, a more pronounced excess of melanoma in Los Alamos County began to appear in the mid 1980's.

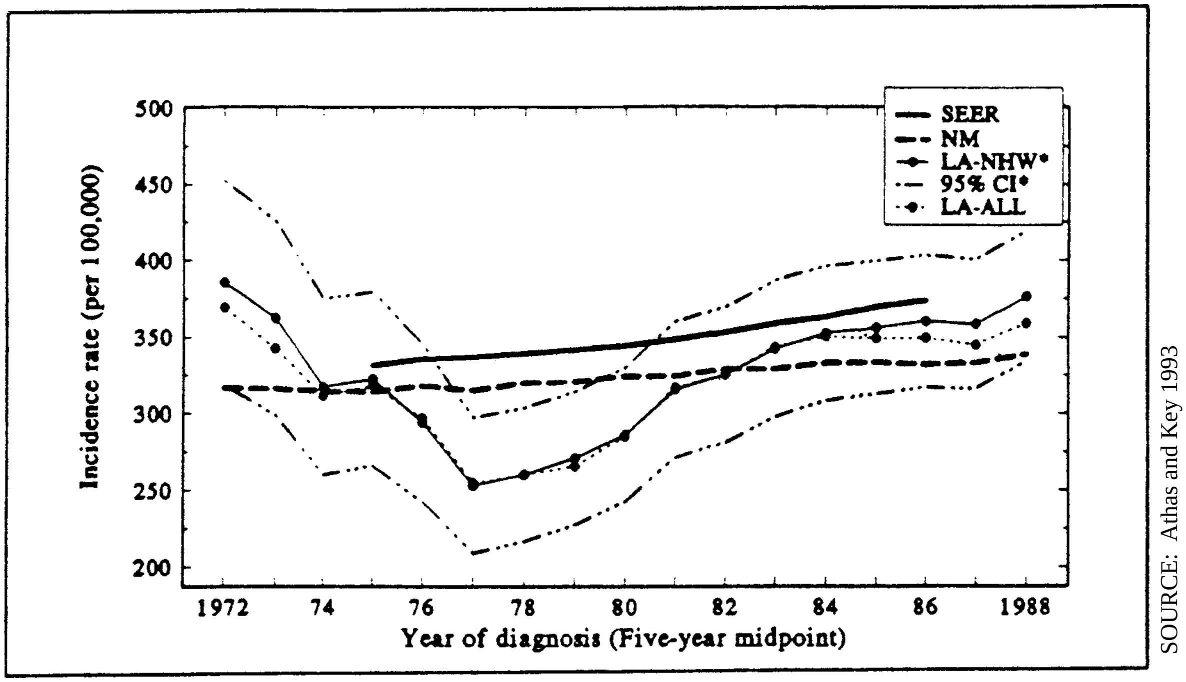

FIGURE G.1.2.4–1.—*5-Year Average Annual Incidence of All Cancer Sites, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

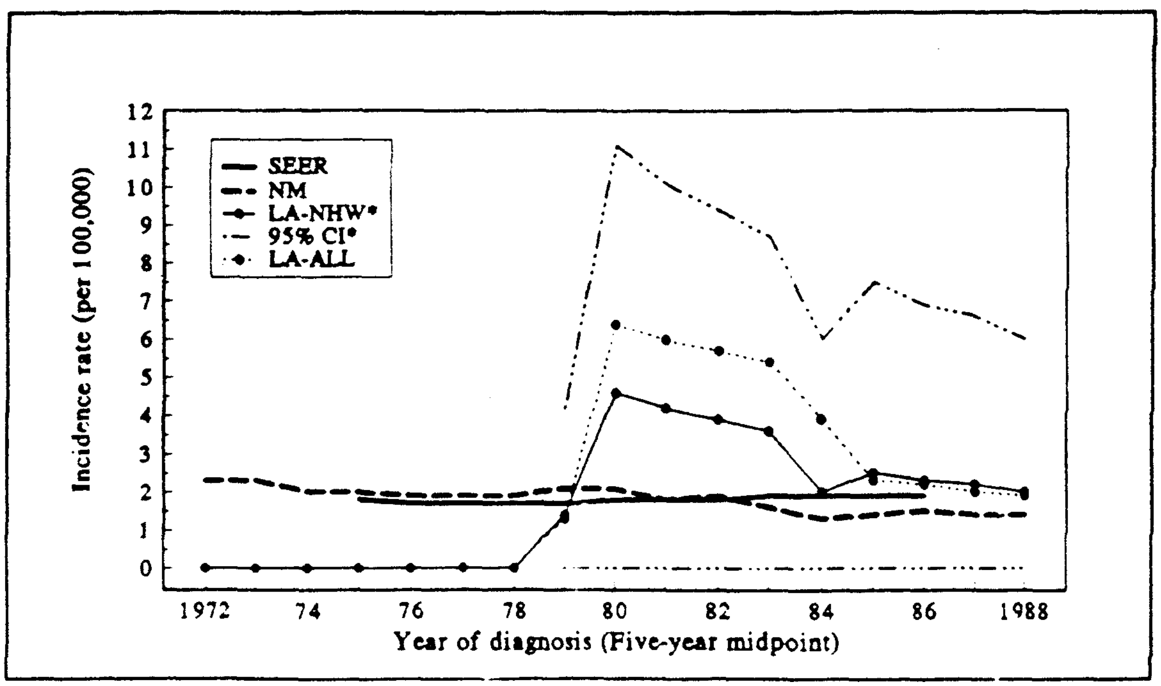

FIGURE G.1.2.4–2.—*5-Year Average Annual Incidence of Liver and Intra-Hepatic Bile Duct Cancer, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

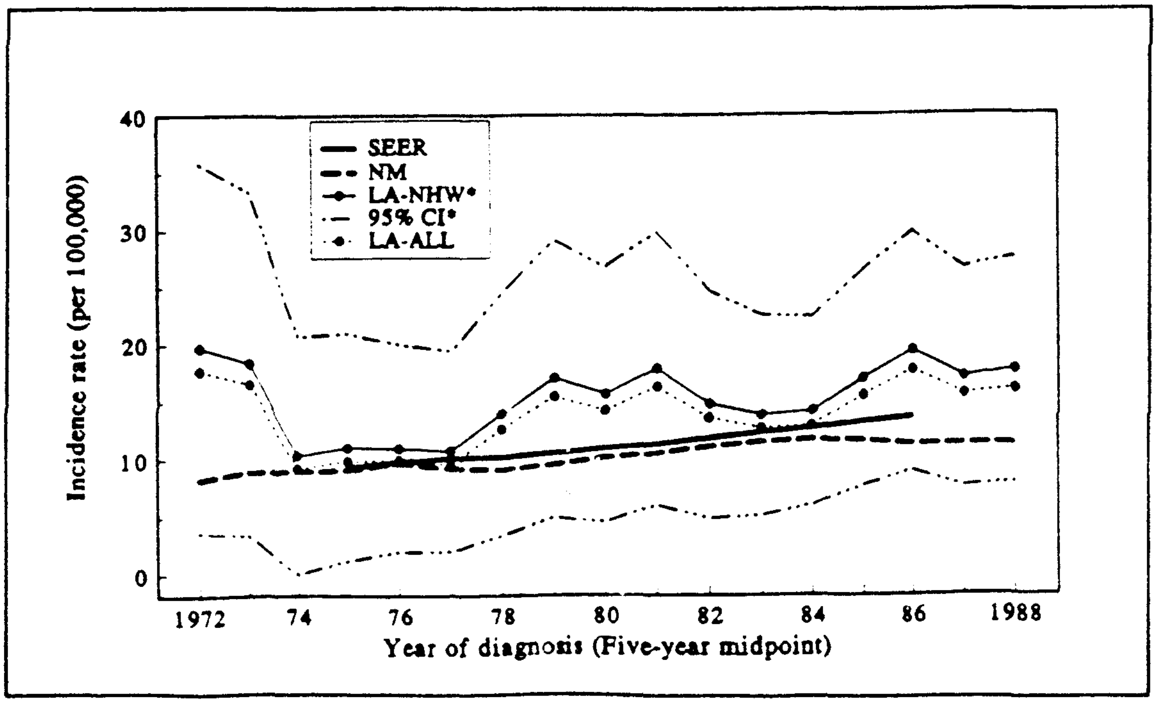

FIGURE G.1.2.4–3.—*5-Year Average Annual Incidence of Non-Hodgkin's Lymphoma, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

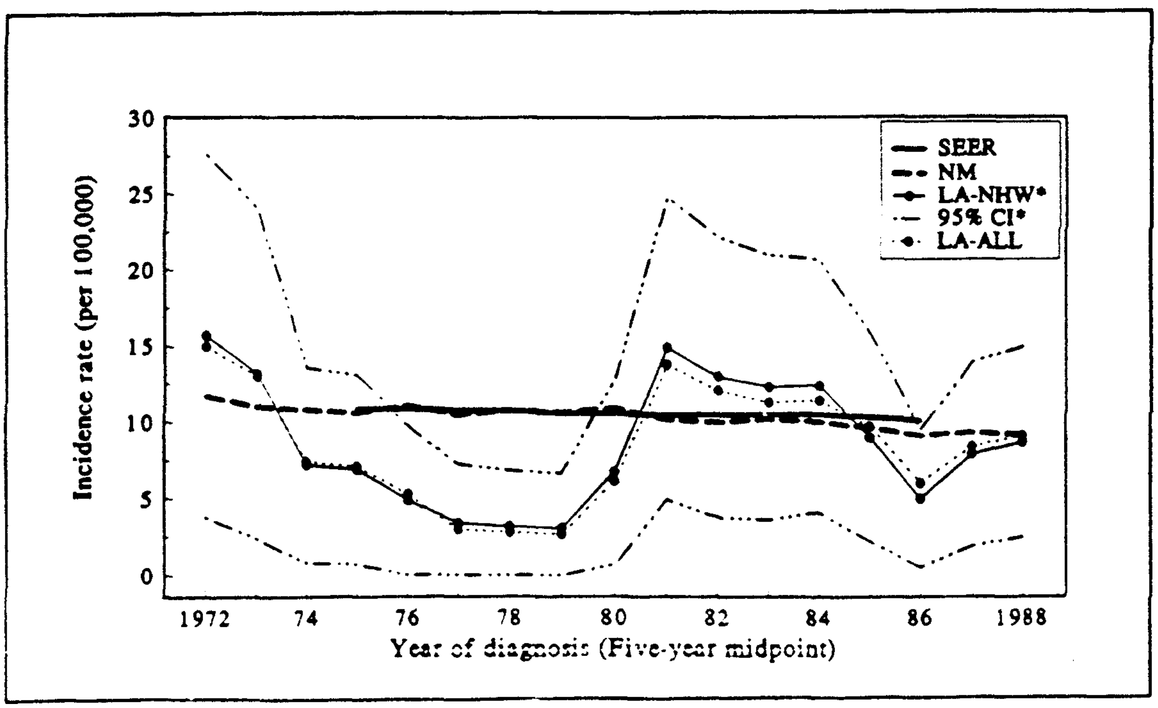

FIGURE G.1.2.4–4.—*5-Year Average Annual Incidence of Leukemia, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

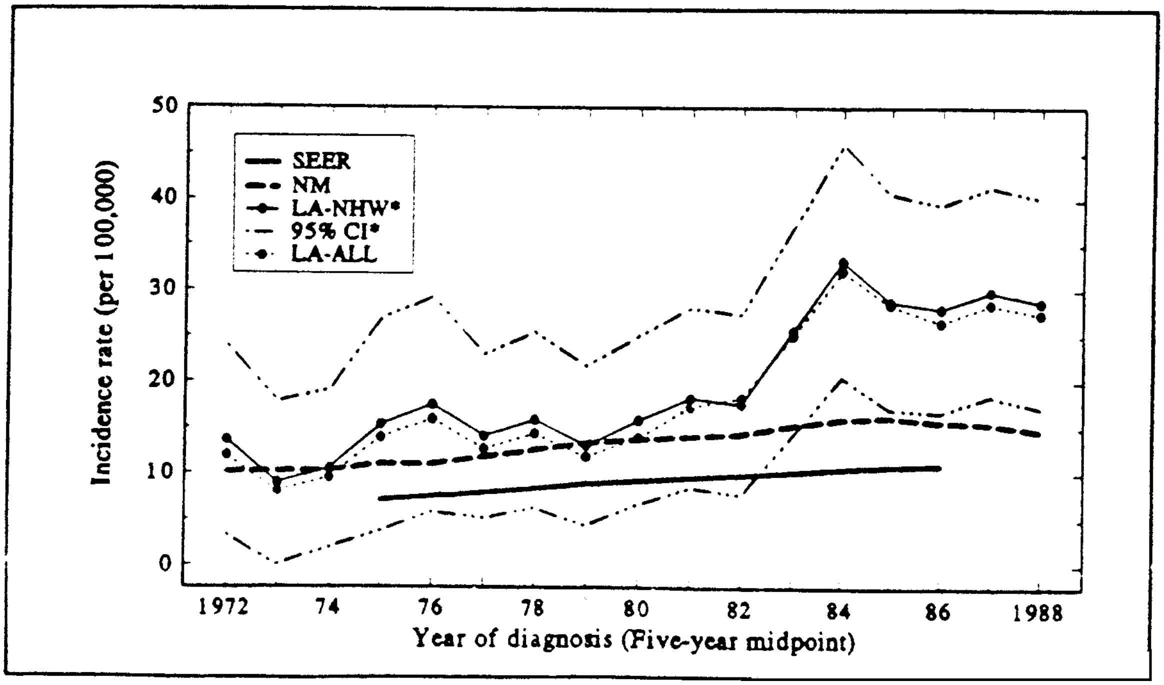

FIGURE G.1.2.4–5.—*5-Year Average Annual Incidence of Melanoma of Skin, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

Beginning with the 1982 to 1986 period, and for all subsequent periods, the lower confidence limit of the Los Alamos County rate excluded the state reference rates. During these later periods, the incidence of melanoma in Los Alamos County increased roughly two-fold over that observed statewide.

Ovarian. Los Alamos County rates steadily rose by three-fold during 1970 to 1990, while both the sate and national reference rates remained essentially constant (Figure G.1.2.4–6). Initially lower than the reference rates, Los Alamos County incidence climbed to a statistically significant three-fold excess level during the 1982 to 1986 period. Half of all the Los Alamos County cases (15 out of 30) were diagnosed during these 5 years. Los Alamos County ovarian cancer incidence was two-fold higher than that observed in the state during the most recent 5-year period (1986 to 1990).

Breast. Breast cancer incidence in Los Alamos County women varied little over time; whereas, both reference populations displayed increasing incidence over time (Figure G.1.2.4–7). Los Alamos County incidence rates were 10 percent to 50 percent higher than the state and national reference rates over the entire study period. The lower confidence limits for the Los Alamos County rates consistently were near the reference rates, but excluded the reference rates in only several instances.

Childhood Cancers. Los Alamos County childhood cancer rates fluctuated around the more stable state and national reference population rates (Figure G.1.2.4–8). Following an initial two-fold elevation during the earliest period (1970 to 1972), subsequent periods were characterized by incidence rates that were slightly higher than or lower than the reference incidence rates. Two childhood brain cancer cases not in the original childhood cancer data set were discovered through a supplemental review of childhood cancer mortality statistics. The two additional cases, diagnosed in 1978 and 1980, would raise the original 1978 to 1982 Los Alamos County rate (13.7 per 100,000) by about

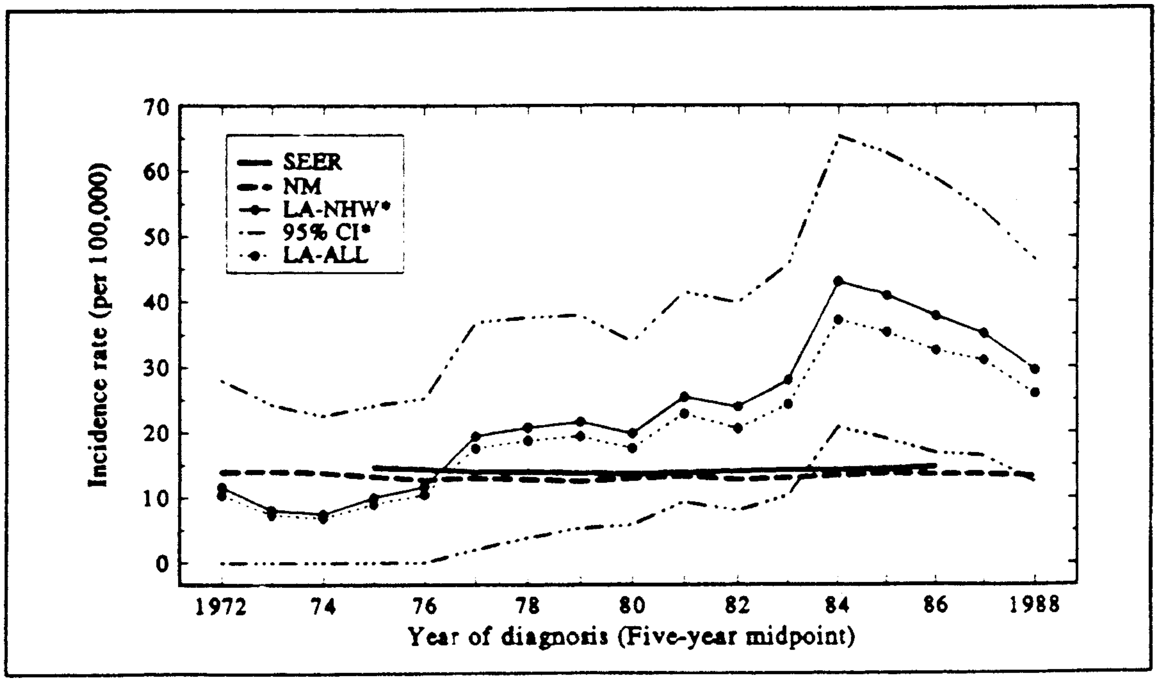

FIGURE G.1.2.4–6.—*5-Year Average Annual Incidence of Ovarian Cancer, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

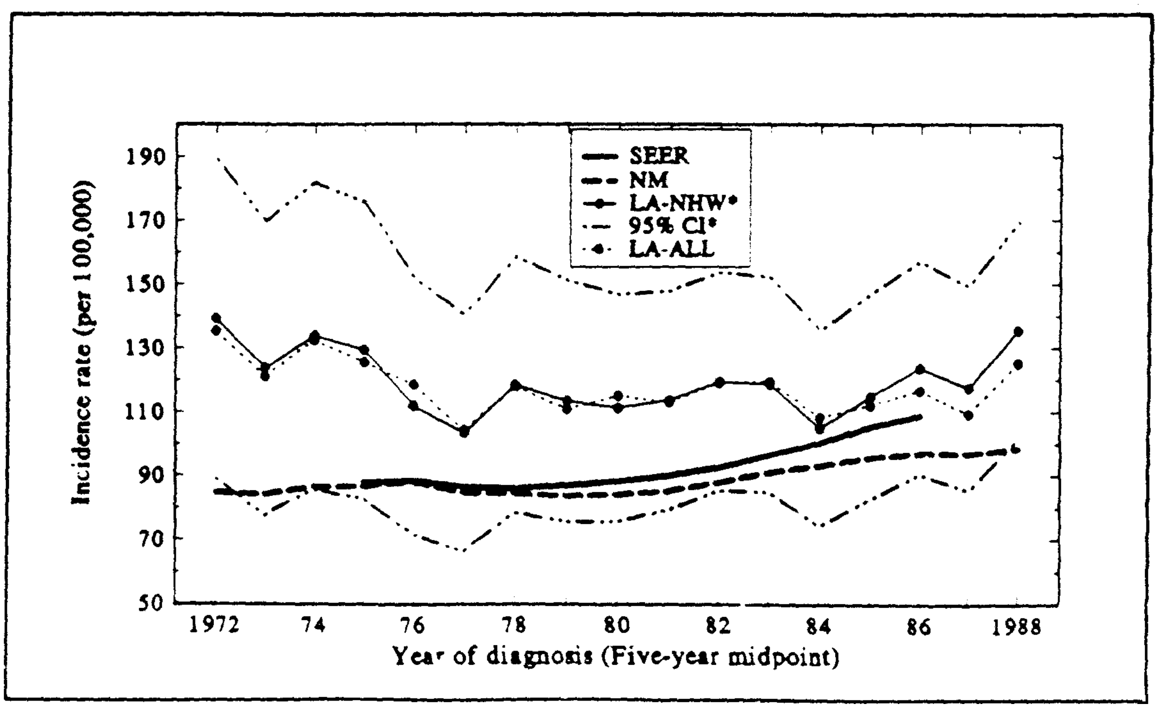

FIGURE G.1.2.4–7.—*5-Year Average Annual Incidence of Female Breast Cancer, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

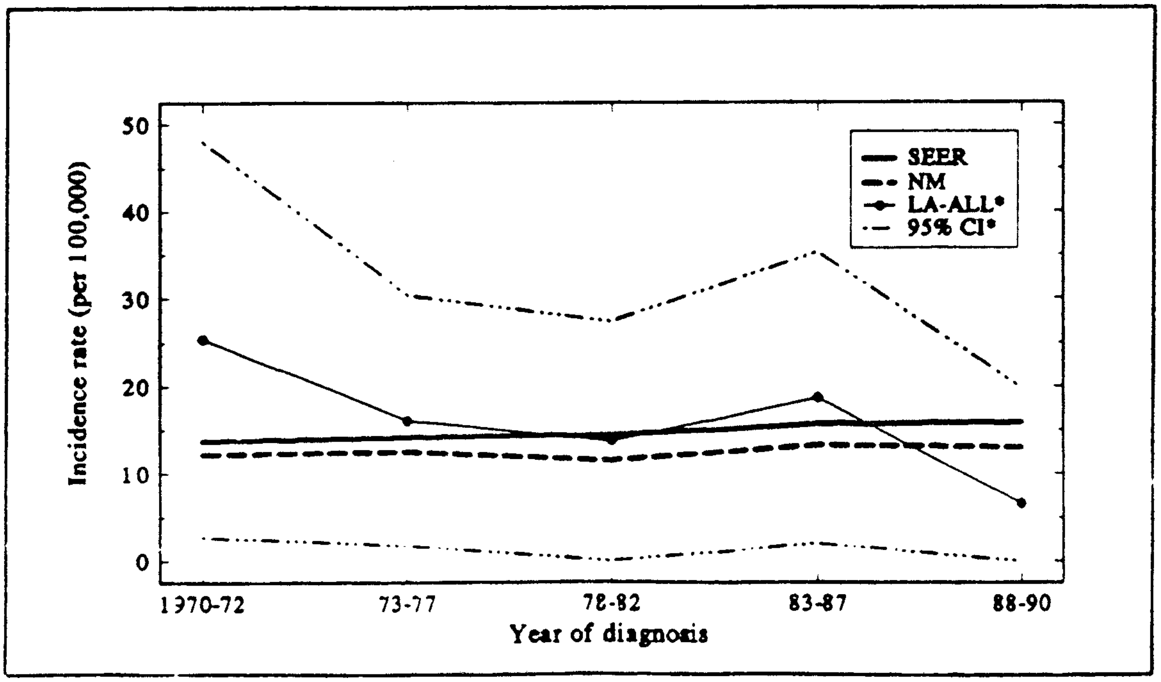

FIGURE G.1.2.4–8.—*Average Annual Incidence of Childhood Cancer (0 to 19 Years), Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*[a]

[a] Incidence rate data based on independent time periods and not 5-year moving averages.

50 percent to 20.3 cases per 100,000. For the latest period (1988 to 1990), the incidence of childhood cancers in Los Alamos County was roughly 50 percent lower than that seen in the state reference population; however, the Los Alamos County rate was based on only one case.

Thyroid. The incidence of thyroid cancer in Los Alamos County prior to the mid 1980's was roughly stationary and less than two-fold higher than that seen in the reference populations (Figure G.1.2.4–9). Los Alamos County incidence rates began to rise during the mid 1980's and continued to climb up until the latest time interval (1986 to 1990). The incidence of thyroid cancer in Los Alamos County during 1986 to 1990 was nearly four- fold higher than that observed in the state reference population. The near four-fold elevation for Los Alamos County was statically significant. Roughly half (17 out of 37) of all thyroid cancer cases that occurred in Los Alamos County between 1970 and 1990 were diagnosed during the 1986 to 1990 interval.

Brain and Nervous System. The incidence of brain cancer in Los Alamos County increased over time (Figure G.1.2.4–10). Los Alamos County incidence rates were lower than or comparable to the reference rates up until the mid 1980's. Increases in Los Alamos County brain cancer incidence became apparent during the mid to late 1980's. Los Alamos County incidence rates (all races) during this period were 60 to 80 percent higher than rates for the state and national reference populations. Diagnosed in 1978 and 1980, two additional cases raised the central portion of the incidence rate curve to a range more comparable with the reference rates, but had no effect on the rates observed during the period of elevated incidence.

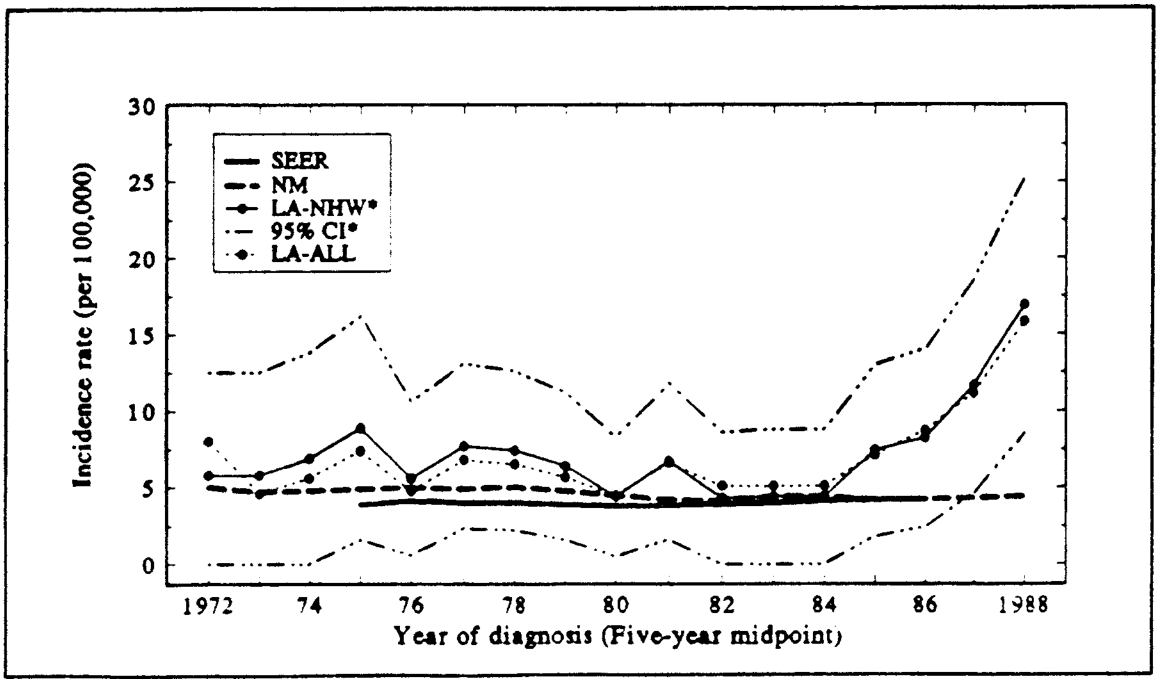

FIGURE G.1.2.4–9.—*5-Year Average Annual Incidence of Thyroid Cancer, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

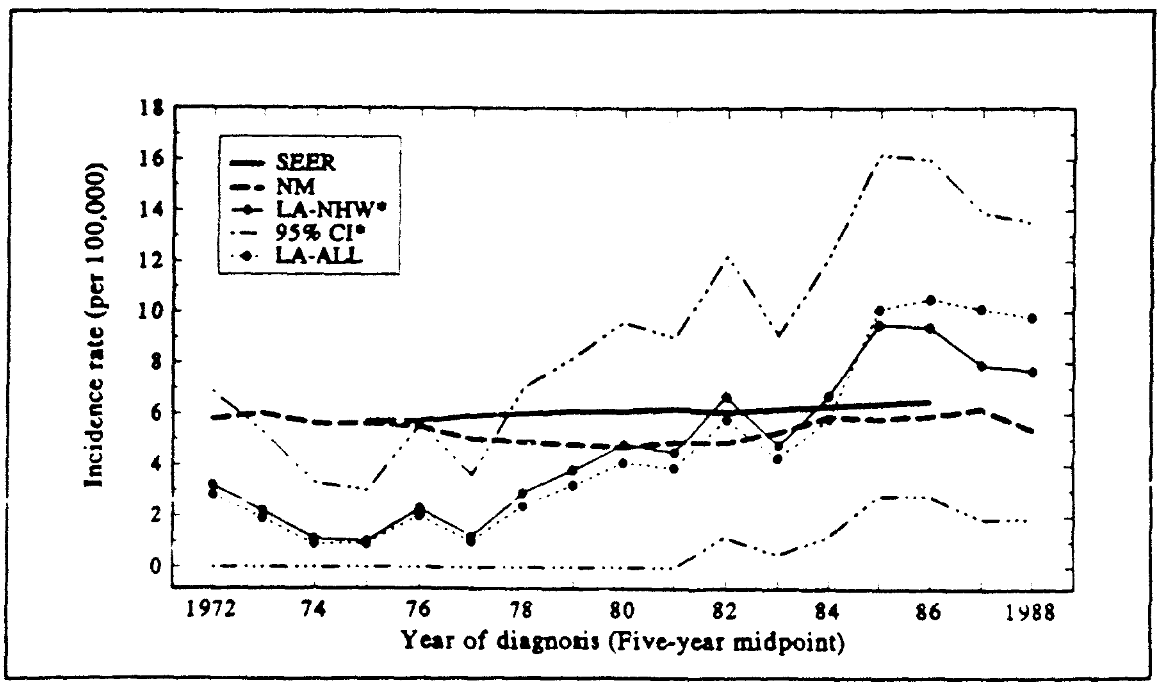

FIGURE G.1.2.4–10.—*5-Year Average Annual Incidence of Brain and Nervous System Cancer, Los Alamos County, New Mexico NHW, SEER Whites, 1970 to 1990.*

Mortality

Mortality rates for Los Alamos County and the U.S. were obtained as age-adjusted average annual mortality rates from the National Center for Health Statistics (NCHS) and the National Cancer Institute. All rates were standardized to the 1970 U.S. standard population and were race-specific for Whites. Site-specific Los Alamos County mortality rates were available for the periods 1969 to 1972, 1973 to 1977, 1978 to 1982, and 1983 to 1987. U.S. rates were available for the time period 1968 to 1972. For some cancers, both Los Alamos County and U.S. rates were available for the period 1968 to 1972. The confidence intervals that accompany the mortality rates were calculated as described for the incidence rates. Table G.1.2.4–1 summarizes the mortality rates by cancer type for Los Alamos County. Nationwide rates are also reported for comparison.

Subcounty Cancer Incidence

Table G.1.2.4–2 describes the cancer incidence for the five census tracts within Los Alamos County for all races, 1980 to 1990. The New Mexico non-Hispanic White population rates are provided also.

TABLE G.1.2.4–1.—*Average Annual Age-Adjusted Mortality Rates by Cancer Type for Los Alamos County and U.S. Whites (1969 to 1987)*

CANCER TYPE	LOCATION	MORTALITY RATE[a]			
		1969 TO 1972	1973 TO 1977	1978 TO 1982	1983 TO1987
Liver and Bile	Los Alamos	14.6 (2)[b]	0 (0)	5.4 (3)	7.1 (4)
	U.S.	—	2.1	2.1	2.3
Non-Hodgkin's Lymphoma	Los Alamos	13.5 (2)	5.8 (2)	12.0 (6)	2.3 (2)
	U.S.	NA[c]	4.9	5.2	5.9
Leukemia	Los Alamos	1.2 (1)	11.2 (6)	1.3 (1)	4.5 (4)
	U.S.	NA	6.8	6.7	6.5
Melanoma	Los Alamos	0 (0)	6.5 (3)	2.9 (2)	1.0 (1)
	U.S.	1.7	1.9	2.2	2.3
Ovarian	Los Alamos	19.7 (3)	5.7 (1)	8.9 (3)	3.8 (2)
	U.S.	NA	8.6	8.1	7.9
Breast	Los Alamos	39.6 (8)	17.4 (7)	60.7 (20)	29.7 (12)
	U.S.	26.9	26.9	26.6	27.2
Childhood Cancer	Los Alamos	3.6 (1)	12.3 (4)	16.1 (5)	10.6 (3)
	U.S.	6.6	5.4	4.6	4.0
Brain and Nervous System	Los Alamos	0 (0)	6.3 (4)	5.8 (5)	5.8 (5)
	U.S.	NA	4.0	4.1	4.3
Thyroid	Los Alamos	0 (0)	0 (0)	0 (0)	0 (0)
	U.S.	NR[d]	NR	NR	NR

[a] Rates per 100,000 and are age-adjusted to the 1970 U.S. standard population.
[b] Number of deaths given in parentheses.
[c] NA = Not available
[d] NR = Not reported

TABLE G.1.2.4–2.—*Average Annual Age-Adjusted Cancer Incidence Rates for Sub-County Regions of Los Alamos County, All Races (1980 to 1990)*[a]

SITE	CENSUS TRACT[b]					CDP[c]		LOS ALAMOS COUNTY	NEW MEXICO NHW[d]
	1	2	3	4	5	LOS ALAMOS	WHITE ROCK		
Non-Hodgkin's Lymphoma	18.9 (2)	4.5 (2)	20.4 (5)	11.1 (5)	16.7 (10)	12.6 (14)	16.7 (10)	14.3 (24)	11.0
	{0.0 to 45.6}	{0.0 to 11.0}	{2.2 to 38.7}	{1.2 to 21.0}	{6.1 to 27.2}	{5.8 to 19.3}	{6.1 to 27.2}	{8.5 to 20.1}	
Leukemia	1.9 (1)	10.3 (4)	17.5 (2)	5.5 (3)	11.8 (7)	7.1 (10)	11.8 (7)	8.5 (17)	9.5
	{0.0 to 5.7}	{0.0 to 20.6}	{0.0 to 42.2}	{0.0 to 11.8}	{2.9 to 20.7}	{2.6 to 11.6}	{2.9 to 20.7}	{4.4 to 12.6}	
Melanoma[e]	33.8 (10)	22.0 (10)	35.8 (7)	13.5 (6)	21.7 (11)	23.2 (32)	21.7 (11)	22.0 (43)	14.5
	{12.4 to 55.2}	{8.1 to 35.9}	{8.7 to 62.9}	{1.5 to 24.5}	{8.6 to 34.8}	{15.0 to 31.4}	{8.6 to 34.8}	{15.3 to 28.7}	
Ovary (Female)	76.7 (9)	19.4 (4)	19.5 (2)	14.0 (3)	12.7 (4)	27.4 (18)	12.7 (4)	23.0 (22)	12.8
	{25.6 to 127.8}	{0.0 to 38.8}	{0.0 to 47.0}	{0.0 to 30.2}	{0.0 to 25.4}	{14.5 to 40.3}	{0.0 to 25.4}	{13.2 to 32.8}	
Breast (Female)	145.3 (28)	120.5 (21)	159.2 (16)	85.3 (21)	116.0 (41)	119.8 (86)	116.0 (41)	119.0 (127)	92.2
	{90.4 to 200.2}	{67.9 to 173.1}	{79.6 to 238.9}	{48.1 to 122.5}	{79.8 to 152.3}	{93.9 to 145.6}	{79.8 to 152.3}	{97.9 to 140.1}	
Childhood (< 20 years)	21.9 (2)	6.7 (1)	0.0 (0)	24.5 (2)	16.9 (4)	14.2 (5)	16.9 (4)	15.2 (9)	14.8
	{0.0 to 52.8}	{0.0 to 20.2}	{ - }	{0.0 to 59.2}	{0.0 to 33.9}	{1.5 to 26.9}	{0.0 to 33.9}	{5.1 to 25.3}	
Thyroid	16.0 (6)	3.8 (2)	5.8 (1)	8.7 (4)	9.3 (9)	9.0 (13)	9.3 (9)	9.8 (22)	4.3
	{2.9 to 29.1}	{0.0 to 9.1}	{0.0 to 17.5}	{0.0 to 17.4}	{3.1 to 15.4}	{4.0 to 14.0}	{3.1 to 15.4}	{5.6 to 14.0}	
Brain	7.3 (2)	5.7 (3)	14.2 (3)	7.4 (2)	8.2 (7)	7.4 (10)	8.2 (7)	7.9 (17)	5.1
	{0.0 to 17.5}	{0.0 to 12.4}	{0.0 to 30.6}	{0.0 to 18.0}	{2.0 to 14.3}	{2.7 to 12.1}	{2.0 to 14.3}	{4.1 to 11.7}	

[a] Rates are for residence at diagnosis for all races per 100,000, age-adjusted to U.S. 1970 standard population; number of cases in parentheses ( ); 95% confidence limits in brackets { }, truncated at zero.
[b] Census Tract Designations: (1) North/Barranca Mesa; (2) North Community; (3) Western Area; (4) Eastern Area; (5) White Rock.
[c] Los Alamos Census Designated Place (CDP) comprises census tracts 1 through 4, White Rock CDP comprises census tract 5.
[d] Non-Hispanic Whites
[e] Excludes two cases with unknown residence at diagnosis.
Source: New Mexico Tumor Registry