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# Los Alamos National Laboratory
# Site Development Plan - Technical Site Information

September 1990

Produced by

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Planning Group, ENG-2

and

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# FOREWORD

Planning provides us with a rational, systematic and flexible process for managing resources. As the pace of global change accelerates and new scientific and technical problems arise, the Laboratory is challenged to continue to play an important national role. This Site Development Plan will help the Laboratory effectively meet this challenge, because it promotes operational efficiency and cost savings while permitting us to employ a comprehensive and a long-term perspective to view important issues. Planning can also help minimize adverse impacts to our environment by preventing shortsighted or inappropriate development.

This Site Development Plan was produced with the assistance and participation of many people representing a broad spectrum of site and facilities interests and expertise. The plan provides the Laboratory with an overall picture of how we can grow or adapt. It is designed to be flexible and updated as conditions change. It includes a comprehensive set of policies to guide decisions about specific development opportunities, land use, facilities, transportation, security, utilities, and environmental, safety, and health planning issues.

This plan will serve as our common frame of reference for making the vital land use and facilities decisions necessary to support current and evolving programmatic requirements. This will help Laboratory management allocate our limited resources. Thus planning not only makes sense, it makes better science.

Siegfried S. Hecker
Siegfried S. Hecker
Director

## DEDICATION

The ideas, talents, and hard work of many have created this plan. One whose positive approach and influence was felt most strongly on this project, and throughout her professional and personal life, was Kim McKeown. Kim was a 32-year-old planning consultant on this project who died in the collapse of I-880 during the San Francisco Bay Area earthquake on October 17, 1989. She was a dedicated and skilled professional, a good friend, and a wonderful person. This Site Development Plan is dedicated to Kim's memory.

# LOS ALAMOS NATIONAL LABORATORY
# SITE DEVELOPMENT PLAN

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# EXECUTIVE SUMMARY

This Site Development Plan (SDP) provides a Laboratory-wide vision of how we can shape our future in an era of limited funding but seemingly unlimited scientific discovery. Implementation of the plan will enable the Laboratory to grow or change while carrying out its mission of maintaining the nation's nuclear deterrent, and applying its vast technical capabilities to solve problems of national interest.

The Los Alamos National Laboratory Site Development Plan is designed to serve as a practical and useful tool. It identifies Laboratory planning and growth issues and addresses them by providing a foundation and framework for Laboratory decision makers who work in an atmosphere of constant change. Policies and specific recommendations complement numerous plan maps, helping to translate long-range goals into a day-to-day action plan for managing Laboratory lands and facilities, utilities, transportation, security, and environmental planning issues in an efficient and cost-effective manner.

This plan assumes a zero net growth rate for the Laboratory during the short-term. In the long-term, beyond the five-year planning horizon, this plan assumes that the Laboratory could grow at an average annual rate of up to one percent. This growth includes projected contractor and non-Laboratory personnel. Certain programs will experience expansion while other programs will decline or be phased out as dictated by changing national priorities.

The Site Development Plan emphasizes:

- Efficient siting of facilities to ensure the wisest use of land holdings;
- Modernizing the Laboratory's aging physical plant by replacing obsolete, outmoded, and substandard facilities with new permanent facilities;
- Integrating safety, health, and environmental requirements into all Laboratory facilities planning and land use activities in order to protect Laboratory personnel, the public, and the environment;
- Maintaining Laboratory security and protection functions through the use of security-conscious facilities siting procedures;
- Improving Laboratory and regional transportation systems to enhance traffic safety, upgrade operations, shorten travel times, reduce energy costs, and improve security;
- Developing Laboratory utility systems that provide adequate service capacity and are modern, efficient, and cost effective; and
- Improving the Laboratory's physical environment to provide employees a quality workplace, and enabling the Laboratory to compete with similar research institutions in the recruitment of employees and the pursuit of new projects.

The plan organizes the Laboratory into eight development areas. A core area in and around Technical Area (TA)-3 contains centralized administrative functions, necessary ancillary activities, and some experimental and theoretical science programs. Three primary development corridors emanate from this core along Pajarito Road, East Jemez Road, and West Jemez Road. Each corridor links technical areas that are related by function. Development sites maps in each of the development area master plans assist the reader by highlighting lands that are available and appropriate for new facilities.

Major Laboratory development issues have been integrated into six planning elements to enable analysis and the development of goals, objectives, policies, and specific recommendations. These element master plans are: land use, population and facilities, transportation and circulation, security and safeguards, utilities, and environment, safety, and health.

The plan's environment, safety, and health element responds to the increased concerns and awareness of the importance of these issues throughout the DOE complex and particularly at Los Alamos. The Site Development Plan:

- Identifies potentially contaminated sites and other potential hazards throughout the Laboratory, which are the focus of environmental restoration and corrective activities;
- Recommends implementation of new waste management initiatives and notes their proposed locations;
- Promotes establishment of an environmental safety and health research and treatment park along the Pajarito Corridor to focus the master planning of environmental remediation, waste management, and corrective activities at the Laboratory; and
- Proposes relocation of sources of radiation that are not compatible with other Laboratory activities.

To accommodate ongoing changes in Laboratory population and facilities, the Site Development Plan:

- Incorporates the Space and Facilities Siting Management Policies and Procedures adopted by the Laboratory in the spring of 1989;
- Promotes decontamination and decommissioning of marginal and substandard Laboratory

facilities and adaptive reuse or redevelopment of selected sites and structures where feasible;

- Identifies the need to build additional permanent facilities to replace the growing amount of temporary space now becoming commonplace throughout the Laboratory; and

- Focuses growth along dedicated utility corridors where existing and planned utilities will be provided.

Nine land use categories and 24 functional zones are used to separate and properly site Laboratory facilities and functions at compatible locations. The Site Development Plan:

- Maintains large areas of the Laboratory as an important resource for high-explosives research, development, and testing;

- Establishes a waste management land use category, reserving areas for future Laboratory waste treatment and disposal facilities and initiatives; and

- Includes a public/corporate interface land use category to identify sites most suitable for future endeavors involving ongoing public contact, including technology transfer.

Transportation and circulation are major concerns at the Laboratory as activities are spread out over 43 square miles and occupy approximately 1,800 buildings at 50 active technical areas. The Site Development Plan:

- "Includes several transportation policies, and numerous specific roadway design recommendations that will enhance both traffic safety, and emergency response and evacuation capability while reducing travel times at the Laboratory;

- Identifies parking areas in all major technical areas to anticipate future building needs; and

- Encourages multimodal transportation alternatives when feasible and appropriate.

Security is a major part of land use and facilities planning and is vital to protect facilities critical to the Laboratory's mission. The Site Development Plan:

- Incorporates a concentric ring security model and consolidates the most sensitive and important facilities deep inside the Laboratory buffered by lower levels of security; and

- Proposes relocation of special nuclear materials (SNM) activities and sources of radiation into both the Pajarito Corridor and the Weapons Engineering Development Areas.

This Site Development Plan is a working document designed to be flexible and updated as conditions change. It complies with the letter and intent of DOE Order 4300.1B (Real Property and Site Development Planning) which was the guidance in effect during plan development and at the time of printing. The SDP reflects the needs of Laboratory management, and scientific, technical and support user groups who were kept involved and informed during the plan's preparation.

Plan text and maps can be made available in a variety of forms. Please contact the Planning Group, ENG-2, for further details.

# INTRODUCTION

The Los Alamos National Laboratory (LANL) Site Development Plan (SDP) has been developed to guide Laboratory land use, facilities, and infrastructure decision making. Its purpose is to serve Laboratory program needs and increase the efficiency of Laboratory operations in a cost-effective manner while making the Laboratory a more desirable place to work.

The technical site information contained in this plan is intended as both a short-range and long-range guide for future building and facilities planning. It recommends the best use of existing land holdings and identifies the need to expand and upgrade facilities so that the Laboratory can more efficiently conduct state-of-the-art research.

Three basic principles guided the site development planning process:

- Optimizing the use of Laboratory lands by balancing specific space, facility, circulation, utility, security, and program requirements with Laboratory-wide functional considerations.
- Providing a framework that facilitates management of changing site, facility, and programmatic needs.
- Building a safe, pleasant, and secure working environment conducive to creativity, productivity, and job satisfaction.

It is important to ensure that the overall Laboratory site remains functional. Therefore, the facility and site needs of individual programs must be examined in the context of Laboratory-wide requirements. Currently, problems are created through uncoordinated expansion and infrastructure development. Although this pattern will be difficult to change, the Site Development Plan provides the foundation to establish a better and more logical pattern of development.

The SDP is divided into four major sections:

- General Site Description;
- Planning Analysis/Laboratory-wide Element Master Plans;
- Development Area Master Plans; and
- Appendixes.

The **General Site Description** section discusses the site and its regional context. The Laboratory's history, adjacent land ownership, and a specific description of the site are included. Eight development areas are identified. These are clusters of technical areas where significant growth and/or change is projected and which are the focus of the SDP.

The **Planning Analysis/Laboratory-Wide Element Master Plans** section identifies and analyzes the major Laboratory-wide site development planning issues, integrating them into six element plans: land use, population and facilities, transportation/circulation, security/safeguards, utilities, and environment, safety, and health.

The **Development Area Master Plans** section focuses on eight specific Laboratory growth areas requiring detailed planning. The discussion of each development area includes detailed descriptions and maps of land use, population and facilities, transportation/circulation, security/safeguards, utilities, and environment, safety, and health issues. The master plans propose long-range solutions and make specific recommendations for improvements. Development sites maps identify parcels suitable for new development or redevelopment, and related development sites evaluation tables present listings of development opportunities and constraints within these areas.

The **Appendixes** section consists of background technical information including existing conditions data (Appendix A), a visual assessment analysis (Appendix B), a list of major facilities (Appendix C), a LANL organization chart (Appendix D), and a glossary of terms and acronyms (Appendix E).

A list of references is located in the back of the document following the appendixes.

# Approach

## Organization of the Planning Team

The 1990 Site Development Plan is the result of a Laboratory-wide team effort. Integral to the process was the participation of Laboratory management, the Facilities Engineering Division, a technical advisory team composed of specialists for each planning element, user organizations with program and division representatives, and a planning and design consulting team consisting of ICF Kaiser Engineers and Royston Hanamoto Alley & Abey. Throughout the process, team meetings were held to ensure that information was shared and specific concerns of the planning team members were addressed.

## Planning Process

The planning process for the Site Development Plan has included a re-examination of existing conditions at the Laboratory. Opportunities and constraints impacting the Laboratory's growth were identified and documented, and recommendations were prepared to guide the future development of the Laboratory.

Given the large size of the Laboratory site and the dispersion of its technical areas, the SDP has been divided into two major sections. In the first section Laboratory-wide issues are identified and discussed as separate element plans under the following headings:

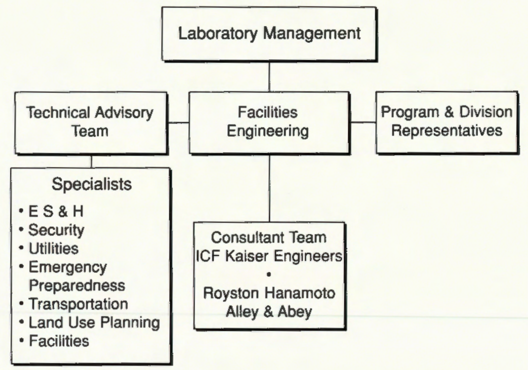
- Land Use;
- Population and Facilities;
- Transportation/Circulation;
- Security/Safeguards;
- Utilities; and
- Environment, Safety, and Health.

The second section contains eight specific development areas that encompass the major concentration of Laboratory technical areas, square footage, land, and population. These are

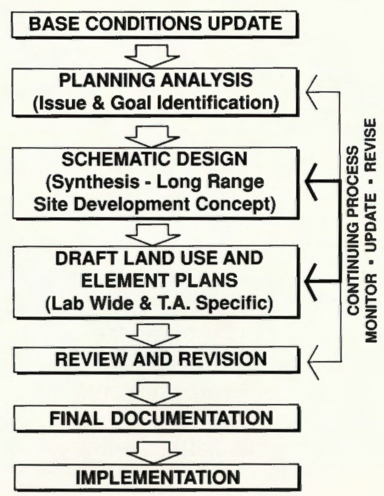
- Core Area and Two-Mile Mesa North (TAs 3, 43, 58, 59, 62);
- Two-Mile Mesa South (TAs 6, 22, 40);
- Pajarito Corridor West (TAs 35, 48, 50, 52, 55, 63, 64, 66);
- Pajarito Corridor Central (TAs 18, 46, 51, 65);
- East Jemez Corridor and Sigma Mesa (TAs 2, 41, 60, 61);
- Weapons Engineering (TA-16);
- Dynamic Testing (TAs 8, 9, 14, 15, 22, 36, 39, 40, 67, 68); and
- Los Alamos Meson Physics Facility (LAMPF) (TA-53).

Other important technical areas such as TAs 21, 33, and 54 are discussed, as appropriate, throughout the element plans and development area plans and are shown on Laboratory-wide maps.

*Organization of the Planning Team*




*The Planning Process*



## Laboratory Planning Model

The Laboratory planning model illustrates the basic functional and spatial organization of the Laboratory. This model establishes the framework and rationale for site planning. As such, the model

- Proposes building upon and strengthening existing development patterns to achieve effective functional working relationships; and

- Considers locations for the accommodation, expansion, and sometimes the relocation of programs and facilities to enhance the compatibility of land uses.

In the planning model, the Core Area (TA-3 and immediate surroundings) remains as the Laboratory's administrative and functional center.

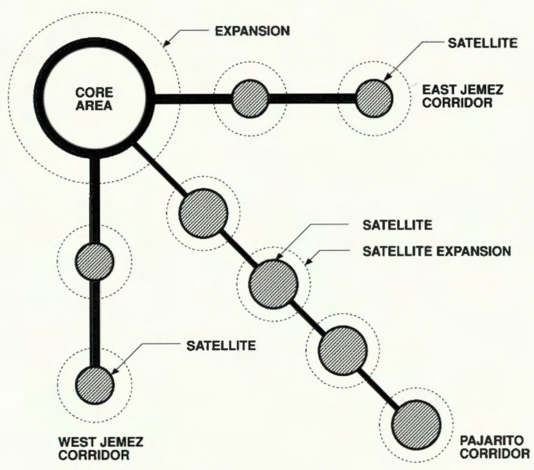
Three main development corridors emanate from the Core Area, each with its own major programmatic emphasis. These are

- East Jemez Corridor, which consists of LAMPF, Sigma Mesa, and East Jemez Road. LAMPF is used primarily for accelerator-related experimental science; Sigma Mesa is proposed for administrative, technical, and physical support functions; and East Jemez Road is proposed for physical support functions and primary access to the Laboratory.

- Pajarito Corridor is used primarily for nuclear materials research and development, fusion and laser research and development, waste management, and other multi-use experimental science.

- West Jemez Corridor has been used basically for weapons engineering and dynamic testing.

*Laboratory Planning Model*




Some experimental science uses will be located at Two-Mile Mesa South in the long-term.

Each of the three main development corridors is planned to have satellite support and service areas for Laboratory administrative and technical support functions. Satellite sites may also be used for physical support functions. Facilities providing cafeterias, wellness centers and other employee services may also be located in these areas. All such satellites require expansion areas to permit the phased, planned growth of facilities as funding permits.

### How to Use this Plan

The Site Development Plan is the Laboratory's primary land use and facilities management and implementation tool. The plan identifies specific areas for new construction and redevelopment. To guide long-range planning and day-to-day decision making, the SDP contains specific **policies** and **recommendations** in each of the element plans and for each development area plan.

The SDP **policies** focus and translate the Laboratory goals and objectives into specific guidelines for use by the Siting and Space Committee (SSC), and Construction Development Advisory Committee (CDAC), as well as other planning personnel, in making Laboratory facility planning decisions.

The **recommendations** offer very specific plan implementation strategies intended to resolve issues identified in the planning analysis, the Laboratory-wide element plans, and the development area plans sections.

The **development sites** maps and accompanying site evaluation tables provide information related to future development possibilities. All plan maps are available in larger size for clarification or consultation. Please contact the Planning Group ENG-2, for more information.

*Aerial View of the Laboratory and Townsite Looking to the West and the Jemez Mountains*

# GENERAL SITE DESCRIPTION

## Regional Overview

Los Alamos is located in north-central New Mexico, an area of enchanting natural beauty enriched by the interweaving of three cultures – Native American, Hispanic, and Anglo-American.

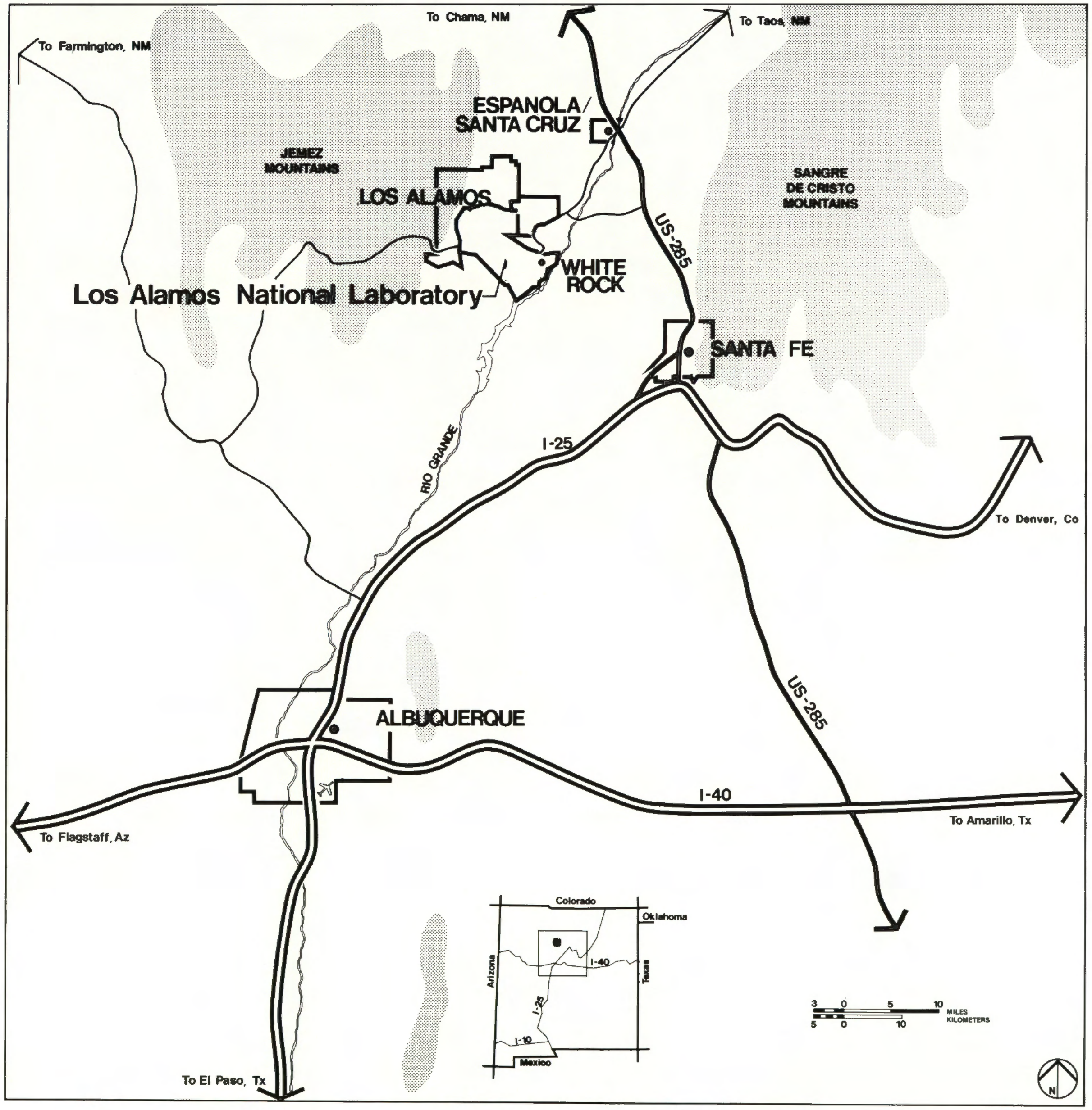
The very old and the very new are juxtaposed within the immediate environs of Los Alamos – pueblos where traditional ceremonies and customs are still honored, old high-mountain Hispanic villages, and the ruins of prehistoric Indian cultures are found nearby. Santa Fe, the oldest capital city in the country, is a major travel destination.

The area is dominated by the Jemez Mountains to the west and Sangre de Cristo Mountains to the east. These two ranges flank the Rio Grande Valley, which roughly bisects the state from north to south. The Laboratory is located on the Pajarito Plateau, a volcanic shelf on the eastern slope of the Jemez Mountains, at an approximate elevation of 7,000 feet (2,134 meters). The Pajarito Plateau is cut by a number of steeply sloped, deeply eroded drainage canyons that have formed isolated finger-like mesas running west to east.

The ecosystems in the region are diverse due to the 2,000-foot (610 meters) gradient between the Rio Grande Valley and the Jemez Mountains. Variations in precipitation and temperature, and differences in the solar radiation reaching north-facing and south-facing canyon slopes have resulted in a diversity of flora, fauna, and soils. The mountain scenery, stark geology, and mild climate provide an enchanting environment for living, working, and recreational activities. More detailed discussions of existing conditions can be found in Appendix A.

The northern portion of New Mexico depends heavily on tourism, recreation, agriculture, and the state and federal governments for its economic base. The Laboratory and its associated support

*Regional Location*



services subcontractors are the largest industrial employers in the region. Thirty-eight percent of the region's jobs are directly or indirectly created by the Laboratory. The Laboratory's positive impact on the Northern New Mexico economy is commensurate with this fact. In fiscal year 1989, the Laboratory's operating budget was $902 million. In fiscal year 1984, when the Laboratory's operating budget was about half of this amount, the Laboratory's overall economic impact on the surrounding tri county area was estimated to be at least $1.4 billion. The Laboratory's economic contribution is no doubt much greater today.

Highways provide the primary access to the Laboratory from the Rio Grande Valley and Albuquerque. Los Alamos has no bus or rail connections, but regularly scheduled commuter air service is available between Los Alamos and Albuquerque.

Sixty percent of the Laboratory employees live in the adjacent communities of Los Alamos and White Rock. The balance of the employees commute from Santa Fe, Española, and other areas.

**Community Attitudes and Local Issues**

People in and around Los Alamos are concerned with a variety of local issues that merit a brief review to permit a better grasp of general planning concerns affecting the region. These issues include concerns about economic development, tourism, housing, schools, and transportation, and are often manifested as disputes about appropriate land use decisions.

Recently, there has been growing public concern about environmental compliance throughout the Department of Energy (DOE) complex. Locally, this has been directed at the Laboratory through media and public scrutiny of previous and proposed activities and their impact on the natural environment. The Laboratory must continue to demonstrate that it can and will comply with all applicable federal and state environmental regulations.

Generally, area residents have been supportive of the Laboratory and its activities. This attitude has been fostered by the tremendous positive economic benefits resulting from the Laboratoy that have accrued to the region during the past four decades.

The people who live in Los Alamos and the surrounding region value highly the quality of life that distinguishes the area. This quality stems from the unspoiled and uncrowded natural surroundings and numerous outdoor recreational opportunities. Many of the current issues of concern arise from differing agency and personal philosophies about managing natural resources. For example, the Santa Fe National Forest, which occupies much of the area and borders on private and Laboratory lands, is managed by the U.S. Forest Service with the guiding principle of sustained multiple use. Therefore, the impacts of proposed lumbering and mining operations in the national forest are of concern, not only to the public, but to other agencies that may view the proposals as threatening their interests. Bandelier National Monument also borders Forest Service and Laboratory lands and is managed by the National Park Service under the guiding principle of preservation and protection of the environment for public use and enjoyment. Also, tourism is a regional economic force that is hotly debated because of the impact of attracting and accommodating visitors.

Housing is an issue that has always been the subject of lively debate in Los Alamos; housing supply and demand, housing choices and affordability, and the selection of new areas for future housing development are always topics of concern to local residents. The local housing market is subject to continual fluctuation because of the town's dependence on the Laboratory as the major employer. Efforts to identify additional land for industrial development that could complement programs at the Laboratory are ongoing in an attempt to continue to further diversify the local economy.

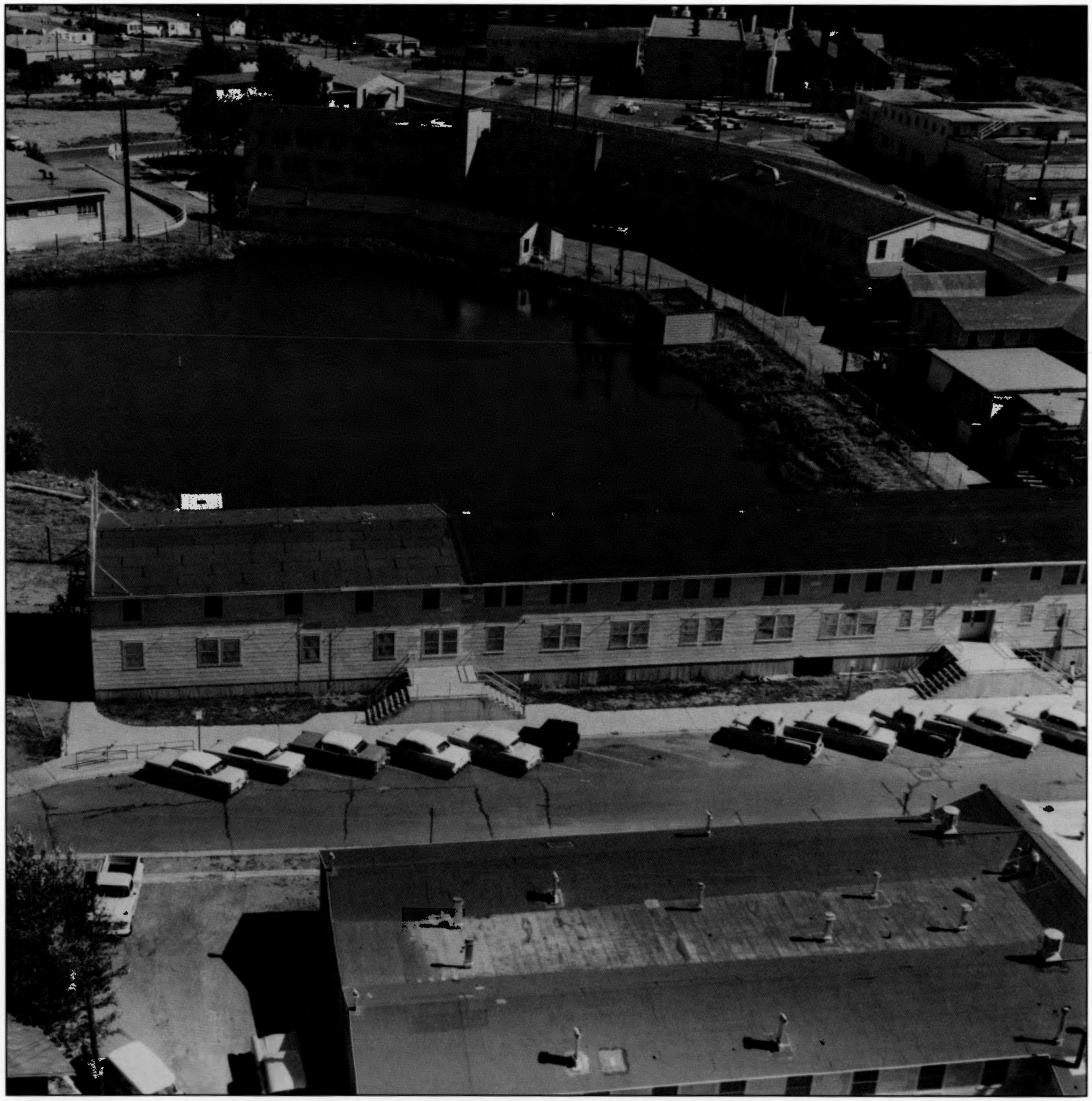
As the population of Los Alamos ages and the proportion of retirees increases, new and different services in the community will be needed. Moreover, local public schools, which have obtained a reputation for excellence, will face the challenge of maintaining high standards and remaining attractive to potential new Laboratory employees seeking quality education for their children while enrollments decline and funding possibly decreases.

Improvements to the regional transportation network, including the upgrading of NM 502 and/or the construction of a proposed Los Alamos/Santa Fe connector, will alleviate some of the current congestion problems resulting from the growing number of commuters to the Laboratory from Santa Fe and the Española Valley. However, there are fears that these improvements will pose further challenges to the community's service and goods sector by making it easier to shop elsewhere. Alternately, these improvements might further expand opportunities for services and tourism by making the area more accessible.

It is in the Laboratory's best interest to continue its good neighbor policy of cooperating with Los Alamos County, the U.S. Forest Service, Bandelier National Monument, San Ildefonso Pueblo, and other neighbors to attain mutually beneficial land use planning goals. The Laboratory's planning efforts should complement and be coordinated with the efforts of these other entities whenever feasible.

*TA-1 in the Late 1950s*

*Ashley Pond and "Downtown" Los Alamos about 1958*



## History

The U.S. Army Manhattan Engineering District, which began with theoretical studies at the University of California at Berkeley in 1942, quickly progressed to a point where a remote site for experimental work was needed. Following surveys of numerous sites, the decision was made to locate weapons research, called Project Y, at the Los Alamos Ranch School for Boys, a group of some fifty log buildings on a 790-acre site, 35 miles northwest of Santa Fe, New Mexico. In 1942, the Undersecretary of War directed acquisition of the site, which ultimately included the Ranch School property, another 3,120 acres in homesteads and grazing lands, and 45,666 acres of public domain lands supervised by the U.S. Forest Service.

In 1943 this land became officially known as the Los Alamos Scientific Laboratory. Its initial mission was to develop the world's first nuclear fission weapon, a project that lasted for the duration of World War II. From its inception the Laboratory was operated under contract by the University of California, although in its earliest years Los Alamos was under Army control.

Laboratory activities were established in what is now downtown Los Alamos in wooden buildings south of the original Ranch School buildings which were used for housing. Early expectations were that the task of assembling an atomic bomb could be handled by a few scientists, engineers, and technicians. These expectations were quickly dispelled, and expansion became necessary. Additional Laboratory buildings were constructed, and army-style barracks and temporary and prefabricated structures provided housing.

With the end of World War II and the growth of international competition, a national policy of maintaining pre-eminence in the field of atomic energy was established. Congress chose to sustain Los Alamos; the Atomic Energy Commission (AEC) received control of the Laboratory from the Army and renewed the operating contract with the University of California. Thereafter, a major construction program was started south of Los Alamos Canyon. During subsequent years the Laboratory continued to expand at a steady rate, first under the AEC, and later under the Energy Research and Development Administration (ERDA). Currently, the Laboratory operates under the aegis of the Department of Energy (DOE).

## Adjacent Land Ownership

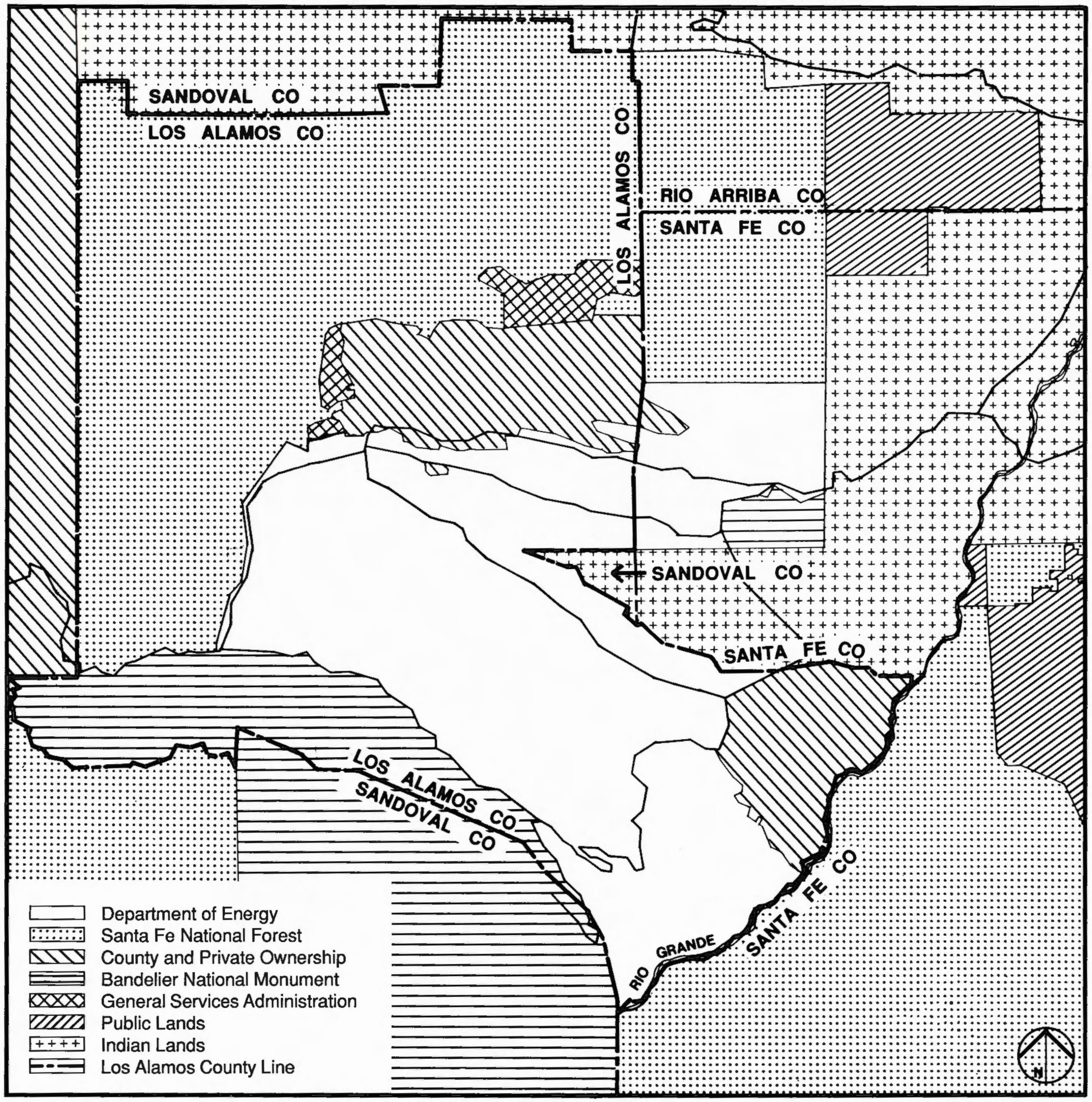
The relative isolation of Los Alamos National Laboratory was considered ideal for an atomic weapons laboratory when the site was selected during World War II. The surrounding area, including all of Los Alamos County and large portions of Sandoval, Rio Arriba, and Santa Fe Counties, remains largely undeveloped except for those areas occupied by Laboratory facilities and associated communities. Large tracts of land in the Jemez Mountains to the north, west, and south of the Laboratory site are held by the U.S. Forest Service and National Park Service. Indian lands of the San Ildefonso and Santa Clara Pueblos border the Laboratory on the east and northeast.

The Laboratory has established numerous formal and informal contacts with agencies and public interest groups that have ownership or vested interest in abutting lands in and around Los Alamos County. The Laboratory fosters economic development and diversification planning throughout northern New Mexico by maintaining active participation in community, regional and state development organizations and their planning initiatives.

The Laboratory Community Council offers an important forum for regional discussion of common Laboratory/community concerns. Programs such as the Speakers' Bureau, Volunteer Action Program and technical assistance are aimed at offering substantive information and tangible assistance to surrounding counties. Several efforts are underway to assure a thorough Laboratory understanding of community needs, concerns and interests, as well as assure a thorough public understanding of Laboratory effects on the community. They include an Environmental Restoration Community Relations program and related public Reading Room; a program for routine dialogue with public interest groups in northern New Mexico; and a pilot tour program for non-official visitors to the Laboratory.

The Laboratory now occupies approximately 24,000 acres within Los Alamos County, which is 32% of all land in the County. The largest landholder in the county is the U.S. Forest Service, which controls nearly 30,000 acres or 42% of the 70,000 acres that make up the county. Bandelier National Monument occupies approximately 7,000 acres, or 10%. About 12% of the lands in the county are in private or local government ownership.

*Adjacent Land Ownership*



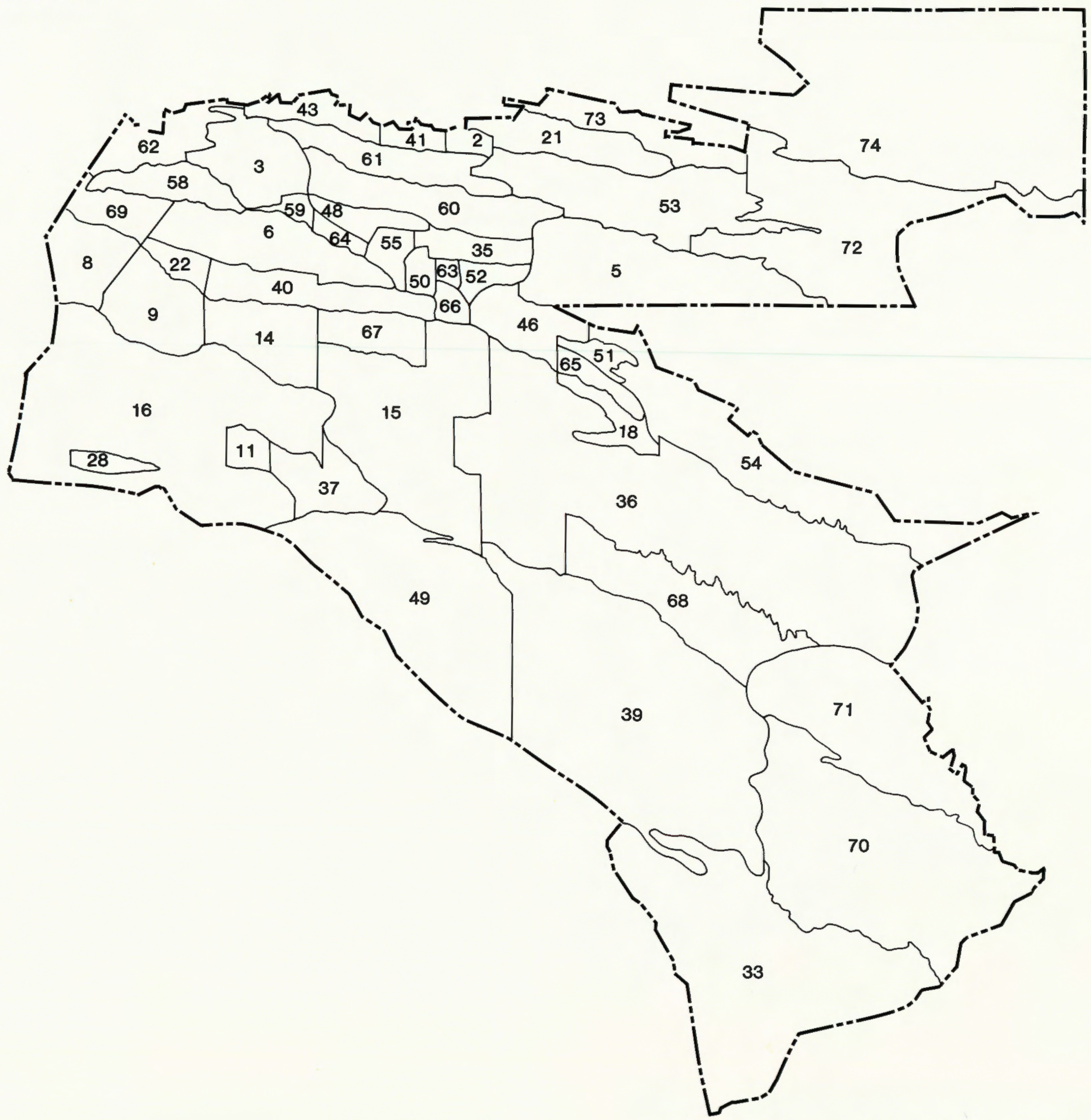
## Site Description

The Laboratory is situated on approximately 27,500 acres (43 square miles) of DOE land, 24,000 acres (87%) of which are located within Los Alamos County. There are currently 50 designated technical areas with locations and spacing that reflect historic development patterns, topography, and functional relationships. Presently, Los Alamos National Laboratory's on-site population is approximately 12,000 people (including both employees and contractors) housed in over 1,800 buildings totalling about 7,300,000 square feet.

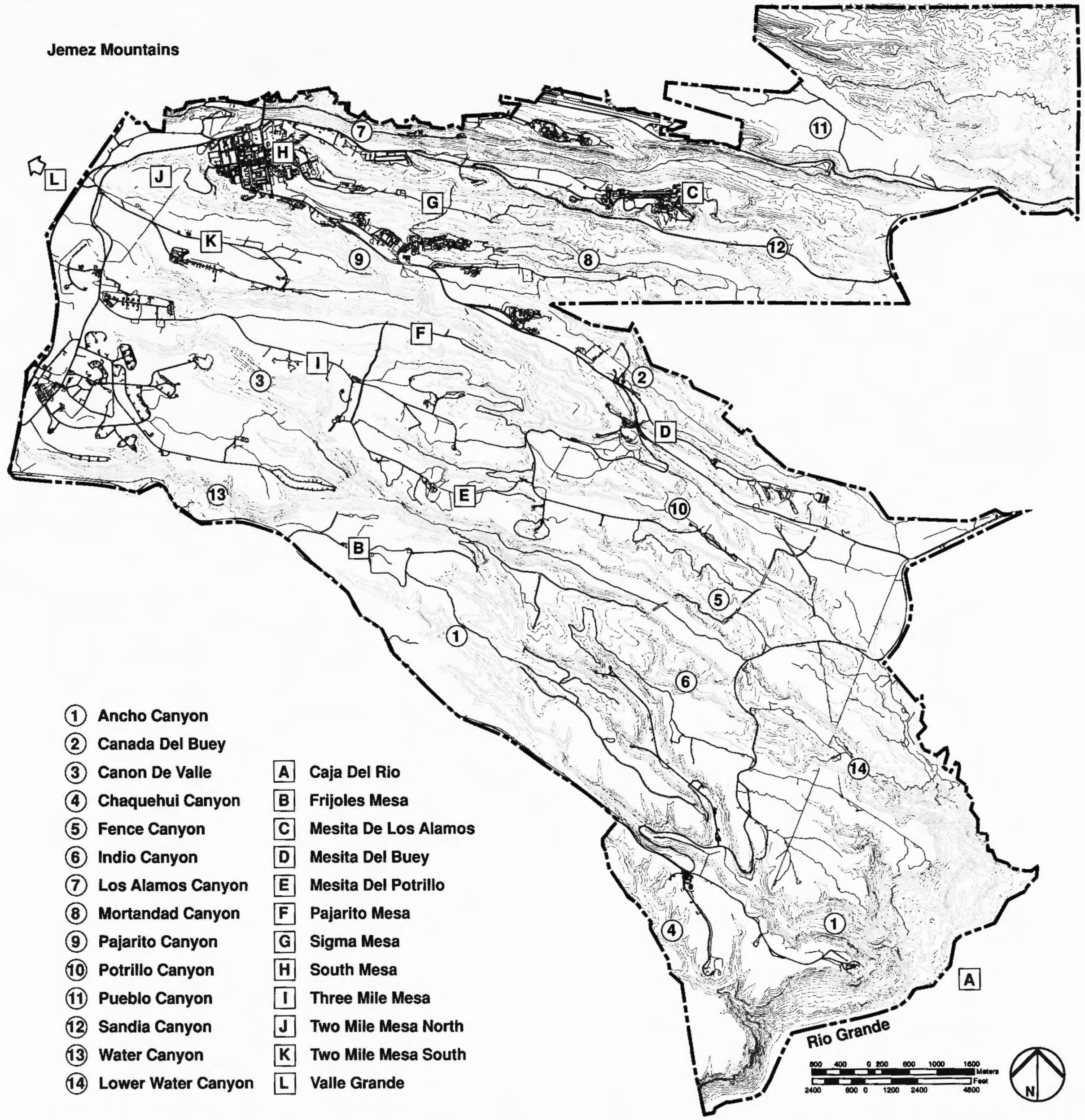
Although at a cursory glance there appears to be sufficient land for future expansion at the Laboratory, the majority of it is very difficult to develop given the severe and significant physical constraints. For example, over half of the acreage consists of slopes that exceed twenty percent. (A map depicting the major canyons and mesas appears on the facing page.) In addition, large reservations of land are required for security and safety buffers so that essential Laboratory programs can continue unhindered and without adversely affecting surrounding areas. Additional information on these and other natural and man-made features that affect land use and facilities development at the Laboratory is presented in the following sections dealing with individual element master plans and the eight development areas.

Further information on existing conditions, including information about slopes, soils, geology and faults, climate, vegetation, wildlife, archaeology, hydrology, and land outgrants can be found in Appendix A.

*TA Boundaries*



*Major Canyons and Mesas*



## Development Areas

Most Laboratory functions, about three-fifths of the land and 93% of the population, are concentrated in the eight development areas identified by this plan. Each is composed of various technical areas as indicated below.

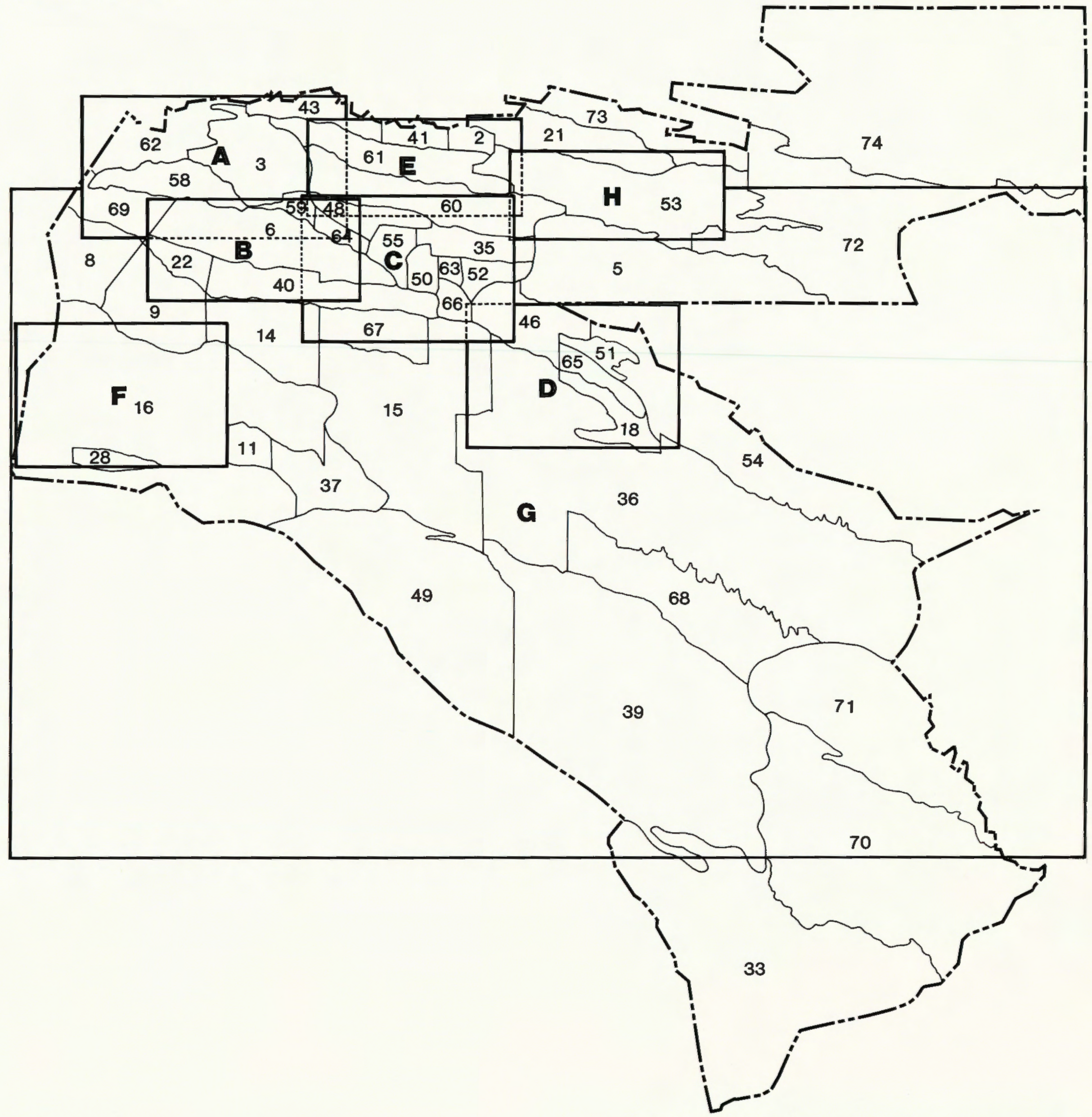
**A. Core Area and Two-Mile Mesa North**
(TAs 3, 43, 58, 59, 62)
This development area includes the central technical, administrative and physical support facilities of the Laboratory as well as experimental science and theoretical/computational science land uses.

**B. Two-Mile Mesa South**
(TAs 6, 22, 40)
This development area is presently used for the research and testing of special detonators and high-explosive systems and as a buffer zone for this function. Large portions of this development area therefore remain undeveloped.

**C. Pajarito Corridor West**
(TAs 35, 48, 50, 52, 55, 63, 64, 66)
Experimental science and special nuclear materials (SNM) land uses, which include radiochemistry, nuclear safeguards studies, analytical chemistry, reactor development, waste management, and plutonium processing occur in this development area.

**D. Pajarito Corridor Central**
(TAs 18, 46, 51, 65)
This development area includes experimental science land uses where research is performed in chemistry, photochemistry, solar energy, biological exposure effects, and nuclear chain reaction behavior.

*Development Areas and TA Boundaries*



E. **East Jemez Corridor and Sigma Mesa**
(TAs 2, 41, 60, 61)
This development area is used primarily for physical support and infrastructure land use activities and is the site of the existing sanitary landfill. The Omega West reactor is located in Los Alamos Canyon, as are special nuclear materials land uses involving the engineering design of nuclear components. It is also the location of lands leased to construction contractors and the privately owned Royal Crest Trailer Park.

F. **Weapons Engineering**
(TA-16)
This development area is dedicated to high-explosives research, development, and testing land uses. Functions at this site include engineering design, prototype manufacture, processing, and environmental testing of nuclear weapon warhead systems. Because TAs -11, 28, and 37 are not the focus of growth, they are not included in this development area, but are discussed elsewhere in this plan.

G. **Dynamic Testing**
(TAs 8, 9, 14, 15, 22, 36, 39, 40, 67, 68)
This extensive area is reserved specifically for high-explosives research, development, and testing land uses. While TAs 33, 49, 54, 70 and 71 fall within the boundaries shown on the development area map, they are not within the Dynamic Testing Development Area. These technical areas are discussed elsewhere in this plan.

H. **LAMPF**
(TA-53)
The primary facility in this development area is the Los Alamos Meson Physics Facility, a linear particle accelerator used for basic physics research, material studies, and isotope production. Other facilities at TA-53 are also accelerator-related.

**Other Technical Areas (TAs)**

Numerous other technical areas are spread throughout the site. These technical areas usually have small populations or are remote. They are not the focus of anticipated future growth and development and therefore are not discussed in detail in this plan. These include

- TA-0, Los Alamos townsite: The Laboratory leases approximately 116,000 square feet in eight buildings primarily for training and support functions.
- TA-5: This large area south of East Jemez Road is mostly undeveloped. It contains some physical support functions, several archaeological sites, and environmental monitoring and buffer areas.
- TA-11, K-Site: Located in the high-explosives area, facilities in this technical area test explosive systems and components under a variety of conditions.
- TA-21, DP-Site: This former radioactive materials processing facility has a problematic location, because its only access route is through Los Alamos townsite. The location is also inconveniently remote from other Laboratory facilities. Currently, decontamination and decommissioning (D & D) of several structures is under way. A study of future use options for TA-21 is also ongoing.
- TA-28, Magazine Area: This is an explosives storage area.
- TA-33, HP-Site: An old tritium handling facility located here is being phased out. This site is remote, constrained by limited utility service, and contains substandard structures. It has however, proven ideal for experiments not requiring daily oversight, or those requiring isolation or that are sensitive to electromagnetic interference. Consequently, there has been increased activity at TA-33 recently. The technical area is also the location of the National Radio Astronomy Observatory's Very Large Baseline Array telescope, a prominent landmark.
- TA-37, Magazine Area C: This is an explosives storage area.
- TA-49: This site is currently restricted to carefully selected functions given its location near Bandelier National Monument and past use in high-explosives and radioactive materials experiments.
- TA-54: The main function of this site is radioactive solid and hazardous chemical waste management. This technical area is discussed within the environment, safety, and health element of this plan.
- TA-57, Fenton Hill Site: This technical area is located west of the Laboratory in the Jemez Mountains. It is the site of the geothermal energy recovery (Hot Dry Rock) project. The Laboratory may decide to convert this demonstration operation to a seismic research facility.
- TA-69: Located at the entry to TAs 6, 8, 9, 22 and 58, this technical area is suitable for future physical support and experimental science uses that have close functional ties to those technical areas. This area also provides an environmental buffer.

- TAs 70 and 71: These undeveloped buffer areas are located southwest of White Rock between the Rio Grande and New Mexico Route 4. They are reserved for future large-scale experimental science.

- TA-72: This undeveloped land along East Jemez Road and NM 502 may offer expansion opportunities for TA-53 related projects.

- TA-73: This is the Los Alamos Airport and an adjacent buffer area along the south side of East Road.

- TA-74, Otowi Tract: This large area, bordering San Ildefonso Pueblo on the east, is isolated from most of the Laboratory and contains significant concentrations of archaeological sites and an endangered species breeding area.

# PLANNING ANALYSIS AND LABORATORY-WIDE ELEMENT MASTER PLANS

## Table of Contents

# PLANNING ANALYSIS AND LABORATORY-WIDE ELEMENT MASTER PLANS

## Introduction

Land use and facilities planning at Los Alamos National Laboratory is driven by national needs and programmatic requirements. The Site Development Plan (SDP) provides recommendations to guide Laboratory land use and facilities and infrastructure decisions in order to enhance operations necessary to the Laboratory mission. The plan also incorporates the themes and priorities established in the Los Alamos 2000 Strategic Plan.

The discussion of overall Laboratory-wide planning considerations crucial to site and facilities development is organized under six specific elements:

- Land Use;
- Population and Facilities;
- Transportation/Circulation;
- Security/Safeguards;
- Utilities; and
- Environment, Safety, and Health.

Some of these elements have been studied and documented elsewhere in detail by the Laboratory. Consequently, there already is a Transportation Master Plan, a draft Utility Master Plan, and Space and Facilities Siting Management Policies and Procedures. The specific recommendations contained in these studies are summarized and incorporated in this document. Each of the planning elements above is presented under three main headings in accordance with the intent of Department of Energy (DOE) Order 4300.1B. These are

- Existing Conditions;
- Issues/Planning Analysis; and
- Element Master Plan.

*Aerial View of the Core Area*

# Land Use

## Existing Conditions

Nine land use categories have been designated to identify major functional and programmatic areas for site planning purposes. These land use categories were developed during the planning process. The planning team reviewed how the 1982 Long-Range Site Devlopment Plan treated land uses and considered the changes that had occurred. They then analyzed ongoing trends to determine how to best represent and organize the myriad of Laboratory programs and functions in a manageable yet meaningful way. The Existing Land Uses map shows how these land uses are presently distributed geographically at the Laboratory. Descriptions of each land use category are set forth below.

- **Administration and Technical Services (ATS)**

  Administration and technical services land uses provide nonprogrammatic technical expertise, support, and services for Laboratory management and employees. These uses typically occur in office settings and may or may not be located in classified areas.

- **Public and Corporate Interface (PC)**

  These are facilities oriented toward the general public and other outside entities doing business with the Laboratory, including technology transfer activities. These uses may occur in a variety of settings including offices, laboratories, and special function buildings. Consequently, security needs vary considerably and care must be taken to locate functions with others that are appropriate and compatible.

- **Theoretical/Computational Science (TC)**

  Interdisciplinary activities that involve mathematical and computational research and related support activities make up this category. Characteristically, these activities are performed in offices and require short links to the Central Computing Facility. Theoretical/computational science functions traditionally had to be centralized due to technological and security constraints. These constraints are diminishing and thus these functions are decentralizing.

- **Experimental Science (EX)**

  Experimental science land uses are typified by applied research and development activities tied to major programs. These uses frequently necessitate large areas for future expansion and the development of related facilities. They occur in a combination of office, laboratory, and ancillary spaces requiring unique and specialized facilities. The nature of the science conducted often requires highly specialized experiments using a one-of-a-kind facility. Security, safety, and infrastructure considerations vary but are very important to the functioning of these specialized uses.

- **Waste Management (WM)**

  These are land uses dedicated to the handling, treating, and disposing of waste products produced by the Laboratory. (Sanitary landfill waste is included in the PSI category because it is governed by a different set of state and federal regulations and is characteristically different from other Laboratory waste products.)

- **Special Nuclear Materials (SNM)**

  This category consists of land uses reserved for facilities and support services that use, produce, or process category I & II special nuclear materials. These require special operations and security measures distinct from other Laboratory functions. Plutonium processing and nuclear materials storage are examples of SNM-related activities.

- **High-Explosives Research, Development, and Testing (HE)**

  Research, development, and testing uses require large, isolated, exclusive, and consolidated reservations of land. Carefully controlled access is required to maintain safety, security, and environmental compliance. These areas also require buffers to minimize adverse impacts on surrounding lands.

- **Physical Support and Infrastructure (PSI)**

  These are facilities and land uses that provide the physical and logistical support services necessary for the ongoing operation of the Laboratory, such as roads, parking lots, and utility corridors. These uses are typified by activities that consume large areas of land. They can be located at the periphery or outside the center of a development area. Some support activities may take place in enclosed buildings.

- **Environmental Research/Buffer (ER)**

  These are lands required for essential but currently nonprogrammatic needs including security and safety buffer zones, fuel breaks, environmental restoration, and cultural resource areas.

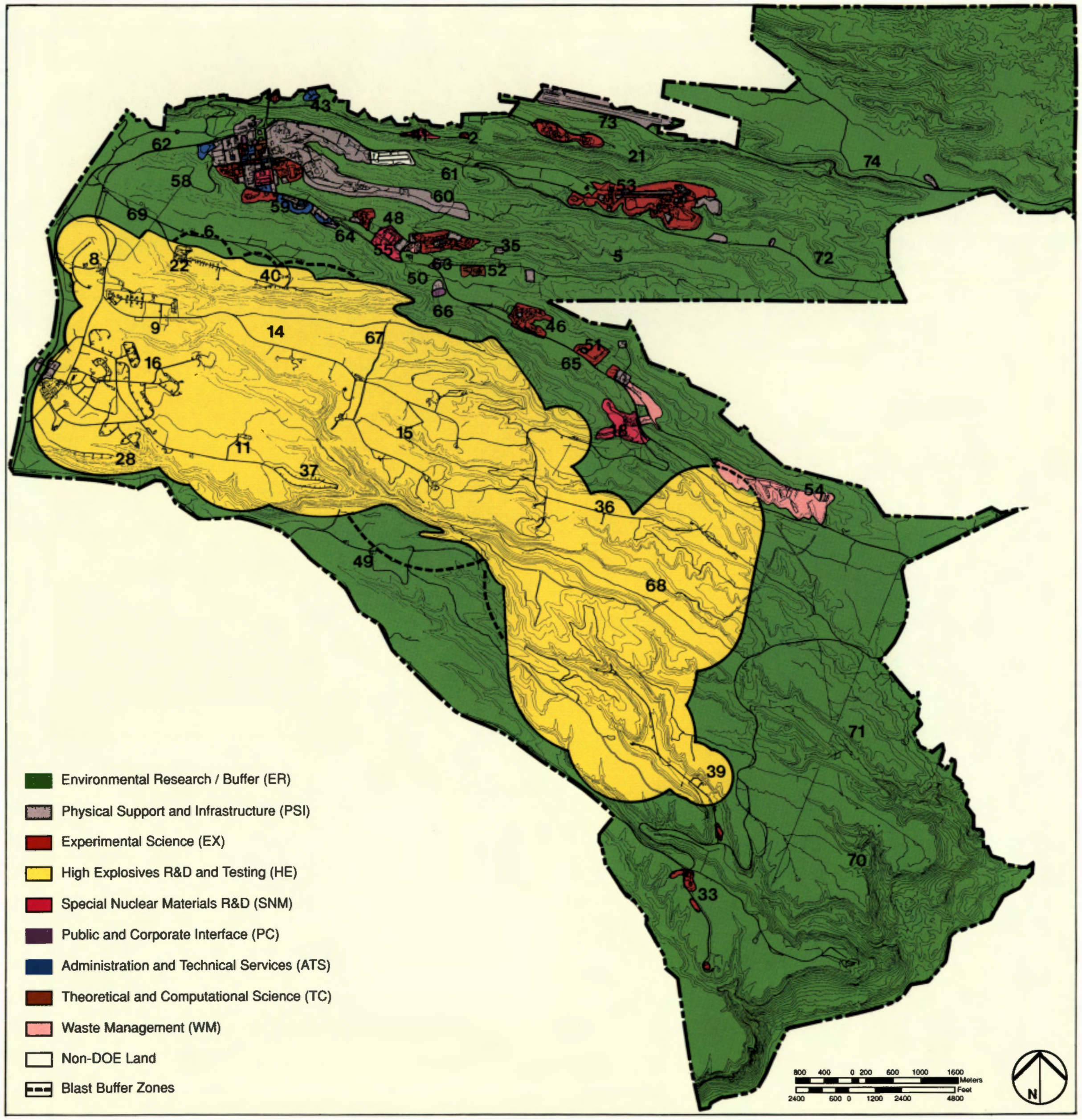
## Issues/Planning Analysis

Existing development patterns and topography at Los Alamos National Laboratory impose major constraints on future development. The extreme topographical changes of flat mesas dissected by steep canyons critically affect road, utility, and facility development and layout. While little can be done to modify topography, historical development patterns can be modified through the application of a rational set of land use and facilities policies and related recommendations. For example, roads and parking can be relocated to the perimeter of developed areas, freeing up prime building sites for more appropriate development.

Most technical areas pose limitations to expansion because of the scarcity of suitable land for building. In addition, special hazardous testing facilities requiring security and safety buffers limit some developable sites. Archaeological sites and other constraints put additional limitations on the Laboratory's development. Other manmade land use constraints include

- Existing circulation and utility patterns that split developable parcels;
- Parking areas and temporary or substandard structures that occupy prime developable land;
- High-explosives safety buffers that restrict development on flat mesa tops in some areas (primarily Two-Mile Mesa South);
- Potentially contaminated sites that must be characterized and remediated by the Laboratory Environmental Restoration Program before they can be reused; and
- A privately owned mobile home park located on 25 prime acres close to the Core Area and completely surrounded by the Laboratory.

*Existing Land Uses*



## Opportunities and Constraints

Establishing areas within the Laboratory where development can best be accommodated required the identification and ranking of potential constraints to such development. The best development opportunities occur where the fewest constraints exist on a given parcel of land. For the Site Development Plan, constraints were classified as severe, moderate, or minimal. The types of constraints that make up each category are listed below. (See glossary on p.279 for definitions.)

***Severe Constraints*:**

- Slopes greater than 20%
- Narrow canyon floors, floodplains, rockfall areas
- Seismic fault zones
- Noncohesive or expansive soils
- Private lands
- Permanent buildings
- Complex and unique archaeological sites, and historical sites
- Blast fragment hazard buffer zones
- Radiation site evaluation circles
- Sanitary landfills
- Hazardous materials landfills
- Radioactive and mixed-waste landfills
- Potentially contaminated areas
- Utility corridors
- Water storage tanks
- Hazardous waste pipelines
- 345 kV transmission line ROW (± 150' wide)
- 115 kV transmission line ROW (± 65' wide)

*Aerial View of TA-53, Illustrating Mesa Top Development Constraints*

***Moderate Constraints:***

- Slopes between 10% and 20%
- Quarries and borrow pits
- Old and obsolete buildings
- Transportables (transitional buildings)
- Existing major paved roads
- High radio frequency interference areas
- Airport

***Minimal Constraints:***

- Slopes less than 10%
- Trailer and transportainer sites (temporary buildings)
- Parking lots
- Airfield clearance zones

## *Specific Development Opportunities*

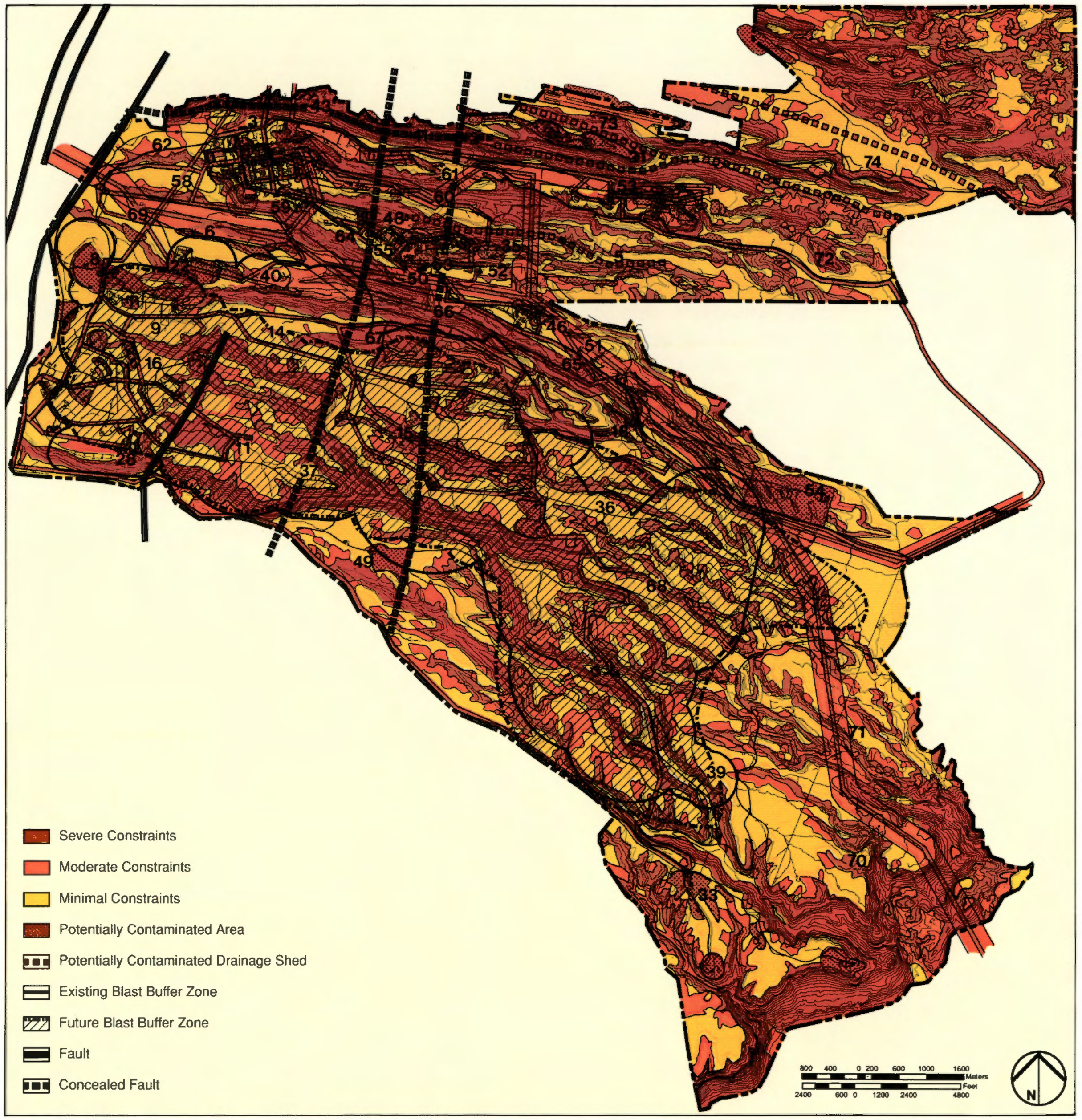
A major Laboratory-wide development opportunity would result from consolidating or relocating some of the high-explosives research areas to the south-central portion of the site as proposed in the Dynamic Testing Division Long-Range Plan. This would enable the future development of Two-Mile Mesa South.

There are also development opportunities at Two-Mile Mesa North just west of the Core Area and at Sigma Mesa to the east. Additional development opportunities include smaller parcels of land at existing technical areas such as at LAMPF, the East Jemez Corridor, Sigma Mesa, and the Pajarito Corridor.

A large area of undeveloped and minimally constrained land exists in TA-70 and TA-71 in the southeastern portion of the Laboratory north of TA-33, and east of NM 4. Other undeveloped lands are located in TA-74 (known as the Otowi tract), situated at the northeast corner of the Laboratory. These lands are remote, and large investments in utility and circulation improvements would be required for their use. However, they provide a valuable land reserve offering future development potential for as yet undetermined needs. Other potential development areas are restricted due to the blast fragment hazard buffers essential for high-explosives testing.

Unless programs expand or change significantly, the existing Laboratory site will be able to accommodate future needs. However, should changing national priorities dictate the need for large experimental facilities that the current Laboratory site could not accommodate, the acquisition of large, new areas may be required. The only such lands currently available are owned by the federal government and lie to the southeast across the Rio Grande in the Caja del Rio area.

*Opportunities and Constraints*



## Future Land Use Zones

The Site Development Plan proposes to plan, organize, and enhance functional relationships within the Laboratory. Key to this process is understanding how land uses should relate to one another and that functional distinctions should be made within each land use category. Future land uses are defined and specific land use zones are mapped on the basis of the compatibility of functions, Laboratory security requirements, consideration of programmatic and operational interactions, and on land and infrastructure availability. Other approaches, such as categorizing uses by major operational needs (e.g. demand for electrical power) are valid. However, the approach used in this plan takes into consideration the broader planning ramifications and needs more appropriate to managing land use at a large and complex installation where there are always conflicting demands and expectations on the limited supply of usable land.

The distinctions within each land use category are defined as land use zones. Locating zones appropriately so that programs and functions can interact optimally is one of the key guiding principles of the land use master plan.

Laboratory land use zones are identified on the future land use maps for each development area. Compatible land use zones were placed on the maps after a careful review and analysis of existing land use patterns, opportunities, and constraints, and an analysis of both short- and long-term population and land use trends at the Laboratory. Strategic planning goals are reflected in the mapping of zones, and ample space for programmatic growth is provided in the appropriate technical areas. Some of the classifications such as high-explosives research, development and testing of special nuclear materials, or waste management are so unique that they already stand out as having special requirements and attributes.

Land use classifications such as experimental science and theoretical/computational science were developed to group non-SNM and non-HE science research endeavors with similar attributes, such as the space and support requirements typical of each activity. Many parts of the Laboratory are not used primarily for scientific work but lend indirect support to the Laboratory mission. These functions can be organized by establishing land uses for basic physical support and infrastructure activities, administrative and technical services activities, and for public and corporate interface activities. Finally, some areas of the Laboratory are reserved for buffers required by the nature of the research occurring within. These areas also offer future expansion and growth opportunities.

The future land use zones have been categorized as follows:

- *Administration and Technical Services (ATS):*

  ATS-1 (administration) zones support management and staff activities directly serving Laboratory management, such as the Director's Office, Associate Directorates, Controller, and Laboratory Counsel.

  ATS-2 (technical services) zones support functions and activities that provide nonprogrammatic technical field expertise and support services to the Laboratory as a whole. Examples include facilities engineering; environment, safety, and health activities; communications; safeguards and security; and human resource functions.

- *Public and Corporate Interface (PC):*

  PC-1 (public and corporate interface – unrestricted) zones contain facilities with access devoted primarily to serving the general public, such as the Bradbury Science Museum and Robert J. Oppenheimer Study Center.

  PC-2 (public and corporate interface-restricted) zones contain facilities that serve or interact with entities outside of the Laboratory. They require varying degrees of security, depending upon function and activity. Examples include technology transfer programs and some of the specialized research centers established to pursue nonprogrammatic interdisciplinary research.

- *Theoretical/Computational Science (TC):*

  TC-1 (theoretical/computational research–unclassified) zones support theoretical scientific research and analysis activities that are not classified.

  TC-2 (theoretical/computational research–classified) zones support theoretical and applied theoretical scientific research and analysis activities that are classified.

  TC-3 (computational facilities and support) zones contain facilities and support functions for theoretical/computational efforts and also provide for the scientific computing needs of the Laboratory such as the Central Computing Facility.

- *Experimental Science (EX):*

  EX-1 (accelerator related science) zones support medium-energy physics research activities related to or utilizing accelerators, which often have high demands for electrical power, such as the Los Alamos Meson Physics Facility.

  EX-2 (nuclear materials research and development) zones support primarily nuclear materials research and development activities associated with weapons technology, defense applications, and energy technology but not involving category I & II quantities of special nuclear materials.

EX-3 (fusion and laser research and development) zones support medium- and high-energy physics activities involving the research and development of laser and fusion technology. These areas require substantial electrical power and freedom from vibrations associated with heavy equipment or the characteristics of the underlying strata and soils.

EX-4 (multi-use experimental science) zones support diverse and separate activities that include materials science, chemistry, physics, life sciences, earth and space sciences, and other miscellaneous experimental science that is carried out at the Laboratory.

- *Waste Management (WM):*

WM-1 (low-level nuclear waste) zones are areas used to handle, treat, or store solid or liquid radioactive wastes that are not classified as transuranic waste.

WM-2 (transuranic waste) zones are areas used to handle, treat, and store radioactive solid or liquid waste. These wastes must be handled in strict compliance with applicable health, safety and environmental regulations possibly for long periods without coming into contact with the environment.

WM-3 (hazardous chemical waste) zones are areas used to handle, treat, and store any waste chemical or mixture of chemicals that in any way poses a present or potential hazard to human health or the environment; or any other waste defined as hazardous by environmental regulations.

WM-4 (mixed waste) zones are areas used to handle, treat, or store waste containing both radioactive and hazardous chemical constituents.

- *Special Nuclear Materials (SNM):*

SNM areas are reserved specifically for facilities and support services that use, produce, or process category I & II quantities of nuclear materials. Consequently, these uses require special operational and security measures different from most other Laboratory functions. Plutonium processing, nuclear materials storage, and tritium handling are examples of SNM. There is currently one SNM land use zone, SNM-1.

- *High-Explosives Research, Development, and Testing (HE):*

HE-1 (high-explosives research and development) zones are areas devoted to the research, development, processing, and storage of high-explosives weapons systems and detonator fabrication.

HE-2 (high-explosives testing) zones are large, isolated, and restricted areas reserved exclusively for the testing (detonation and observation) of high explosives. These areas also include large safety buffer areas which comprise the vast majority of lands in this zone.

- *Physical Support and Infrastructure (PSI):*

PSI-1 (physical plant) zones are areas used or occupied by crafts, utilities, and vehicle maintenance, warehousing and materials distribution, and construction contractors.

PSI-2 (transportation and circulation) zones are service roads, major parking lots, and related facilities.

PSI-3 (sanitary waste treatment and disposal) zones are areas reserved or used for the collection, sorting, and burial of solid sanitary wastes and for the treatment of liquid waste water effluent.

- *Environmental Research/Buffer (ER):*

ER-1 (security and safety buffers) zones buffer, protect, separate, or secure other areas based on programmatic needs. Many of these areas are difficult to develop, but may serve as fuel breaks or provide open space as a secondary function.

ER-2 (environmental restoration) zones are areas undergoing environmental restoration because of prior or suspected prior contamination. Remediated areas are being improved for eventual reuse. These lands are monitored and play an important role in the Laboratory's research efforts on environmental clean up of the DOE complex.

ER-3 (environmental/cultural resource protection and study) zones are usually undisturbed areas that serve as reserves and study areas where the long-term environmental effects of a multiprogrammatic laboratory can be observed. These zones also include archaeological sites and wildlife habitats that are either protected from encroachment or are under study.

## Land Use Master Plan

The master plan sets forth strategies for addressing land use issues at the Laboratory. The plan implements the future land use zone system and establishes a relevant set of goals, objectives, policies, and recommendations to site land uses and facilities.

The Future Land Use map on the next page shows that there will be a significant expansion of experimental science functions in many areas of the Laboratory. There will also be an expansion in the areas of administrative and technical services and public and corporate interface largely occurring in the Core Area at TA-3. Theoretical/computational science will expand and consolidate in TA-3. There will be a substantial expansion of waste management functions at TA-50 and further consolidation of SNM research and development functions at TA-55. High-explosives research, development, and testing will relocate from some outlying areas to the Weapons Engineering and Dynamic Testing technical areas, particularly at TAs 14, 15, 16, 36, 67 and 68. Physical support activities now at TA-3 will be relocated to more appropriate areas such as Sigma Mesa and East Jemez Road, although the amount of land these require will remain unchanged. Some reconfiguration and decrease in environmental research/buffer zones will occur as programs change and new facilities are built.

### Goal and Objectives

The Laboratory's land use goal is to *achieve the most effective use of land to fulfill Laboratory missions.* This can be accomplished through the following objectives:

- Increase awareness of development constraints.
- Increase awareness of land use compatibility issues during the siting and design process.
- Identify alternative locations for development and provide areas for expansion.
- Improve functional relationships between existing and future land uses by emphasizing functionally related corridors between the Core Area and other major development areas.

### Policies

The following policies are set forth to assist the implementation of the plan by guiding the Laboratory's land use decision making process.

- Locate buildings and facilities in the appropriate land use zones, in nodes and along development corridors, and within service areas as depicted in the plan. Buildings and facilities shall be located only with the approval of the Siting and Space Committee (SSC) as detailed in the Space Management and Facilities Siting Policies and Procedures approved by the Laboratory.
- Reserve areas for expansion of existing programs and development of future unique facilities.
- Consolidate land uses to improve efficiency and travel time, and to contain infrastructure costs.
- Establish support and service land uses in the major satellite technical areas of the Pajarito Corridor, at LAMPF, on Sigma Mesa and along East Jemez Road, and in the high-explosives research and development areas.
- Provide suitably located land for public and corporate interface functions related to technology transfer.
- Retain current high-explosives areas and buffer zones intact as an important resource, as long as programmatic needs exist.
- Redevelop contaminated areas for reuse as Laboratory facilities when it is safe to do so.
- Relocate physical support and infrastructure uses to the perimeter of sites so that land closer to the centers of sites can be used for more important uses.
- Identify land suitable for the expansion of existing programs in all technical areas.
- Maintain environmental research/buffer areas to provide adequate security and safety buffers, archaeological and wildlife areas, and environmental research areas for environmental restoration and research.
- Promote Laboratory cooperation with surrounding counties and pueblos, U.S. Forest Service, National Park Service and other neighboring landowners to accomplish mutually compatible and beneficial land use goals and objectives as set forth in this Site Development Plan.

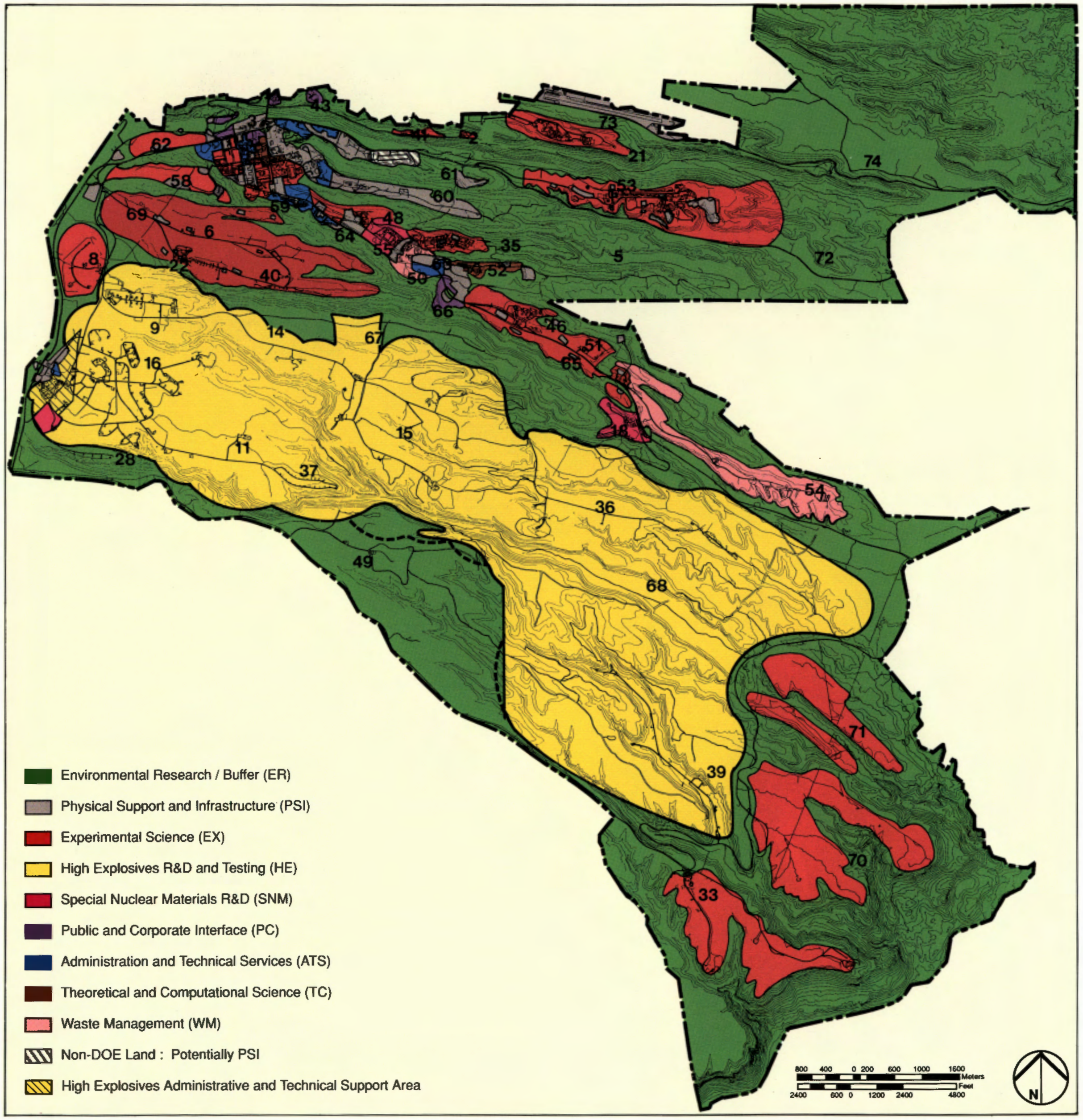
### Recommendations

The following recommendations suggest direct actions the Laboratory should take in pursuit of its land use goal.

- Consolidate and relocate Dynamic Testing and Design Engineering functions (high-explosives functions) so that Two-Mile Mesa South becomes available for large-scale experimental science facilities.

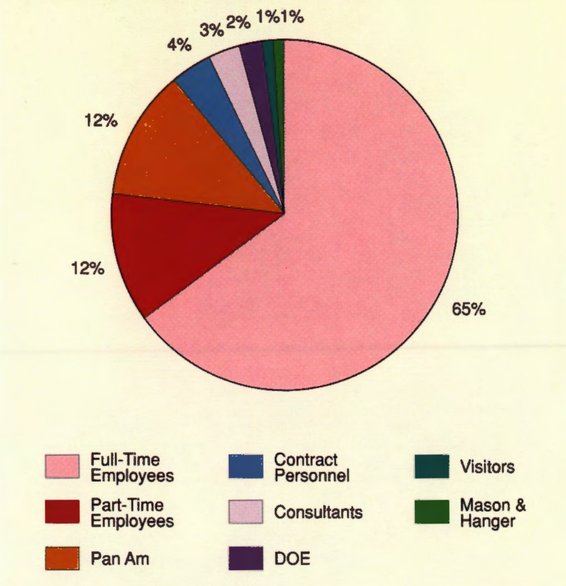
- Develop Two-Mile Mesa North for expansion of Core Area experimental science functions with emphasis on small-scale experimental activities.
- Reserve land within the planned utility corridors for the future installation of utilities and future rights-of-way for roadways.
- Reserve developable land in the southeastern area of the Laboratory at TA-70 and TA-71 for experimental science uses.
- Continue relocation of the physical support area in TA-3 to Sigma Mesa, TA-60, as appropriate and feasible.
- Relocate SNM uses from TA-3 to TA-55, and from TA-41 to TA-16.
- Relocate the existing sanitary landfill after a new site is permitted, per the Sanitary Landfill Site Locations Study, and redevelop the existing site.
- Site and obtain a permit for a mixed waste disposal facility, as required by the Resource Conservation and Recovery Act (RCRA), to receive Environmental Restoration Program wastes.
- Reserve undeveloped, long, linear mesa tops for accelerator experimental science and related activities.
- Investigate potential of land aquisitions such as the Caja del Rio parcel for consideration as part of a possible land transfer when or if appropriate.

*Future Land Use Map*

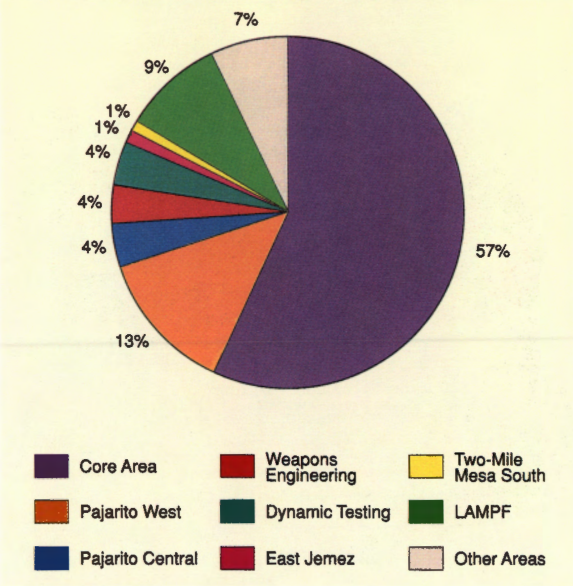


## Population and Facilities

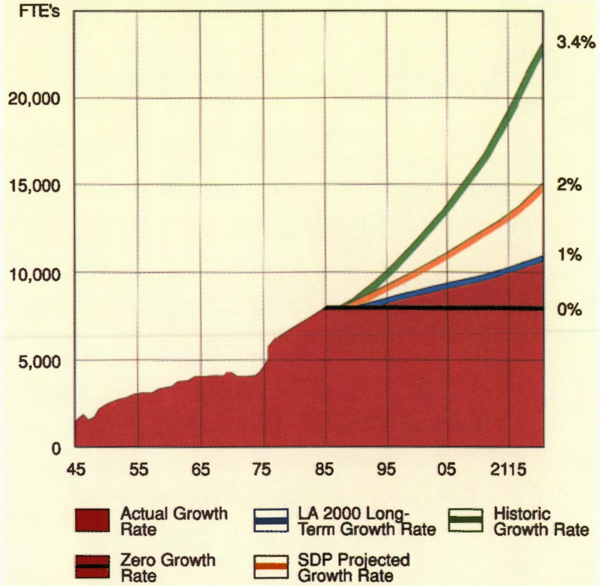
*Laboratory Population Breakdown*




*Laboratory Population Distribution by Development Area*




*Laboratory Population Growth*




## Existing Conditions

### Population

As of June 1990, about 12,000 people worked at the Laboratory including approximately 7,900 full-time equivalents (FTEs). The remainder is composed of about 2,500 casual and contractual employees, consultants, visitors, and about 1,600 support services subcontractor employees.

Ninety-three percent of the Laboratory population is concentrated in the eight development areas identified in this plan. Only 7% of the population is housed outside of these eight development areas.

The 1989 Los Alamos 2000 Strategic Plan assumed a short-term growth rate of 2% per year of FTEs, and a long-term growth rate of 1% per year. Laboratory population growth has historically averaged 3.4% per year since 1942.

Despite changes in the federal administration, the national outlook, and the political environment, this upward trend has persisted. However, major geopolitical changes occurring in the late 1980s have caused the Laboratory to re-evaluate earlier population growth assumptions such that a short-term steady state (zero net growth) and up to one percent long-term net growth rate is assumed for facilities planning in this plan. There will, nevertheless, be growth experienced in specific programs while other programs will decline in response to the sweeping political changes now under way worldwide. For more specific information about current Laboratory strategic planning assumptions, please refer to the latest Los Alamos National Laboratory Institutional Plan.

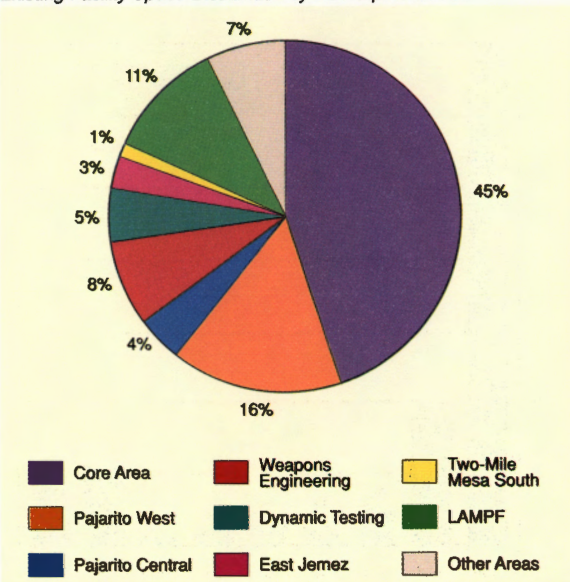
An important trend at the Laboratory is the relative growth of part-time, casual and contract employees. These currently constitute approximately one-third of the on-site population. Although it is difficult to project changes in this segment of the on-site population, facilities planning efforts must continue to account for the needs of this large group.

### Existing Facilities

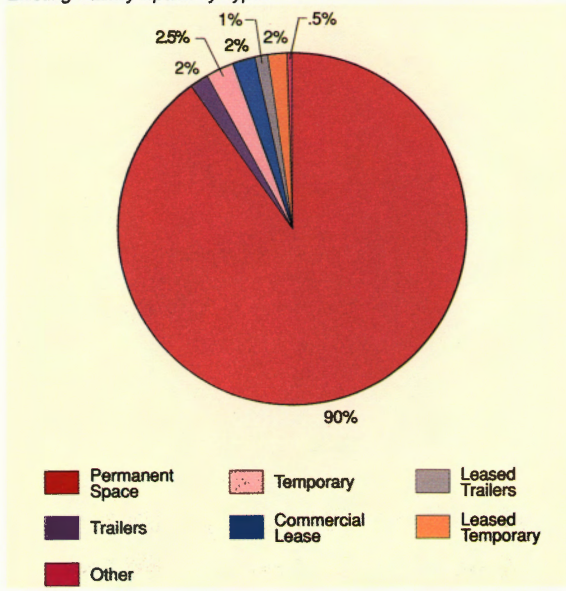
As of January 1990, Los Alamos National Laboratory had approximately 7.3 million gross square feet of space contained in 1,835 buildings. The estimated replacement value of these buildings is roughly $2.7 billion, while the total replacement value of the Laboratory (including land, buildings, and infrastructure) approaches $4.3 billion.

The facility space growth chart on page 29 shows that the Laboratory will continue to see growth of

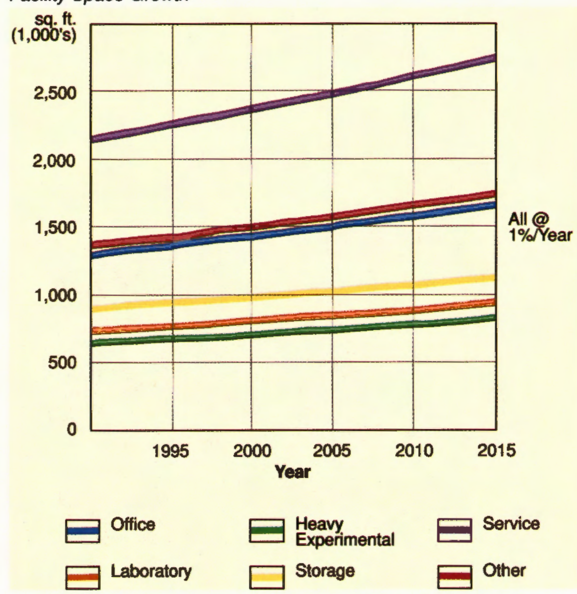
*Existing Facility Space Distribution by Development Area*




*Existing Facility Space by Type*




*Facility Space Growth*




all kinds of space requirements. Assuming just a 1% long-term increase per year, there will still be new facility space required in all categories.

Buildings are generally clustered by similar function into technical areas (TA's). The technical areas are clustered mainly in development corridors along major roads. The central core of the Laboratory includes TAs 3, 43, 58, 59, and 62 and contains 45% of the net square footage of all Laboratory facilities space. The Pajarito Corridor is the second largest cluster of facilities, containing about 20% of the total net square footage of Laboratory space. The eight development areas identified in this plan account for about 93% of the total net space at the Laboratory.

Ninety percent of the buildings at the Laboratory are permanent while the remaining 10% are either transitional, temporary, or leased. Over the years, the Laboratory has acquired a variety of transitional and temporary building types, including about 580 trailers, transportable buildings, and leased buildings. These units have been acquired mainly because of a lack of capital funding to build permanent office and storage space and the amount of time needed for construction of permanent structures. Temporary structures are costly to maintain given that their cost-effective life span is relatively short. Short-term economy and expediency have prevailed over the need for permanent facilities with lower life cycle costs, longer life spans, and higher-quality work environments. The use of transitional and temporary structures has also resulted in significant underutilization and poor long-term planning of limited Laboratory lands.

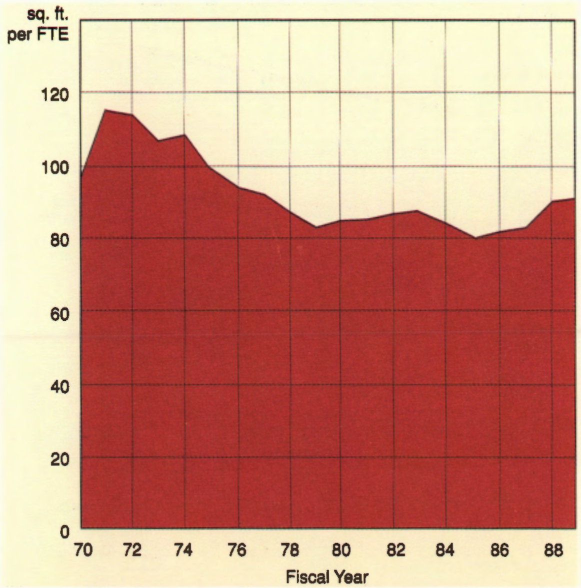
### *Facilities Occupancy*

Fully 19% of the Laboratory work force occupies transitional and temporary space and works in substandard facilities that account for about 10% of the total Laboratory space. This space totals approximately 716,000 gross square feet, including 146,000 square feet in Laboratory-owned trailers, 83,000 square feet in leased trailers, 189,000 square feet in temporary buildings such as transportables, 140,000 square feet in leased temporary space, nearly 116,000 square feet in commercial leased space, and about 43,000 square feet of miscellaneous, small, non-permanent space such as transportainers, sheds, and guard stations. The remaining 90% of the space is permanent space, which houses 81% of the Laboratory work force.

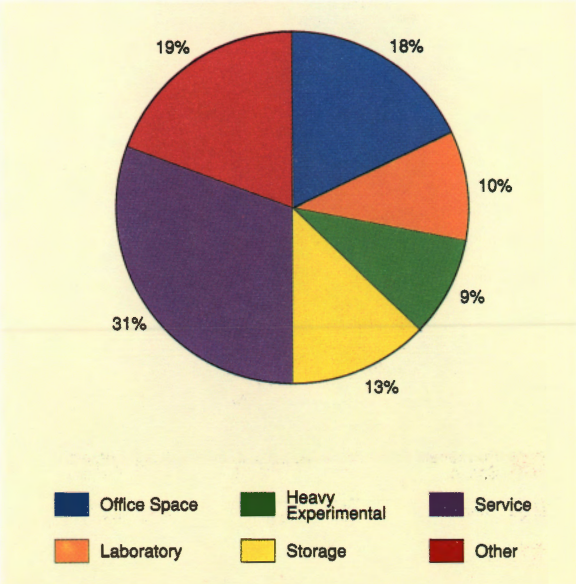
### *Facilities Age and Size*

There are about 370 buildings at the Laboratory that exceed 2,000 square feet in area. These major buildings account for 6.5 million square feet or 89% of all Laboratory gross square footage.

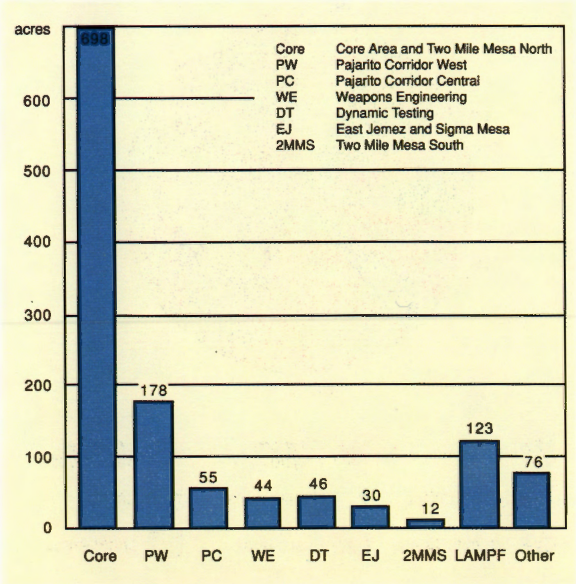
*Ratio of Office Square Footage to Total Employees*




*Facilities Space Categorization*




*Office Space Distribution*




One-hundred thirty-three buildings in this group exceed 10,000 square feet and comprise 75% of all Laboratory facility space. The average size of these major buildings (> 2,000 square feet) is about 17,700 square feet. The remaining buildings (approximately 1,160), are small and less than 2,000 square feet in size. About half of these are either temporary or transitional and include both owned and leased buildings. The average size of these buildings is 650 square feet, the area of a typical trailer.

Many of the buildings used by the Laboratory for conducting state-of-the-art science are old and outdated. Fifty-one percent of all Laboratory buildings larger than 2,000 square feet are more than 30 years old. In addition, 53% of all major buildings (larger than 10,000 square feet), were constructed before 1960, and are now at least 30 years old. Only 16% of the square footage in buildings larger than 2,000 square feet was constructed after 1980.

Many of the remaining medium-sized facilities are also old and can be considered substandard. Priority must be given to important Laboratory facilities for maintenance and upgrading. More funding is needed to rehabilitate substandard facilities if they are going to continue being used in the future.

The Laboratory could reuse developable land and reduce its energy, security, and maintenance costs by replacing its inventory of small buildings, particularly temporary, substandard, and transportable buildings, with larger new, permanent buildings. However, several recent trends indicate that this goal will be difficult to achieve. These trends are

- The procurement of transportables has increased in recent years.

- The demand for trailers, both leased and purchased has increased.

- The use of readily acquired but substandard, small metal sheds and transportainers for storage has increased.

These trends are compounded by the practice of retaining and reusing temporary structures, some of which date back to World War II.

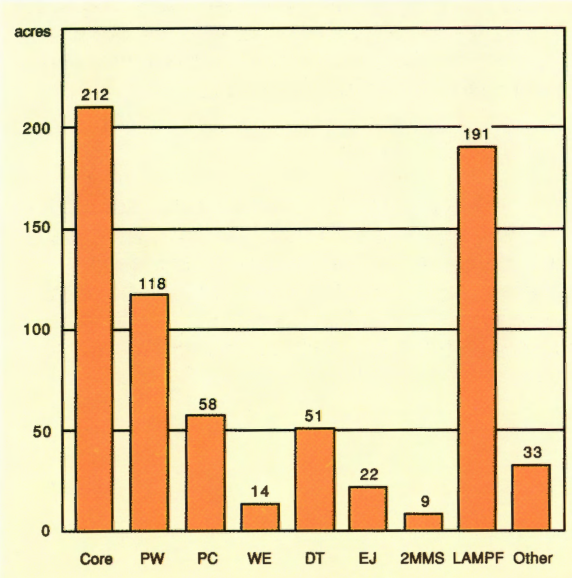
*Facilities Space Categorization*

Space utilization at the Laboratory falls into six basic categories: office, laboratory, heavy experimental, storage, service space and "other."

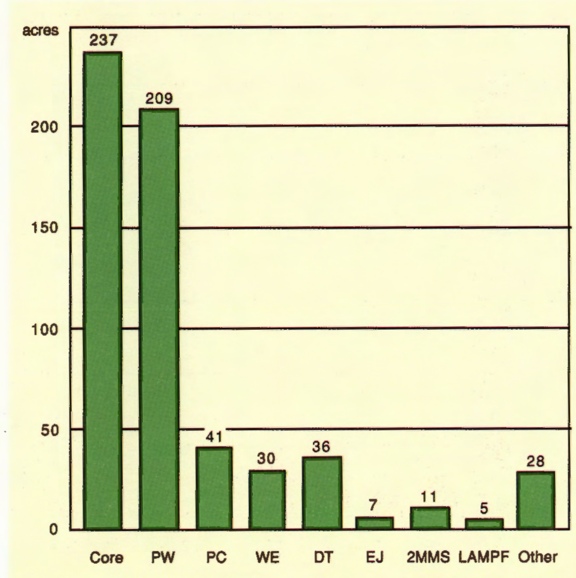
<u>Office Space</u>

Approximately 1.3 million net square feet of office space currently exists at the Laboratory comprising 18% of the total net space. In 1990, about 86% of

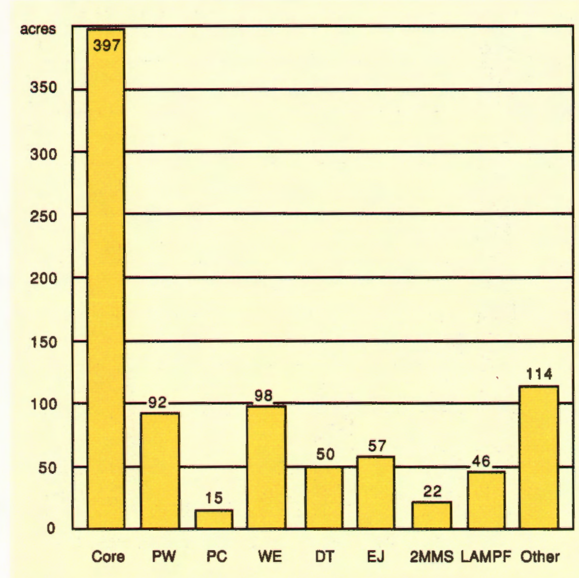
*Laboratory Space Distribution*




*Heavy Experimental Space Distribution*




*Storage Space Distribution*




the total Laboratory population worked in office space, compared with just 70% in 1986.

Over time, the ratio of office floor area per full-time office employee has been holding steady. The average net per capita office space per employee at the Laboratory is approximately 120 square feet, 11% below the General Services Administration (GSA) standard of 135 square feet per person. Considering ongoing trends in scientific research toward computer modeling, necessitating larger offices to accommodate the required equipment, the offices at the Laboratory appear to be less suitable than average. Moreover, the Laboratory is sometimes forced to convert existing office space into other uses, displacing occupants into temporary or leased space.

More permanent office facilities are needed. An additional 670,000 square feet of permanent office space would be required if all leased, transitional and temporary office space were to be vacated. This temporary and leased space could be gradually relinquished as permanent, more economical facilities are constructed.

Laboratory Space

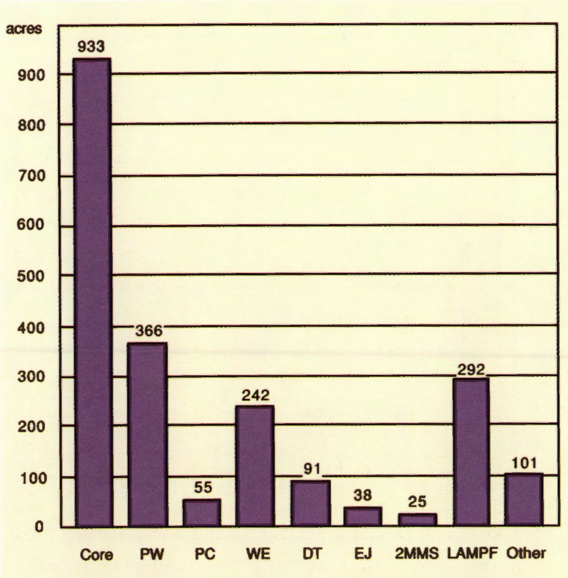
There are approximately 706,000 net square feet (10% of the total net space) of laboratory space, characterized by bench-type research facilities such as biology, electronic, and chemistry laboratories. The Laboratory has had to convert laboratory space in some older buildings into office space because of the shortage of permanent office space. This reduces the potential for the future rehabilitation of older laboratory space.

The need for laboratory and office space has been identified, and currently funded or proposed line-item construction projects will include plans for more laboratory/office complexes. The Materials Science Laboratory and the Life Sciences and Human Genome Research Facility are two examples.

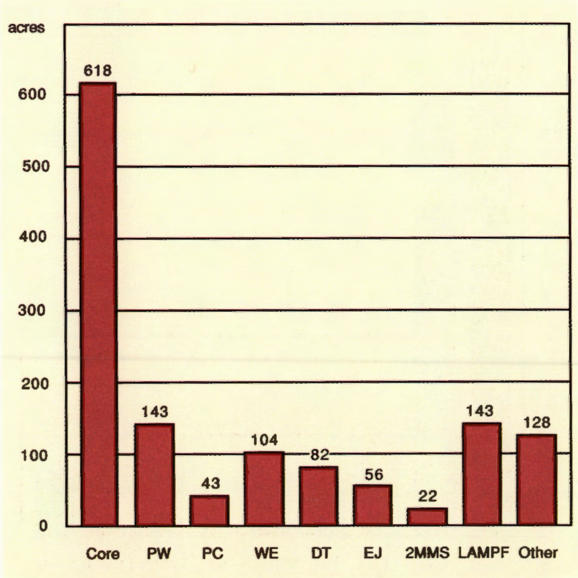
Heavy Experimental Space

Approximately 603,000 net square feet of heavy experimental space, (9% of the total net space), currently exists at the Laboratory. Characteristically, this space consists of large, high bay areas equipped with overhead cranes to accommodate massive scientific equipment. Examples are the Antares Laser Halls and the Van de Graaff Ion Beam Facility. With this type of space, building age is critical. Retrofitting for other uses is typically very difficult and expensive.

*Service Space Distribution*




*Other Space Distribution*




## Storage Space

Approximately 891,000 net square feet of storage space (13% of the total net space) exists at the Laboratory. There has been a tendency to retain equipment that is not being used, resulting in a large and ever-growing storage problem. The storage of needed items, therefore, has become problematic.

Adequate, easily maintainable storage space, built specifically for storage is lacking. As a result there has been a proliferation of small, low-cost, uninhabitable structures – including shipping cargo containers, metal sheds, and even railroad freight cars – that are used for this purpose. In addition, many items are stored outdoors for lack of proper storage facilities. The maintenance demands and environmental and aesthetic ramifications of this proliferation of substandard units are a problem.

Storage is often the first space deleted from a project when total estimated costs need to be reduced. Space that has become inadequate for other uses is often used for storage. This type of conversion minimizes the amount of marginal facilities disposed of or decommissioned. The Laboratory currently is examining storage space issues.

## Service Space

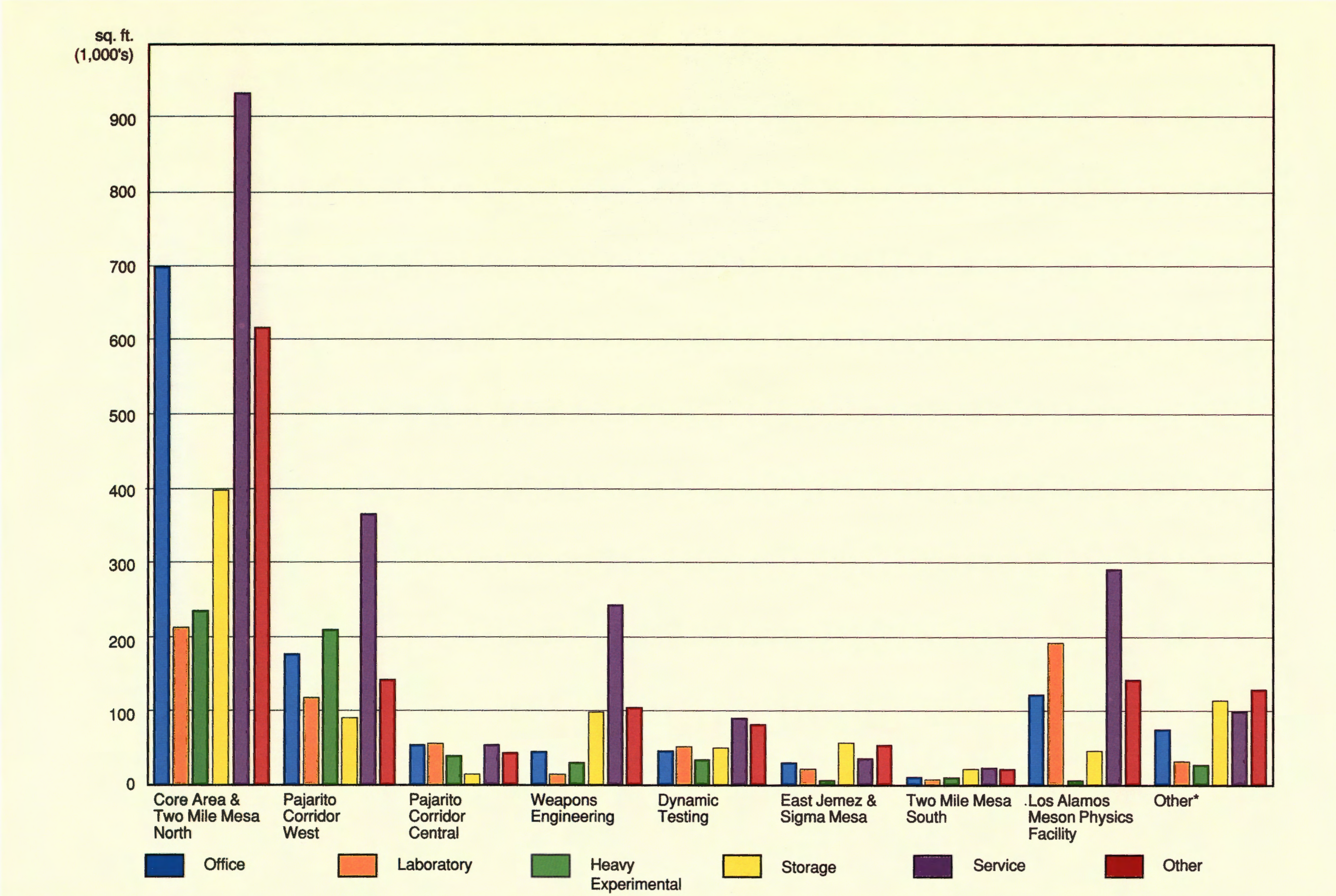
There are approximately 2,143,000 net square feet of service space (31% of the total net space) at the Laboratory. This category includes space that cannot be occupied by staff or used for storage. Building plant and equipment space, restrooms, stairwells, halls, and so on, also fall into this category.

On the average, buildings at the Laboratory are 65% efficient; typically about one-third of a building is taken up by service space. However, some are far less efficient than the average. Generally these are heavy experimental and special nuclear materials facilities that typically have a basement and/or an attic allocated to service needs.

## Other Space

There are approximately 1,340,000 net square feet of "other" space at the Laboratory, which translates into 19% of the total net space. This category includes shops, control rooms, and unique or specialized facilities such as the airport terminal, guard houses, libraries, auditoriums, laundry rooms, and so on.

*Development Areas Facility Square Footage by Category*




** other includes space located outside the eight development areas and is a gross square footage figure. All other space figures are net.*

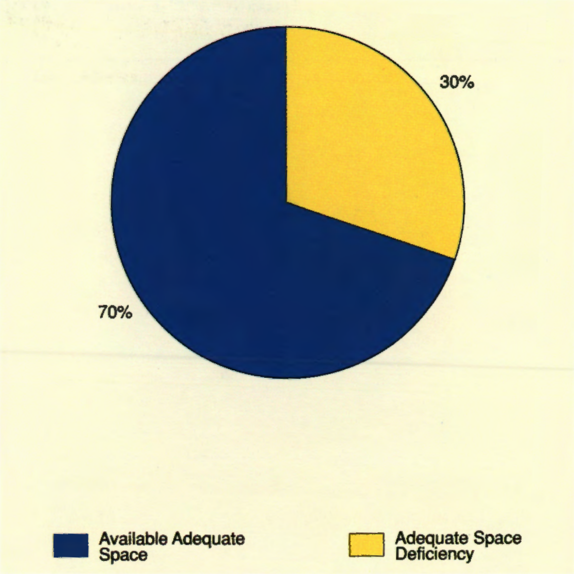
## Issues/Planning Analysis

Los Alamos National Laboratory can be compared to the central business district in a large city. The daytime population approximates 12,000 persons working in hundreds of buildings with a gross floor area totaling nearly 7,352,000 square feet. Unlike a city, however, the Laboratory does not have a well-defined set of regulations or a marketplace economy to guide making complicated decisions about allocating space resources, or the highest and best use of land. By establishing such a set of a coherent and predictable rules and a well defined allocation process, space management and facilities siting decisions could be made in a consistent and equitable manner.

The heavy use of temporary and transitional space at the Laboratory masks the real need for additional high-quality permanent space. For example, if transitional, temporary, and leased space are excluded, a deficit of at least 670,000 square feet of permanent office space exists. Increased funding for permanent office space would redress this constant problem. Moreover, conversion back and forth from office to laboratory space is very inefficient, disruptive, and expensive. If there was adequate space in each category to maintain a small surplus for allocation, the expense and inconvenience of such conversions would be lessened.

Historically, the Laboratory's growth pattern has consisted of the building of small additions and satellite buildings surrounding large original structures. The resulting development pattern is often dispersed and chaotic. While this pattern is difficult to change given programmatic funding realities, it is possible to organize and plan growth around major Laboratory facilities. For example, areas near such facilities can be reserved for either future parking needs or for consolidating

*Laboratory Space Deficiency*




temporary structures in a well-planned complex. Also, permanent storage space should be included in the design of line-item project facilities as well as for satellite buildings so that growing programs will have sufficient space to store needed items. Likewise, materials that will not be required should be discarded rather than placed in long-term storage.

Another option for making better use of facilities at the Laboratory is the long-term increase in density of facilities, thereby reserving more land for future needs. This could be accomplished through the building of multiple-story facilities and parking structures when circumstances warrant, such as in TAs 3 and 55.

Certain marketplace practices, such as recharging for space (currently being investigated), might also be useful to improve space management at the Laboratory. However, recharge should be augmented by the implementation of a formalized space management and facilities siting system that emphasizes space and land as a limited resource to be allocated with Laboratory-wide needs in mind. This approach optimizes resource allocation such as in accordance with strategic planning goals.

There are no childcare facilities on site at the Laboratory. Given the changing demographics of the Laboratory work force and changes in worker's expectations about childcare at the work place, the feasibility of providing on-site childcare facilities should be further studied. Alternately, the Laboratory can work with off-site providers to improve service delivery.

Another issue affecting facilities at the Laboratory is the need for better-quality site design when new facilities are constructed and existing ones are modified or renovated. Site design should enhance the appearance and functioning of facilities, making them productive and pleasant working environments. Specific recommendations about improving site design are covered in the Visual Assessment section in Appendix B.

Aerial View of Core Area Showing Infill Development Potential

## Facilities Master Plan

The master plan sets forth strategies for addressing the above issues with respect to facilities. Goals and supporting objectives have been identified to establish a direction for Laboratory growth. Specific policies based on these strategies can guide the Laboratory's population and facilities decision making process. Recommendations suggest direct actions that the Laboratory should take in pursuit of its goal.

The Laboratory has adopted a comprehensive set of Space Management and Facilities Siting Policies and Procedures. These are used in space planning at the Laboratory to ensure that space resources are used efficiently and effectively. Excerpts from these policies and procedures are included as the policies section of this element plan.

### Goal and Objectives

The Laboratory's facilities goal is to *implement high quality permanent and flexible facility improvements in a manner consistent with the Laboratory mission.* The following objectives have been established to accomplish this goal:

- Emphasize quality site design and careful site planning for new Laboratory facilities.
- Provide new permanent facilities based on Laboratory programs and operations needs as set forth in the Los Alamos 2000 Strategic Plan.
- Eliminate leased buildings, trailers, and temporary facilities when feasible and cost effective and replace them with permanent facilities.
- Continue to rehabilitate or replace obsolete structures when cost effective and appropriate.
- Continue to decontaminate and decommission facilities for adaptive reuse or disposal.
- Increase scheduled maintenance efforts to enhance facility lifetimes, reduce unanticipated repair costs, and provide an environment more conducive to professional scientific work.

### Policies

The following policies are set forth to provide a framework for guiding decision making about the proper management of land, facilities, and site design at the Laboratory. They have recently been reviewed and adopted by the Laboratory and they are hereby incorporated into the Site Development Plan.

- Space is a Laboratory-wide resource that will be allocated in the most efficient, effective, and equitable manner possible.
- As an ideal, all Laboratory organizations should be entitled to occupy a sufficient amount of space that is appropriately located and of the proper type. This shall be determined by policies and procedures that are in accordance with Laboratory land use and facilities plans and by programmatic priorities set forth by the Los Alamos 2000 Strategic Plan. Moreover, preplanning for adequate work space is the responsibility of those proposing new work. Proposals should not be approved for transmittal from the Laboratory until space availability has been addressed.
- Space shall be considered a Laboratory-wide resource to be reallocated in accordance with land use and facilities plans and programmatic priorities set forth by the Senior Management Group. Specifically, all space allocation proposals for interdivisional swaps, space conversions, transfers, backfilling, vacating or reuse of existing space and facilities on an interdivisional basis,and all line-item projects, general plant projects, and expense project proposals that affect space utilization shall be submitted for approval to the Siting and Space Committee (SSC).
- ENG-2 will provide the necessary technical support required for SSC review and evaluation. The SSC will approve or deny interdivisional space allocation requests.
- Decisions about space utilization and allocation must consider possible long-range land use and facilities impacts and the effect these have on Laboratory functionality, efficiency, cost effectiveness, and environmental safety, and health. "Ownership" or present occupancy shall not be the only determining factors in such decisions.
- The cost of moving and reconfiguration as a result of interdivisional space allocation decisions shall be paid in the following manner: if the move is the result of a voluntary request, then the requesting organization shall pay the full costs thereof; if the move directly benefits and results from another organization's request, then the requesting organization shall pay the full costs thereof; if the move is of Laboratory-wide benefit the costs shall be paid by the Associate Director for Operations from funds reserved for this purpose.
- Before a new line-item or major GPP facility receives siting approval, space utilization plans addressing the proposed reuse of existing occupied user space will be submitted by the affected line managers or their designees, reviewed by the SSC.

- Line-item facilities shall pay for site improvements at a cost proportional to their impacts on area infrastructure, including consideration of immediate area needs, existing deficits, and long-term requirements for the vicinity. GPP facilities shall pay for site improvement costs that are directly related to and required by the project, including deficits created by the project.

- Site approval reserves a line-item site for as long as the project is listed in the current Construction Plan. It shall reserve GPP project sites for two years and expense sites for one year after approval. Subsequent siting proposals that any party may submit for the same location shall be considered as a new and separate request for siting. Subsequent proposals shall be subject to all applicable siting policies and procedures as though a new request has been made for the site. Unique sites can be held in reserve beyond this time frame for conceptualized line-item scale projects with unusually restrictive siting requirements (e.g. a linear accelerator or a reactor).

- Portable structures shall be sited on a temporary basis, and only when there are no significant adverse effects created as a result. Every attempt will be made to identify potential problems or conflicts during the siting review process. However, approved sites for such structures shall be considered to be temporary and the portable structure will be required to be removed if future construction of higher priority is located on the site.

- Site improvements that are related or are required as a result of the installation of a portable structure shall be constructed when the structure is installed or within one year. Portable structure installation shall occur only after siting approval.

- Long-term storage, whether equipment items (bar coded) or expense items, will be minimized as storage is space-intensive, difficult to track, and creates housekeeping problems or liabilities, and is an environmental, health, and safety concern.

**Recommendations**

The recommendations below suggest direct actions the Laboratory should take for proper management of lands, facilities, and site design.

- Aggressively pursue additional funding for maintenance, marginal facilities decontamination and decommissioning, and for facilities modernization efforts, when cost-effective.

- Phase out leases and temporary space as permanent space becomes available.

- Investigate alternative funding sources for non-programmatic support facilities (offices, parking, storage, etc.) such as lease-to-own, or space recharging.

- Encourage phased, master-planned complexes throughout the Laboratory when funding for major line-item projects is either not available or not practical.

- Finalize and implement the draft Site Improvements Standards Manual to promote quality Laboratory site design. Implement the recommendations contained in the Visual Assessment section, Appendix B.

- Assure that the siting of all structures or operations is consistent with the Site Development Plan, the goals and design principles of other adopted Laboratory land use and facilities plans, programmatic priorities set forth in the Los Alamos 2000 Strategic Plan, and applicable DOE regulations.

- Consider long-range land use and facilities impacts on infrastructure, maintenance costs, operational efficiency, functional interactions, and cost-effectiveness when making facilities siting decisions.

- Remove portable structures (i.e. trailers and transportables) and build permanent structures to provide needed space as funding permits. If no other alternative for needed temporary space is available, portable structures should be clustered in specifically designed areas or parks.

- Investigate alternatives to trailers and transportables including third-party financing of permanent facilities and the construction of larger, high-quality modular facilities with expense funds.

- Conduct thorough space utilization audits to identify underutilized space and the potential uses for such space by type, regardless of its present use.

- Identify underutilized space that could have a higher and better use and make it available as a Laboratory space resource.

- Use energy-conscious site design guidelines to reduce heating and cooling costs.

- Investigate the feasibility of on-site childcare facilities in the Core Area or in conveniently located off-site areas.

- Site and screen service, storage, and salvage areas in an aesthetically pleasing fashion.

# Transportation/Circulation

## Existing Conditions

The Laboratory is served by an extensive system of roads and parking facilities. Roadways are aligned with the predominant topography of east/west canyons and mesas. Cross-canyon travel is limited to the Los Alamos Canyon Bridge, West Road, and NM 4 to the southeast.

The Laboratory has approximately 85 miles of paved roads and 70 miles of dirt or gravel roads and fire lanes, for a total of 155 miles. This total includes all paved roads and unpaved vehicle trails immediately bordering or within the Laboratory perimeter as of April 1989. The Laboratory also has approximately 205 acres of paved parking areas and two acres of gravel or dirt parking areas.

There are four major portals to the Laboratory, which convey a total of 40,000 Average Daily Trips (ADTs). They are

1. Los Alamos Canyon Bridge (25,000 ADTs);
2. Pajarito Road (8,000 ADTs);
3. East Jemez Road (6,000 ADTs); and
4. Back Gate (1,000 ADTs).

Employee reliance on the automobile is necessary for the foreseeable future given the Laboratory's isolation and the resulting commute from remote areas. Currently, 38% of all commuters originate from areas east of the White Rock wye (eastern region), splitting traffic patterns between the Los Alamos Canyon Bridge, East Jemez Road and Pajarito Road portals. The remainder of the commuters originate from:

- Los Alamos townsite – 36%;
- White Rock – 24%; and
- The Jemez (area west of the Laboratory) – 2%.

*Average Daily Trips Through Laboratory Portals*

The Laboratory's existing development pattern of dispersed technical areas and the lack of transportation alternatives such as an intra-Laboratory employee shuttle exacerbates the situation and makes internal commuting by automobile a necessity.

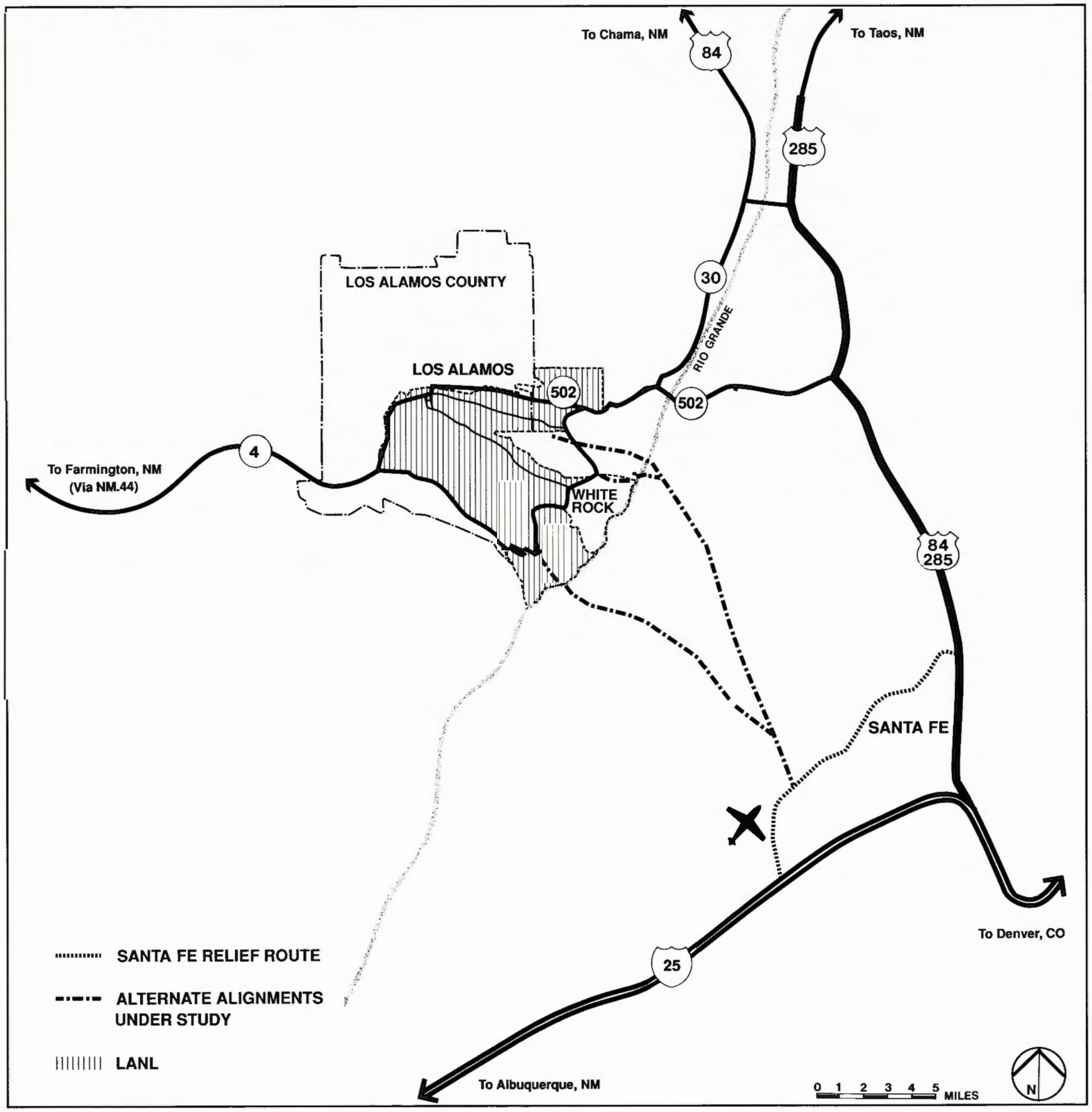
Because of the nature of the topography, Pajarito and East Jemez Roads provide the best year-round access between the communities of Los Alamos townsite and White Rock. As a result, White Rock school buses use Laboratory roads to access townsite schools.

A unique nonprofit bus system (LA BUS) currently links and serves White Rock, the Laboratory and the Los Alamos townsite. LA BUS is unusual because it combines volunteer and paid operations to provide regular, scheduled service to a semi-rural area having a residential population of less than 20,000.

All goods shipped from locations outside the Laboratory are first received at or shuttled through TA-3. The redistribution of materials is also handled from locations in TA-3.

The Regional Transportation Network map depicts the major existing highways that serve Los Alamos, connecting it to the surrounding cities. Design alternatives for the new Los Alamos/Santa Fe connector and the Santa Fe relief route alignment are also shown. A "no-build" alternative is also being considered.

*Regional Transportation Network*



## Issues/Planning Analysis

The Laboratory's remote location, topography, and development patterns create unique transportation problems both to and within the site. Mesa tops separated by deep canyons, and the dispersion of the technical areas combine to make access to and between Laboratory facilities difficult and circuitous. As a result, the transportation of employees at the Laboratory is difficult and time consuming, particularly during peak traffic hours. Many major roads and intersections currently provide poor and unsatisfactory levels of service during these times. However, from a security standpoint, the Laboratory's isolation is ideal.

An emerging trend is the growing number of employees who do not live in Los Alamos County. About 40% of Laboratory employees, and 80% of the support services subcontractors' employees commute from outside of the county.

The development of roads and parking at the Laboratory has thus far occurred in an incremental fashion, often guided by short-term requirements. This has resulted in difficulties such as

- Infrastructure development lagging behind growth;
- Peak-period traffic congestion on major roadways;
- Insufficient parking in certain areas;
- Transportation of hazardous materials using roads currently accessible to the public;
- Costly utility relocations necessitated by roadway expansion;
- Single access/egress points to technical areas with large employee concentrations in potential high-risk locations containing hazardous materials or conditions;
- Conflicts between Laboratory and non-Laboratory traffic; and
- Conflicts between vehicles and pedestrians, bicyclists, and joggers.

Potential changes to the existing Laboratory and regional road network may drastically alter commuting patterns and traffic counts. A significant increase in traffic is projected along East Jemez Road because of

- Recent reconfiguration of the White Rock wye and improvements to NM4 and 502;
- Potential for closure of Pajarito Road to public traffic for safety and security reasons; and
- Planned construction of the new alternate Los Alamos/Santa Fe connector.

The need for new internal and regional roadways is another important transportation issue at the Laboratory. These roadways are required to

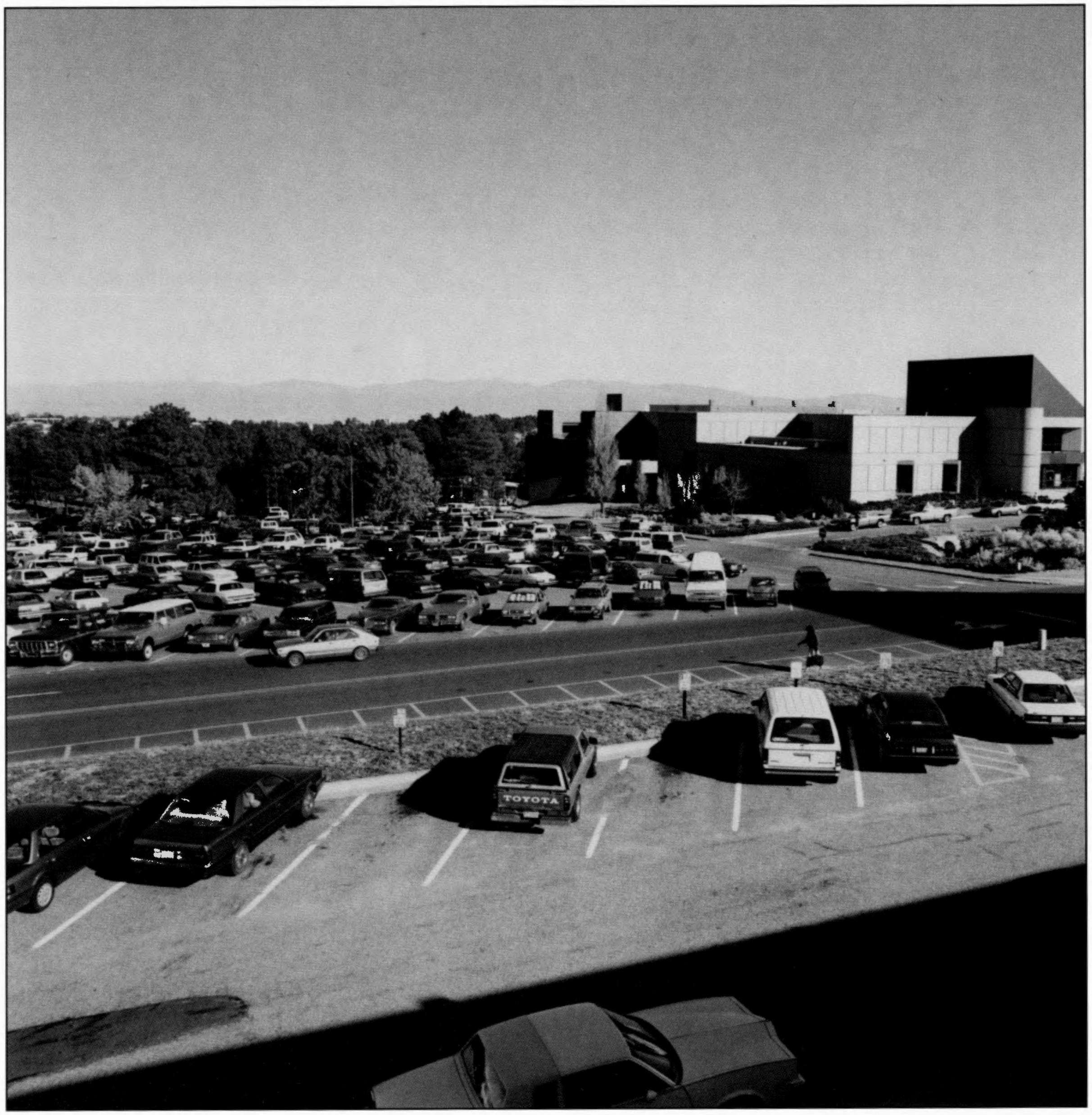
- Lessen congestion and reduce travel time;
- Enhance security and emergency response/evacuation capability;
- Facilitate the transport of hazardous materials; and
- Improve traffic safety.

Parking lots and roads are currently the single largest non-programmatic users of Laboratory land. Consequently, the increased parking demand and construction and maintenance costs of on-site parking is of concern. Furthermore, interior parking lots utilize valuable land that could be better used for major new buildings.

Alternative transportation modes need to be encouraged by the Laboratory. The relative costs of planned roads and parking areas must be weighed against the benefit of encouraging modal options such as carpools, vanpools, intra-Laboratory shuttlebuses, and other alternatives to the use of private vehicles.

The proposed Santa Fe relief route and the Los Alamos/Santa Fe connector also create unique opportunities for the Laboratory. These roads will provide a safer alternate route to the Waste Isolation Pilot Project (WIPP) by avoiding the Santa Fe metropolitan area while providing a second major route to and from the Laboratory. They would also reduce travel time for the growing number of Laboratory commuters living in the Santa Fe area and beyond.

*Parking Areas are the Single Largest Non-programmatic Consumer of Land at the Laboratory*



## Transportation Master Plan

A complete transportation master plan has been developed for Los Alamos National Laboratory. The plan integrates vehicular circulation, parking, pedestrian circulation, bicycle ways, and other modes of transportation used or proposed at the Laboratory. The plan provides transportation and circulation policies to guide improvements and prioritized recommendations for physical transportation improvements. These improvements are portrayed on the map on page 45 and explained in the table on page 44.

### Goal and Objectives

The Laboratory's transportation/circulation goal is to *develop and improve site circulation for efficient transportation, improved operations, reduced energy costs, and enhanced safety, security and emergency response capability.* The objectives for improving the Laboratory's transportation/circulation system are listed below.

- Design technical areas and building sites for efficient circulation and parking to minimize pedestrian and vehicle conflicts and to maximize operational efficiency.
- Improve connections between Laboratory technical areas.
- Improve methods and routes for transporting hazardous materials.
- Encourage safe and efficient multimodal transportation options for Laboratory employees.
- Promote improved connections between the Laboratory and surrounding communities.

### Policies

The following are the Laboratory's policies regarding future transportation/circulation improvements.

*Roads:*

- Designate and preserve right-of-way alignments for future roadway improvements.
- Realign and relocate major arterial links around major developments. This will not only promote safety and security, but will also release prime land for development.
- Limit driveways and uncontrolled intersections along major arterial roads such as Pajarito Road, East Jemez Road, and Diamond Drive.
- Design roads on the south side of mesa tops and the north side of canyon bottoms, where feasible, to use solar gain for reducing roadway icing.
- Establish a limited local and collector road network within the development areas for access and service uses, and configure the network to minimize use by through traffic.
- Alter selected roadways so that public access to potentially hazardous areas of the Laboratory is minimized where possible.
- Provide, when feasible, a minimum of two ingress/egress points to all technical areas for service and emergency response or evacuation capability.
- Widen major roads to accommodate left turn, right turn, and acceleration lanes at congested technical areas.
- Separate trucking, particularly of hazardous materials, from major traffic routes and population centers by developing alternative, internal routes, when feasible.
- Enhance traffic safety through good design and adherence to American Association of State Highway and Transportation Officials, and Facilities Engineering Division standards.
- Support external circulation improvements that enhance safety and efficiency of transportation of populations and materials in Los Alamos County and northern New Mexico, while encouraging alternatives to private vehicles.

*Parking:*

- Relocate, as appropriate, existing interior parking lots to the perimeters of developed areas to create building sites within those areas.
- Incorporate parking lot construction into line-item and general plant projects, thereby replacing parking lost to new construction and correcting existing parking deficiencies.
- Relocate private vehicle parking, when feasible, from limited-security areas when such parking can be accommodated within walking distance.
- Consider preferential parking spaces close to buildings for carpools, vanpools and other high-occupancy vehicles.
- Reserve future major parking lot areas by limiting the siting of temporary facilities in these areas.
- Require organizations requesting expense-funded facilities to be located in major parking lots to replace those spaces lost to development.

*Multi-Modal:*

- Improve pedestrian access to both perimeter parking and development area buildings by using sidewalks, crosswalks, and marked paths to minimize pedestrian/vehicular conflicts.
- Improve bicycle access within the Laboratory through the development or designation of wide shoulders, bicycle paths, and bicycle parking areas.
- Support rideshare and transit programs to minimize the number of cars accessing the Laboratory.
- Encourage the substitution of telephone, facsimile, and data network communications for intra-Laboratory travel when appropriate.

**Recommendations**

The table that follows on page 44 contains prioritized recommendations for roadway improvements at the Laboratory. The priorities of these improvements are based solely on traffic volumes and do not necessarily reflect the magnitude of safety concerns associated with a given improvement. These improvements are illustrated in the future transportation/circulation improvement maps found in this element and in each development area master plan.

The priority levels indicated reflect current and potential future Laboratory growth conditions. They are intended to be flexible and periodically adjusted in accordance with ongoing efforts to implement transportation improvements and the actual development timing of Laboratory growth within various technical areas. The designated priority levels are as follows:

High - Travel demands at present or from potential near-term Laboratory growth conditions require upgrading to mitigate capacity deficiencies or to achieve functional goals for internal roadway linkages accommodating transport of hazardous materials to enhance safety and security.

Medium - Travel demands from potential mid-term Laboratory growth conditions may require upgrading to mitigate capacity deficiencies or to achieve functional goals for internal roadway linkages accommodating transport of hazardous materials to enhance safety and security.

Low - Travel demands from potential long-term Laboratory growth conditions may require upgrading to mitigate capacity deficiencies or to achieve functional goals for internal roadway linkages accommodating transport of hazardous materials to enhance safety and security.

In the interest of effective regional planning, non-Laboratory (county and state) roadways have been included in the transportation plan analysis, and recommendations for these roads are included in this master plan. Improvements suggested for non-Laboratory facilities are based on anticipated travel demands and levels of service resulting from potential Laboratory and area growth and from projections made by the New Mexico State Highway Department.

Recommendations for other improvements that are not covered on the table on page 44 are as follows:

- Consider implementation of an intra-Laboratory transit shuttle in accordance with the Shuttle Bus Feasibility Study conducted in 1987, and if implemented, maintain a reduced fleet of government vehicles to be used for those trips for which it is not appropriate to take the intra-Laboratory transit shuttle.
- Establish an improved capital improvements planning process for transportation and other infrastructure improvements as part of the Laboratory's Construction Development Advisory Committee's recommendation process and the Construction Plan.
- Use Infrastructure Support Facilities (ISF) line-item funding to accomplish necessary transportation improvements.

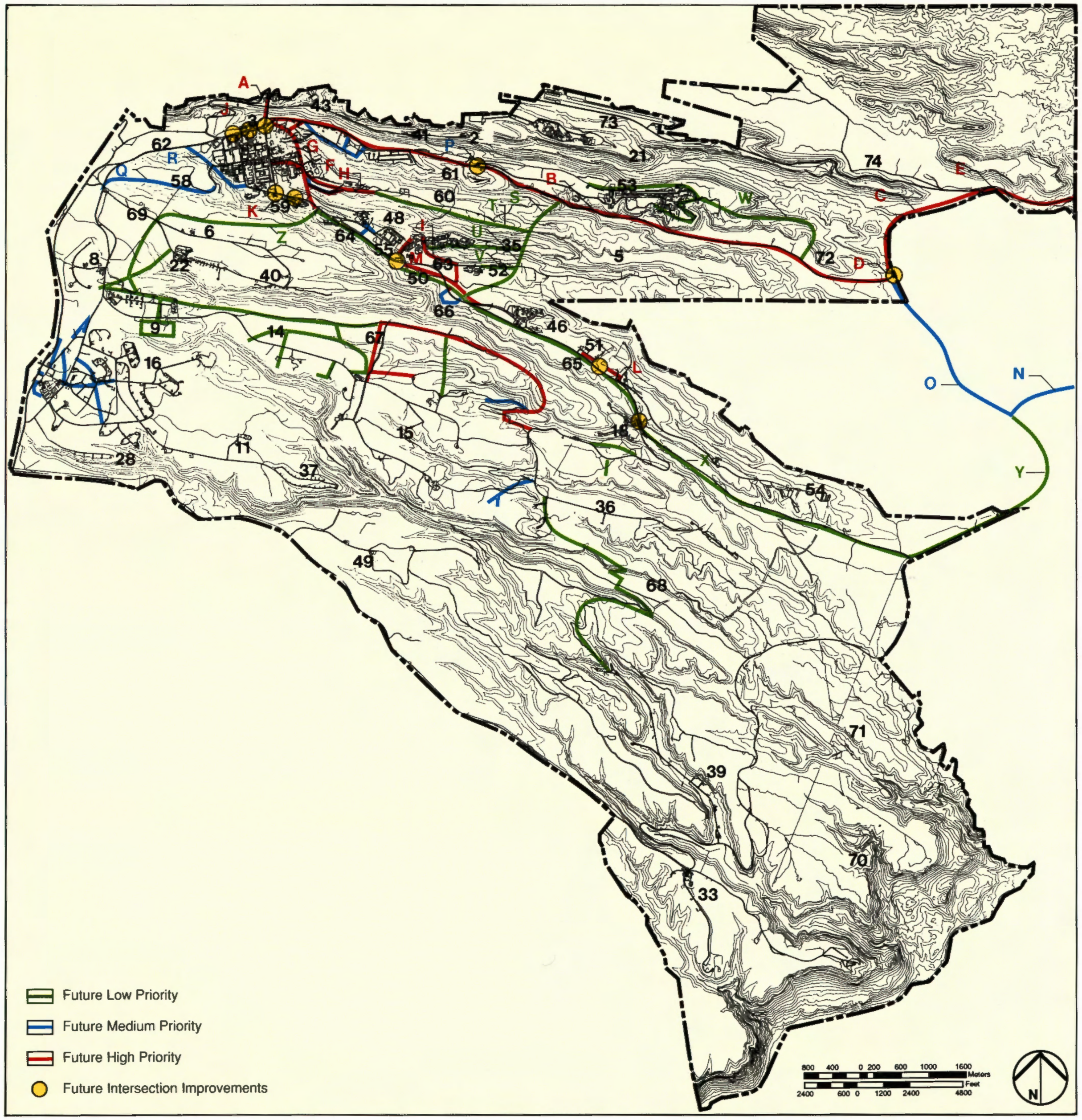
*Major Recommended Transportation/Circulation Improvements*

| High Priority | Roadway Corridor | From | To | Recommended Improvement |
|---|---|---|---|---|
| A | Los Alamos Canyon Bridge | | | Upgrade bridge deck including lane widening for improved capacity |
| B | East Jemez Road | NM 4 | Diamond Drive | Establish consistent four-lane cross section |
| C | NM 4 | NM 502/East Jemez | | Establish consistent four-lane cross section from White Rock wye |
| D | NM 4/East Jemez Road | East Jemez/NM 4 | Rover Boulevard | Upgrade intersection capacity and improve design safety |
| E | NM 502 | White Rock wye | Rio Grande | Establish consistent four-lane cross section |
| F | TA-3 Eastern Bypass[1] | Diamond Drive | Pajarito Road | Develop four-lane facility; reconfigure the Diamond Drive/Jemez Road intersection to allow access as a downgraded collector street |
| G | TA-3 Eastern Bypass Spur | Eastern Bypass | East Jemez Road | Develop four-lane facility |
| H | Eniwetok Road | Diamond Drive | east (TA-60) | Establish consistent four-lane cross section with development of Sigma Mesa |
| I | TA-35 Alternate Access | Pajarito Road | Pecos Drive | Construct two-lane alternate access road to TAs 35, 50, and 55 |
| J | West Jemez Road | Diamond Drive | Pajarito Road | TSM-style[2] improvements to improve peak capacity |
| K | Pajarito Road | at Diamond Drive | | Reconstruct intersection to improve peak capacity and safety |
| L | TA-51E/TA-54 | Pajarito Road | north | Relocate intersections and access road to improve safety |
| M | Pajarito Road | TA-55 | TA-46 | Realign Pajarito Road to enable expansion of TA-50 and TA-66 |
| **Medium Priority** | **Roadway Corridor** | **From** | **To** | **Recommended Improvement** |
| N | Santa Fe Connector | Santa Fe Bypass | NM 4 | Develop four-lane divided facility to expressway/freeway design standards |
| O | NM 4 | East Jemez Road | south of Santa Fe Connector | Establish consistent four-lane cross section with improved intersections |
| P | La Mesita Road | at East Jemez Road | | Improve intersection capacity |
| Q | TA-58 Road[1, 3] | Mercury Road | Anchor Ranch Road | Develop two-lane facility to improve internal access to TA-58, Anchor Ranch Sites |
| R | TA-3 Western Bypass[1] | Pajarito Road | West Jemez Road/West Road | Develop two-lane facility allowing Pajarito Road closure, TA-58 access |
| **Low Priority** | **Roadway Corridor** | **From** | **To** | **Recommended Improvement** |
| S | Pajarito/East Jemez Connector[1] | Pajarito Road | East Jemez Road | Develop four-lane facility |
| T | Eniwetok Road | TA-60 | Pajarito/East Jemez Road | Extend two-lane facility to Pajarito/East Jemez Connector |
| U | Pecos Drive | TA-35 | Pajarito/East Jemez Road | Extend two-lane facility to Pajarito/East Jemez Connector |
| V | Puye Drive | TA-52 | Pajarito/East Jemez Road | Extend two-lane facility to Pajarito/East Jemez Connector |
| W | La Mesita Road | TA-53 | East Jemez Road or NM 4 | Create alternate access, extend two lane facility |
| X | Pajarito Road | Eastern Bypass | NM 4 | Expand to four lanes |
| Y | NM 4 | Santa Fe Connector | Pajarito Road | Expand to four lanes |
| Z | TA-6 Road[1, 3] | Pajarito Road | Two-Mile Mesa Road | Develop two-lane facility allowing internal access to TAs 6, 22, 40, and 67 |

Notes:

1. Priority designation subject to change as a result of altered security requirements.
2. TSM means transportation systems management and is a planning method used to improve roadway capacity problems by applying low cost modifications to enhance efficiency. An example would be synchronizing traffic signals to maintain optimal traffic flow on a major street without having to resort to expensive roadwork.
3. This roadway link was not represented in the transportation plan model network presented in the Transportation Master Plan prepared by ENG-2 and Barton-Aschman, Associates, but is included here based on information obtained subsequently on potential Laboratory growth conditions and/or security requirements.

*Future Transportation/Circulation Improvements*



# Security/Safeguards

## Existing Conditions

Security at Los Alamos National Laboratory involves protecting personnel and facilities in a manner appropriate to respond to postulated threats. Safeguarding consists of guarding, protecting, or providing a defense based on several considerations: the sensitivity of the facility, the level of threat, the Laboratory's vulnerability, and the defense options.

The hazardous nature of much of the Laboratory's work, the dispersion of facilities within the large site, and constraints imposed by the rugged terrain have led to the development of many scattered and separate security areas. The nature of the security interest in each area determines the type and degree of security required.

### Security Measures

Most research at the Laboratory is performed under the DOE rules and regulations that govern the protection of national security interests. In complying with these regulations, the Laboratory uses a variety of security measures, including:

*Badges*

Badges identify their wearers, indicating clearance status and the areas the wearer may enter.

*Barriers*

Fences and other physical barriers, such as buildings, walls, and canyons define areas within which classified information may be used, discussed, and stored. These barriers deter penetration and outside monitoring.

*Control Points*

Access to classified areas is granted to authorized and escorted personnel and denied to unauthorized personnel. Access is restricted by a protective force officer stationed at the access point or by access controlling equipment, such as automated badge check booths.

*Surveillance*

The Laboratory is monitored by security patrols and by remote electronic devices.

*Distance*

Site location combined with canyons, posted property, and security buffer zones all serve as barriers between the area to be protected and potential threats.

### Security Areas

There are five levels of security maintained by the Laboratory:

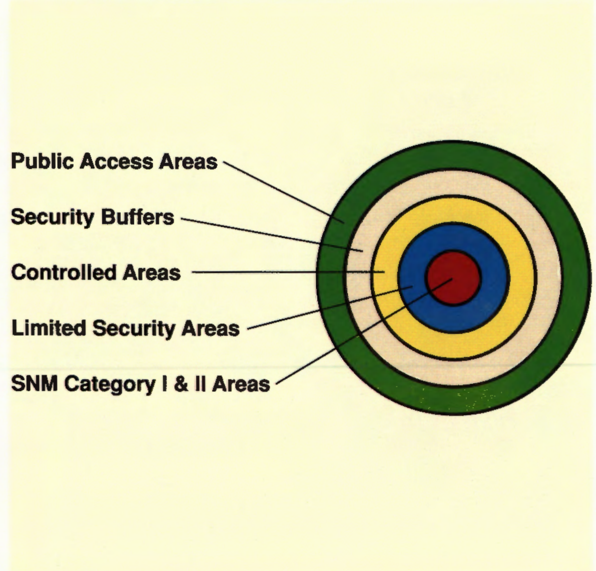
*Public Access Areas*

Public access areas are normally open to the public during working hours, such as the Bradbury Science Museum and certain roadways at the Laboratory.

*Buffer Areas*

Public entry is managed in buffer areas through posted signs, fencing, patrols, and other methods. These buffer areas contain no classified or hazardous materials.

*Security Planning Model*




*Controlled Areas*

Controlled areas are technical areas or buildings outside of security areas in which Laboratory business is conducted. Examples of controlled areas are property protection and industrial security areas. To enter a controlled area, employees are required to wear security badges, but clearances are not required. No classified matter may be used or stored in controlled areas, nor may classified matters be discussed. Uncleared visitors on official business may enter these areas with prior authorization.

In addition to the preceding three levels of security, there are two more levels that are considered security areas. All classified and SNM operations are conducted within one of four types of security areas: limited-security areas, exclusion areas, protected access areas, and material access areas.

*Limited-Security Areas*

Limited-security areas may be entered by persons who hold Q clearances or by persons accompanied by authorized escorts. In limited-security areas, classified matter can be used and stored, and classified discussions are permitted. However, access to the area does not necessarily constitute access to classified matter.

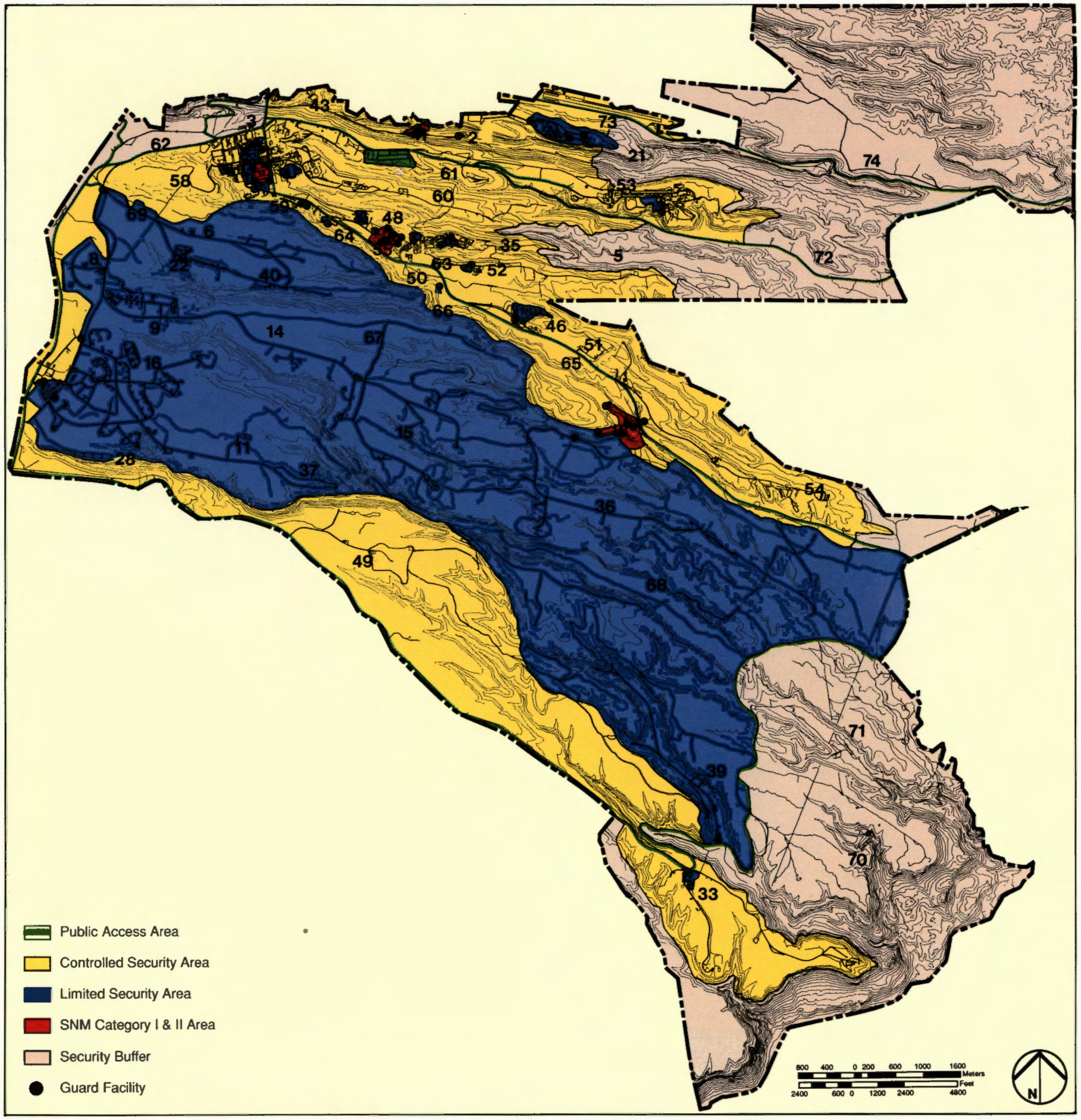
A limited-security area may contain exclusion areas. These are security areas designated for the protection of classified matter where mere access to the area would result in access to the classified matter used or processed therein. Access to an exclusion area requires a Q clearance and a specific need-to-know with regard to the classified information contained within the area.

*Category I & II Special Nuclear Materials (SNM) Areas*

Protected areas (PA's) and material access areas (MAA's) are established for the protection of category I and II SNM operations and may be entered only by Q cleared persons with special authorization for each specific area. These protected areas or materials access areas contain SNM and/or classified matter of such a nature that access to the area actually constitutes access to the material.

The pattern of the five security levels and physical security facilities at the Laboratory is shown on the Existing Security map. Most Laboratory functions operate at relatively low levels of security appropriate to research programs. Major roads through the

*Existing Security*



Laboratory, such as Pajarito Road, are open to public traffic but can be closed in case of need. The 25-acre private trailer park on East Jemez is surrounded by a controlled-security area.

High-explosives research activities maintain a large contiguous area of limited-security as required by the national security implications of the work. Limited-security protects classified research functions along Pajarito Road and in TA-21. Laboratory administration, theoretical and computational sciences, and certain programmatic research within the TA-3 Core Area are also in limited-security areas.

Four areas within the Laboratory conduct programmatic work with category I and II special nuclear materials. These four areas – TAs 3, 18, 41, and 55 – are currently maintained at the appropriate category I & II SNM level of security, the highest level of security protection at the Laboratory.

Security systems at the Laboratory include cable television surveillance and a variety of security, fire, and utility alarms. All alarm and monitoring signals are processed at the central alarm station in TA-3.

*Architectural Security Fence in High–Visibility, Limited Security Area*

## Issues/Planning Analysis

The Laboratory must maintain and strengthen security protection and meet DOE security regulations and requirements. Consolidation and centralization of secure functions, and the control of public access in and around public areas should be accomplished through careful land use and facilities planning that considers security in the context of overall Laboratory missions, conflicting goals, and competing programmatic needs. Concern for the potential for terrorism and vulnerability to outside forces are other considerations.

Certain items need careful security planning to facilitate their siting: communications lines, electrical substations, the central computing center, and the cooling water facilities for the computing center.

Ideally, the Laboratory site should be arranged concentrically, with the lowest-level security zones (public access and buffer areas) at the perimeter and the highest-level zone (category I & II SNM areas) at the center. This model is optimal for three major reasons:

- The most sensitive functions are the most highly protected.
- Theoretically, the highest level of security is achieved by locating those with the least need to know on the perimeter, and those with the most need to know at the center.
- Circulation would be continuous within each security zone and convenient between zones.

The Laboratory's historic land use pattern and natural topography imposes major limitations on this model. Most of the highly classified activities are dispersed among a number of technical areas.

*Security Protection for Materials Access Area*

## Security/Safeguards Master Plan

The master plan sets forth strategies for addressing security/safeguards issues at the Laboratory. The following sections outline these strategies.

### Goal and Objectives

The Laboratory's physical security/safeguards goal is to *maintain and strengthen security protection through long-term site development planning.* This goal can be accomplished through the following objectives:

- Consolidate secure functions and interests to the extent permitted by other Laboratory functional and technical requirements.
- Limit public access to, and visibility of, limited-security and category I & II SNM areas.
- Minimize public proximity to secured areas by locating public interface functions at the perimeter of the site.
- Establish buffer zones to protect limited-security and category I & II SNM areas from unauthorized access.
- Surround or buffer higher-security functions with lesser-security functions to protect and insulate these functions from security threats.

### Policies

The following policies are proposed to guide the Laboratory's security/safeguards decision making process.

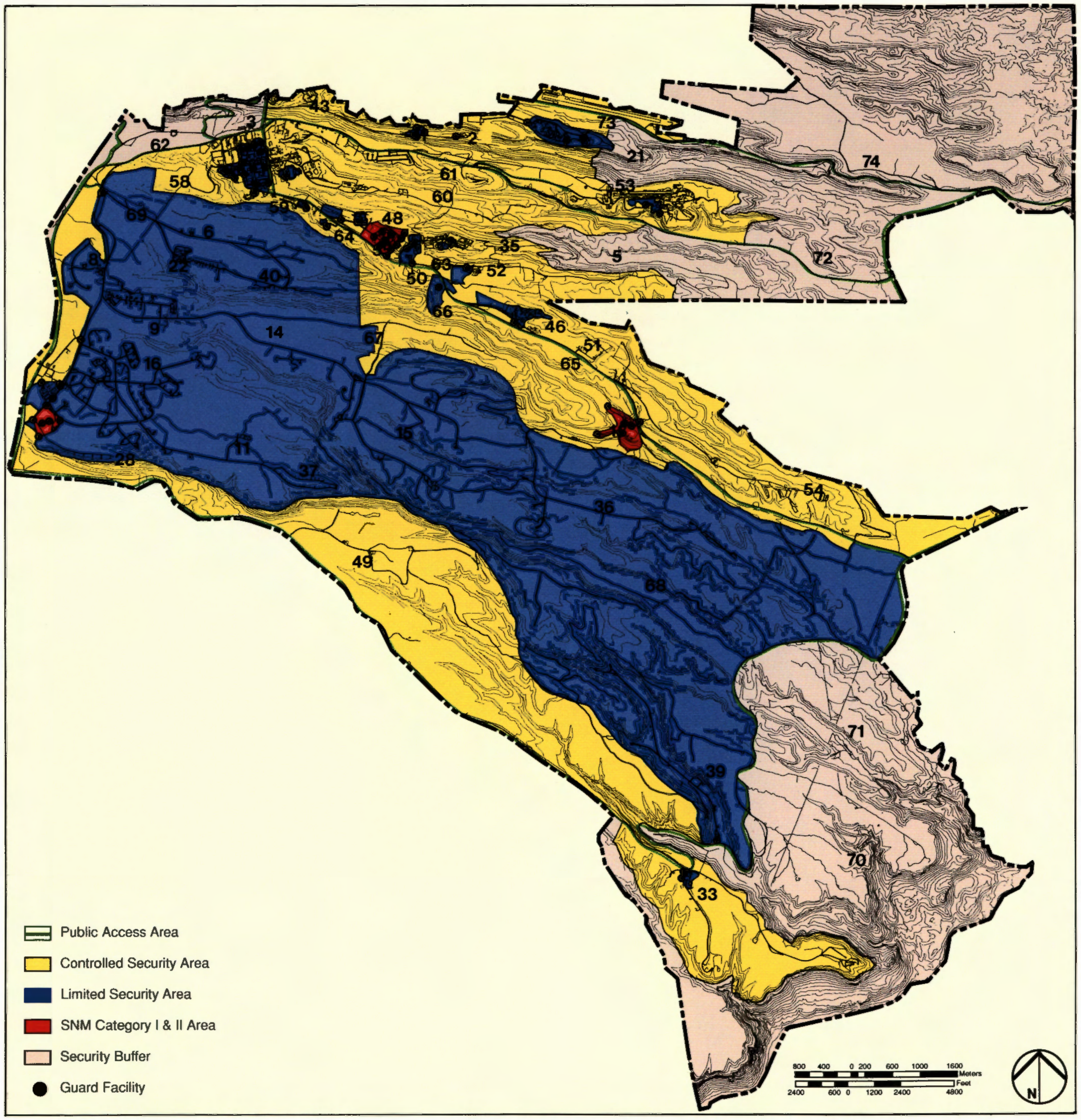
- Enhance awareness of physical security threats through education of all Laboratory personnel as necessary to help identify potential problems before any incident occurs.
- Consolidate all category I & II special nuclear materials in as few areas as possible to enhance safeguards and security.
- Minimize the number of limited-security areas to the extent permitted by programmatic needs to consolidate and buffer such operations.
- Provide new road linkages between selected points to enhance security and emergency response time capabilities and to lessen reliance on public roads for operational activities.
- Construct peripheral roads and parking to minimize private vehicle access to secure or sensitive areas.

### Recommendations

The following recommendations suggest direct actions that the Laboratory should take in pursuit of its physical security/safeguards goal.

- Prepare a comprehensive physical security plan for the Laboratory.
- Establish a secure, centrally located storage facility for inactive classified documents.
- Complete the industrial security perimeter fence around TA-3 and construct visible entry points that can be optionally manned. These entry points should be pleasant looking and functional.
- Provide capability to control access at Laboratory entry portals.
- Widen East Jemez Road and make related intersection improvements so that public use and access along Pajarito Road can be de-emphasized.
- Install fencing or other deterrents between NM 4 and the southeast boundary of the Dynamic Testing area.
- Continue to fence, sign, and enhance patrols of all Laboratory lands, as has been done for the land bank areas at TA-70 and TA-71, to discourage illegal and undesirable activities such as poaching, unauthorized entry, and vandalism as well as erosion and habitat degradation.
- Close Pajarito Road to public access when limited-security islands along Pajarito Road and in the southwest portion of TA-3 expand toward each other. Reroute traffic to the TA-3 bypass roads, after it is constructed. This action will further the objective of consolidating secure functions.

*Future Security*



# Utilities

## Existing Conditions

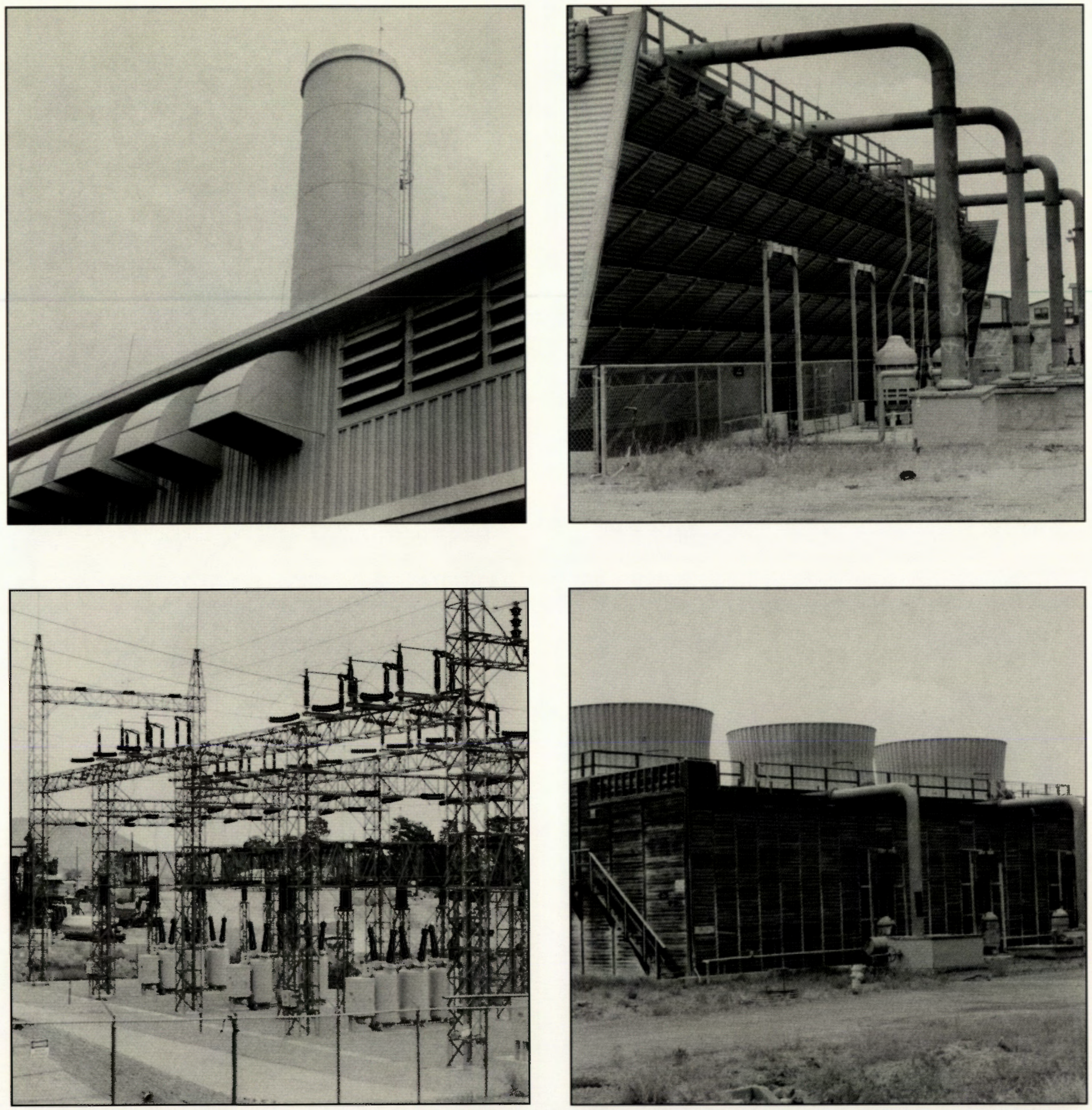
The Laboratory's extensive utility network is its life support system. Providing utility service is the single largest component of the Laboratory's site development costs.

Currently, the Laboratory's utility system contains approximately 400 miles of lines. Six primary utilities make up the utility system – electricity, telecommunications, water, sanitary sewer, radioactive liquid waste, and natural gas with associated steam plants.

The Facilities Engineering Division has completed a draft Long-Range Utilities Development Plan. It proposes integration of the existing infrastructure and identifies future corridors for major utilities. Implementation of the plan will result in coordinated utilities support for major construction items and a reduction in utility relocations necessitated by such projects. The major recommendations of the Long-Range Utilities Development Plan have been incorporated into this document.

Each primary utility is addressed individually in this section. The accompanying maps depict existing major utilities and near-term system improvements.

*Utility Systems*



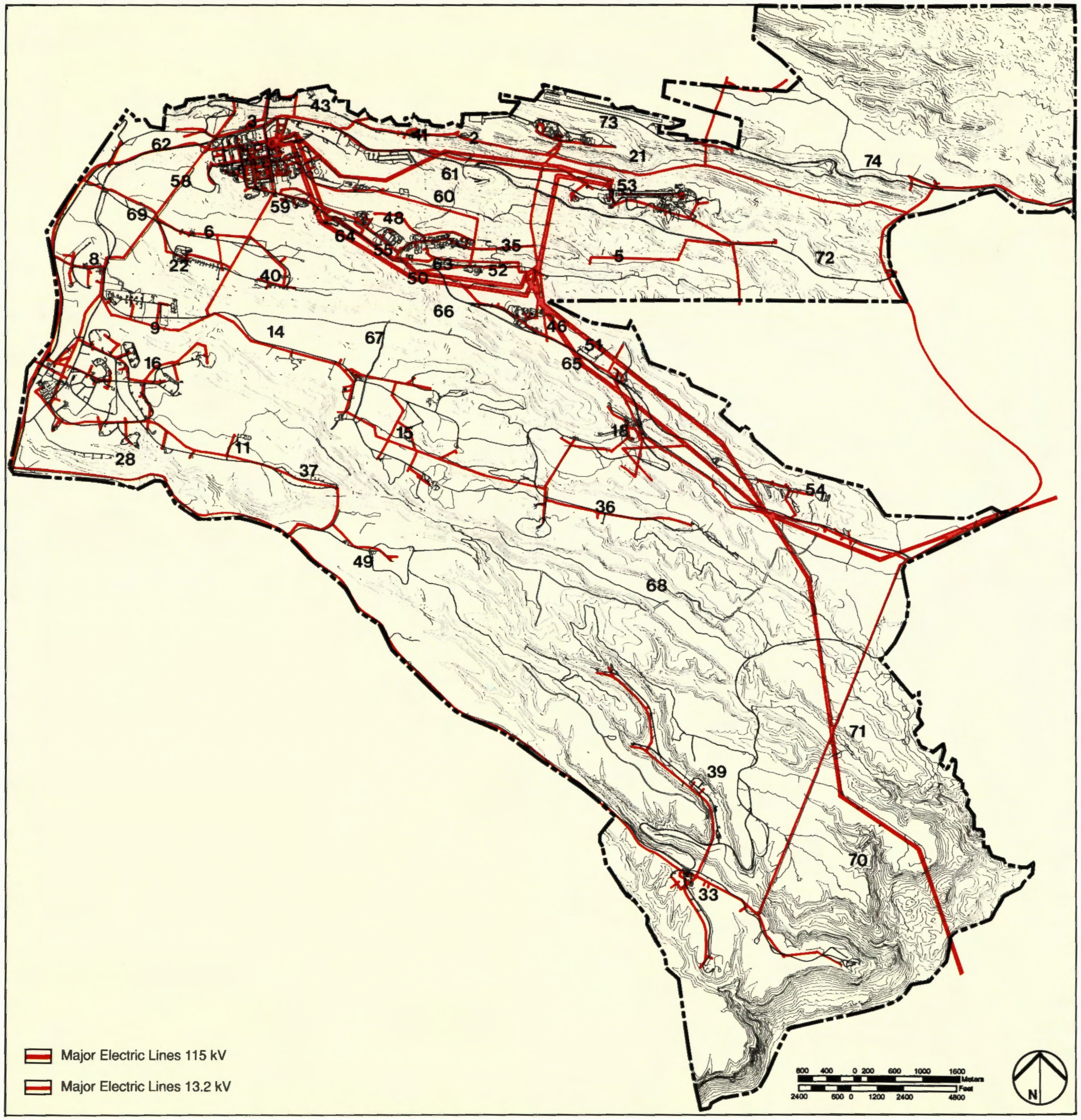
## Electricity

The Laboratory is supplied with electricity by a Los Alamos County/DOE power pool. It also has a 20 megawatt (MW) gas-fired generating plant in TA-3. Electricity is transmitted to the Laboratory and the county over two 115 kilovolt (kV) lines, one from Santa Fe (Norton Generating Station) and one from Albuquerque (Reeves Generating Station). The lines enter the Laboratory near the substation in TA-5 (Eastern Technical Areas substation). Electricity is distributed throughout the Laboratory via 13.2-kV lines. The 115-kV system includes a loop that ties substations at TAs 3, 5, and 53 together. This looping ensures a power supply throughout the Laboratory should outages in any major line occur.

The Laboratory's total annual consumption of power is considerably below the transmission capacity of the system. Efforts are made to level out the peak demand load by running equipment with large demands for power at night when the base power demand of the Laboratory is at its lowest. Another optimization tactic has been to schedule experiments when the Los Alamos Meson Physics Facility, the Laboratory's single largest power consumer, is not in operation. Although LAMPF consumes roughly 30% of the electricity used by the Laboratory, it operates only five months of the year.

Electrical projects in progress at the Laboratory include review of an alignment for a proposed 345-kV power line by the Public Service Company of New Mexico, replacement and retrofitting of Polychlorinated biphenyl-filled (PCB) transformers, and replacement of obsolete 13.2-kV switch gear.

*Electrical System*



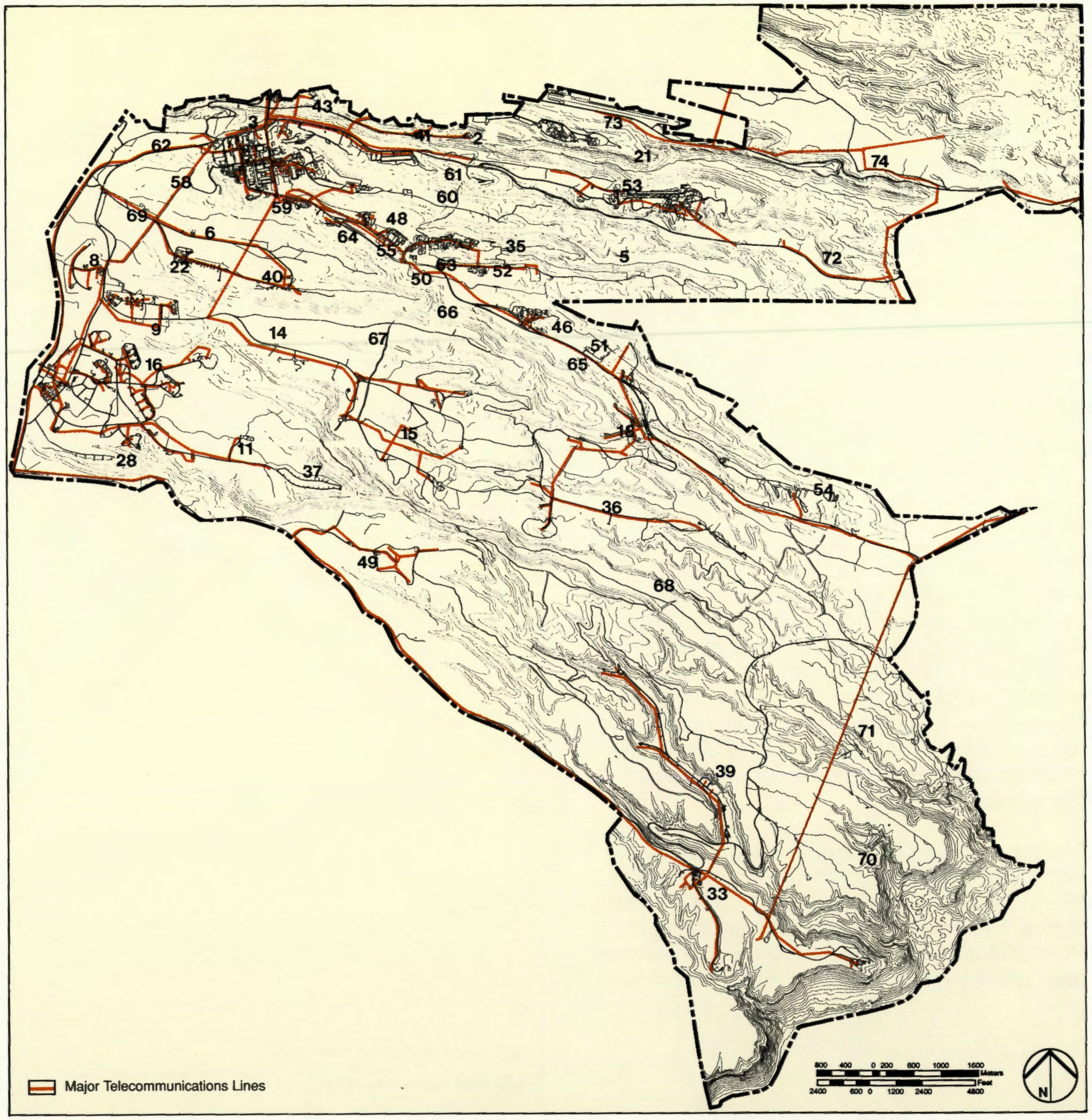
## Telecommunications

The central goal of voice, data, and video communications planning at the Laboratory is to provide an effective, secure, and economical communications system that helps maximize the productivity of employees in accomplishing the Laboratory's mission. A key factor in providing effective communications service is staying abreast of and applying new technologies. Currently, U.S. West Communications provides leased CENTRON service to the Laboratory using a switching system located in the U.S. West building in downtown Los Alamos. The system provides the Laboratory and associated organizations with approximately 15,000 stations and 11,000 main lines. AT&T is the primary interexchange carrier for the Laboratory.

The major data communications network at the Laboratory is the Integrated Computer Network (ICN). The heart of the ICN is contained in the Central Computing Facility (CCF). Terminals with access to the ICN are located throughout 30 technical areas. Data communications within the ICN are divided into three classes of computing: secure, administrative, and open. Secure computing requires the use of encryption devices and protected lines. Bulk encrypted trunks are used to minimize the number of encryption devices required.

The Laboratory's telecommunications system is undergoing major changes. The development of the Los Alamos Integrated Communications System (LAICS) is a six-year project that will integrate new and selected existing telecommunication systems and equipment (primarily existing analog telephone equipment) into a unified system of voice and data communication services. LAICS will feature expandable digital transmission and switching facilities to meet the Laboratory's evolving communications requirements through the 1990s and beyond. The result will be a communications

*Telecommunications System*



network with four fiber optics nodes linked together at the new TA-3 Laboratory Data Communications Center.

**Water Supply**

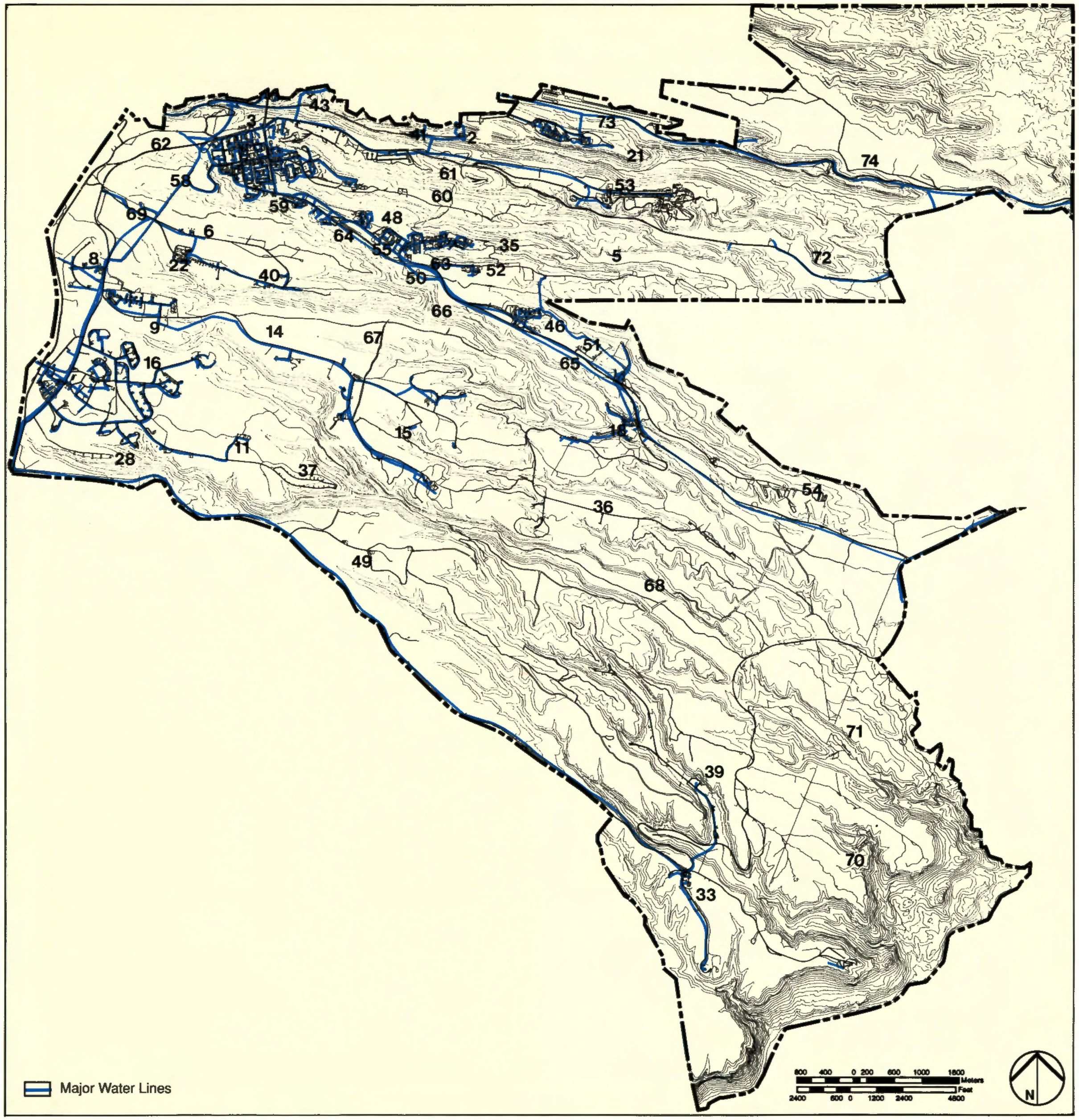
Water for the Laboratory and adjacent areas (including Los Alamos townsite, White Rock and Bandelier National Monument) primarily comes from three DOE-owned well fields and surface water from the Jemez Mountains. The system depends on gravity flow for distribution from high elevation terminal storage facilities.

Between 1972 and 1981, the average annual production for the entire system was approximately one billion gallons of water. The peak production year was 1976, when 1.7 billion gallons were produced for the Laboratory and county.

The DOE controls the rights to 5,540 acre-feet of groundwater as well as another 1,200 acre-feet of San Juan-Chama Diversion water, for a total of 6,740 acre feet. The total system consumption for 1983 was 4,790 acre-feet, or 85% of the available groundwater. Earlier studies have concluded that present water rights are sufficient until the mid-1990s, and that additional water rights must be acquired as they become available.

Most water consumption is industrial water use directly related to the work performed at the Laboratory, rather than per capita consumption as in domestic water use. Future use is expected to be similar. Higher prices for water combined with conservation efforts have reduced consumption since 1976. However, new developments within the Laboratory and the county are expected to increase demand. The annual demand projected for the Laboratory alone in 2005 is approximately 600 million gallons, 20% more than the current demand of 500 million gallons.

*Water System*



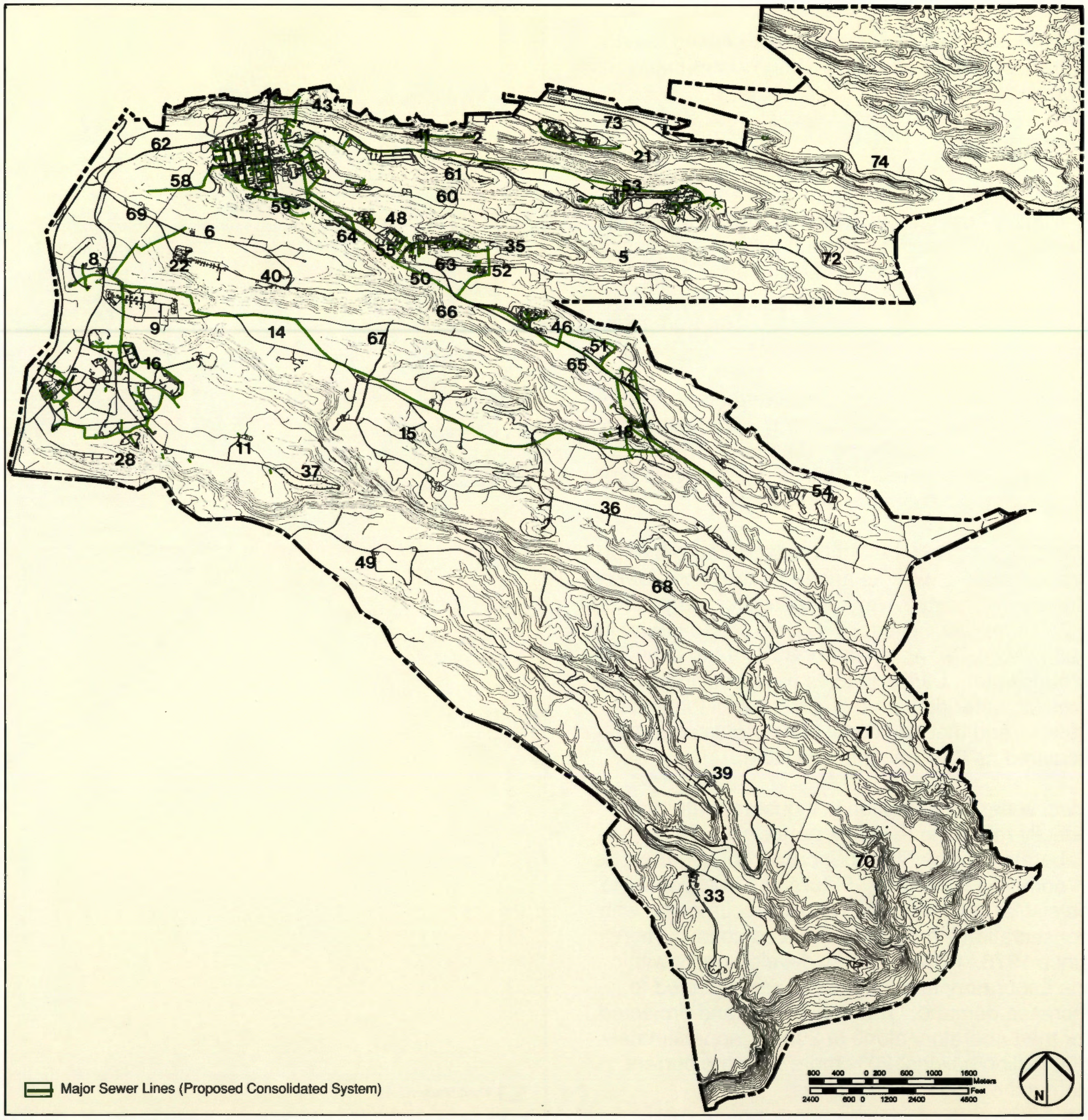
Water quality is monitored by the Laboratory. This monitoring has shown that system water meets the primary drinking water standards for public health, as well as the secondary standards with the exception of iron concentrations. All samples are monitored for compliance with radiochemical standards.

**Sanitary Sewer**

The existing sanitary sewer system includes nine treatment facilities. In addition, approximately 70 septic tanks are dispersed throughout the Laboratory. Consolidation of the sanitary waste water treatment system is underway and will eliminate eight of the existing treatment facilities.

Areas of the Laboratory not served by the existing sanitary sewer system use septic tanks. These areas tend to be the least densely populated areas of the site. Many waste water projects are also underway to bring all treatment systems, including individual septic systems, into compliance with the latest Environmental Protection Agency (EPA) and New Mexico State Environmental Improvement Division (EID) regulations.

*Sanitary Sewer System*



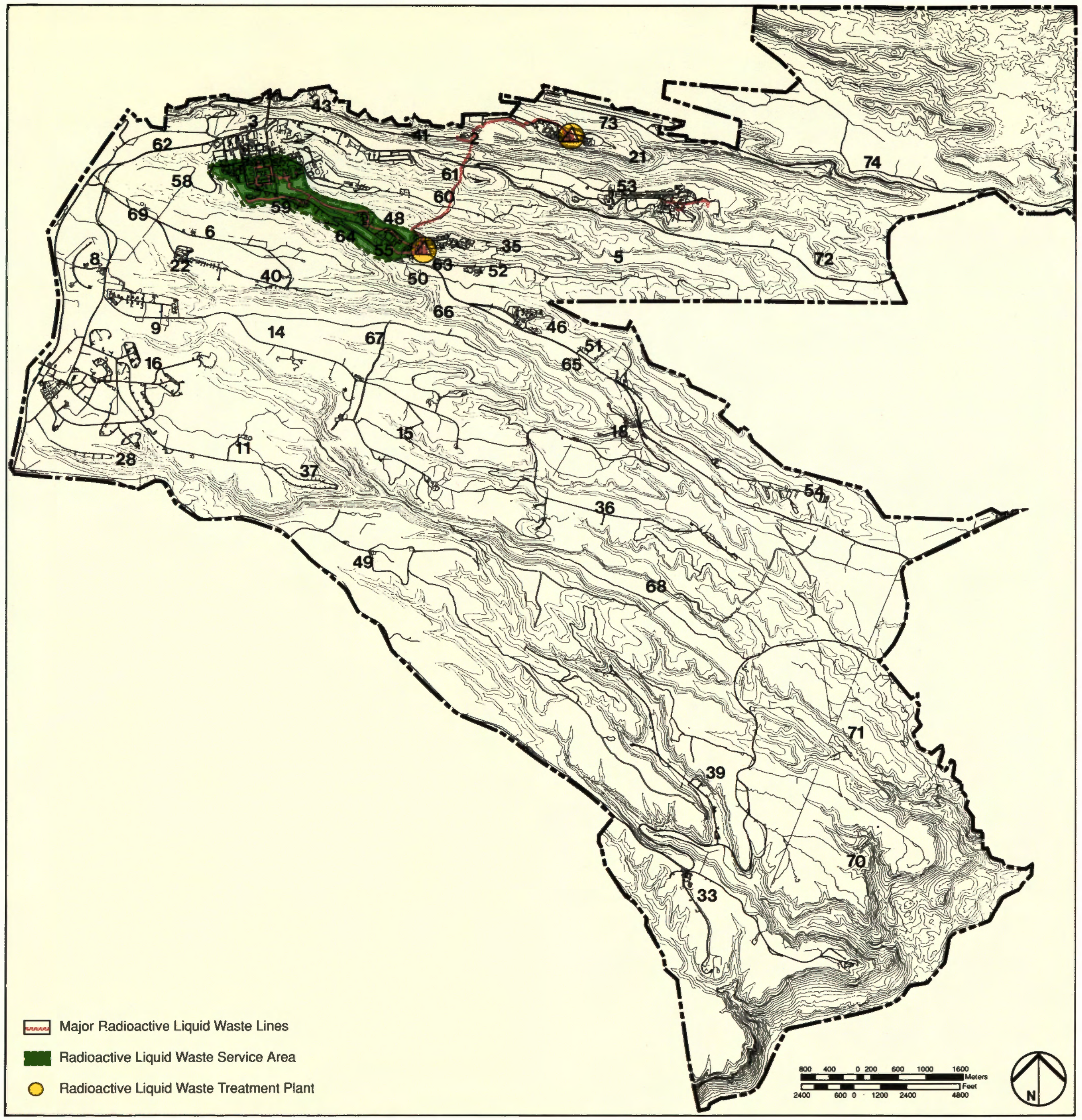
## Radioactive Liquid Waste

The radioactive liquid waste system service area includes TAs 2, 3, 21, 48, 50, 55, and 59. Radioactive liquid wastes from TAs 16, 35, 43, and 54 are collected and treated at TA-50. TA-53 has a self-contained radioactive liquid waste collection system. Functions that produce significant radioactive waste water shall be located within this service area.

Radioactive liquid wastes (RLW) are generated by a variety of activities at the Laboratory, including those that deal with weapons, radiobiology, laser technology, energy, safeguards, and waste management. The system is monitored constantly for leakage by electronic surveillance equipment that also tracks flow level and pH levels from the waste sources.

Treatment of radioactive waste discharges is handled in facilities at TA-21 and TA-50. These two facilities can normally process all liquid low-level radioactive wastes produced by the Laboratory. All treated liquid discharged into the environment is monitored, sampled, measured, and analyzed to maintain the Laboratory's compliance with the requirements of the Federal Clean Water Act.

*Radioactive Liquid Waste System Service Area*



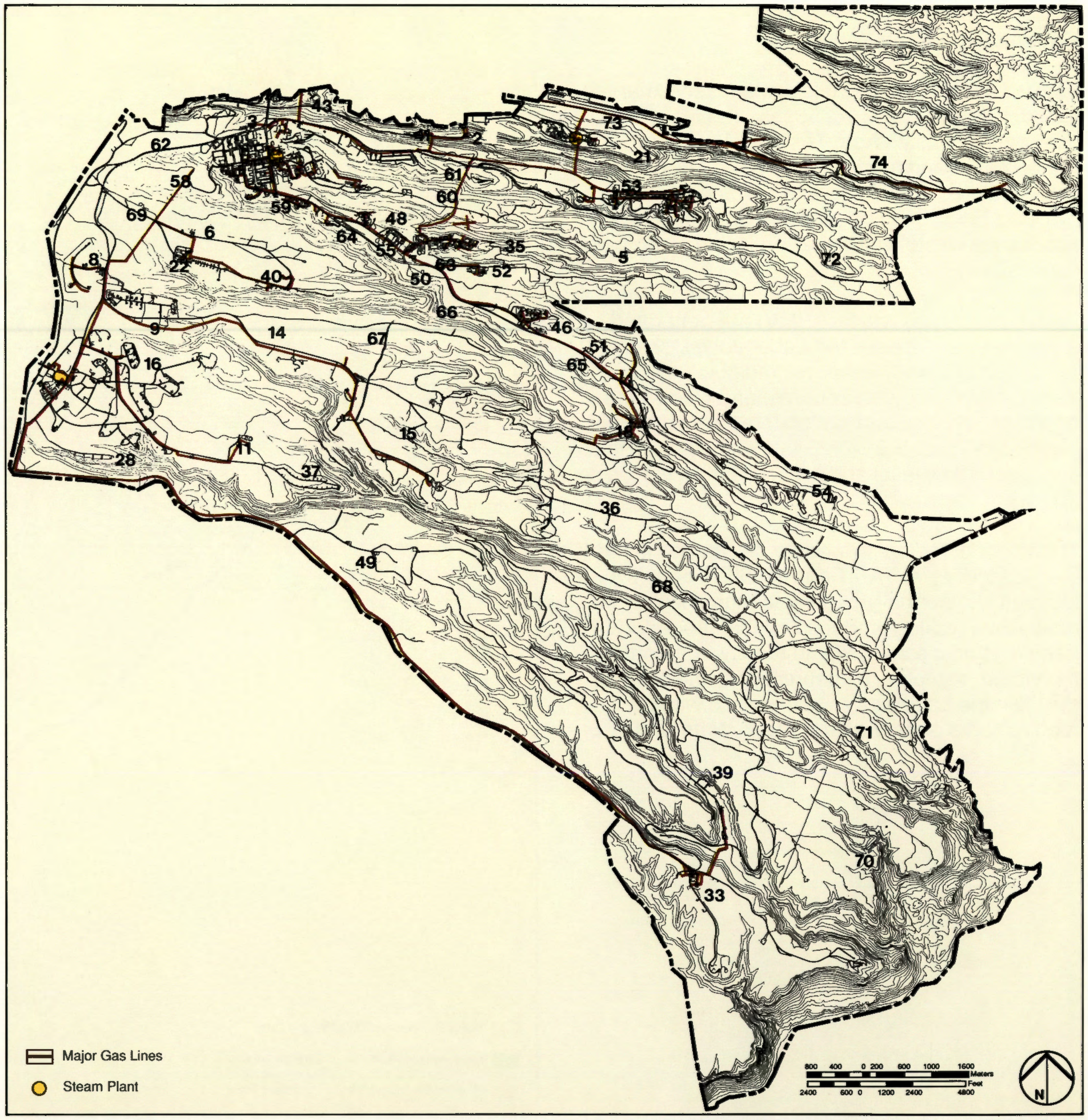
## Natural Gas and Steam Plants

Natural gas used by the Laboratory comes from the San Juan Basin in northwest New Mexico. The lines are owned by DOE but operated and maintained by the Gas Company of New Mexico under contract to DOE.

The Laboratory depends on natural gas for most space heating requirements. Gas-fired forced air furnaces, hot water boilers, and steam boilers are some of the equipment used. Natural gas is distributed to buildings directly, or to three central steam plants (TAs 3, 16, and 21), and a standby plant for fueling the heating system. All plants also maintain reserves of fuel oil.

Total gas consumption at the Laboratory was approximately 2.5 trillion Btus in 1983. Gas use has declined somewhat since then because of decreased power production at the TA-3 gas-fired power plant.

*Natural Gas System*



## Issues/Planning Analysis

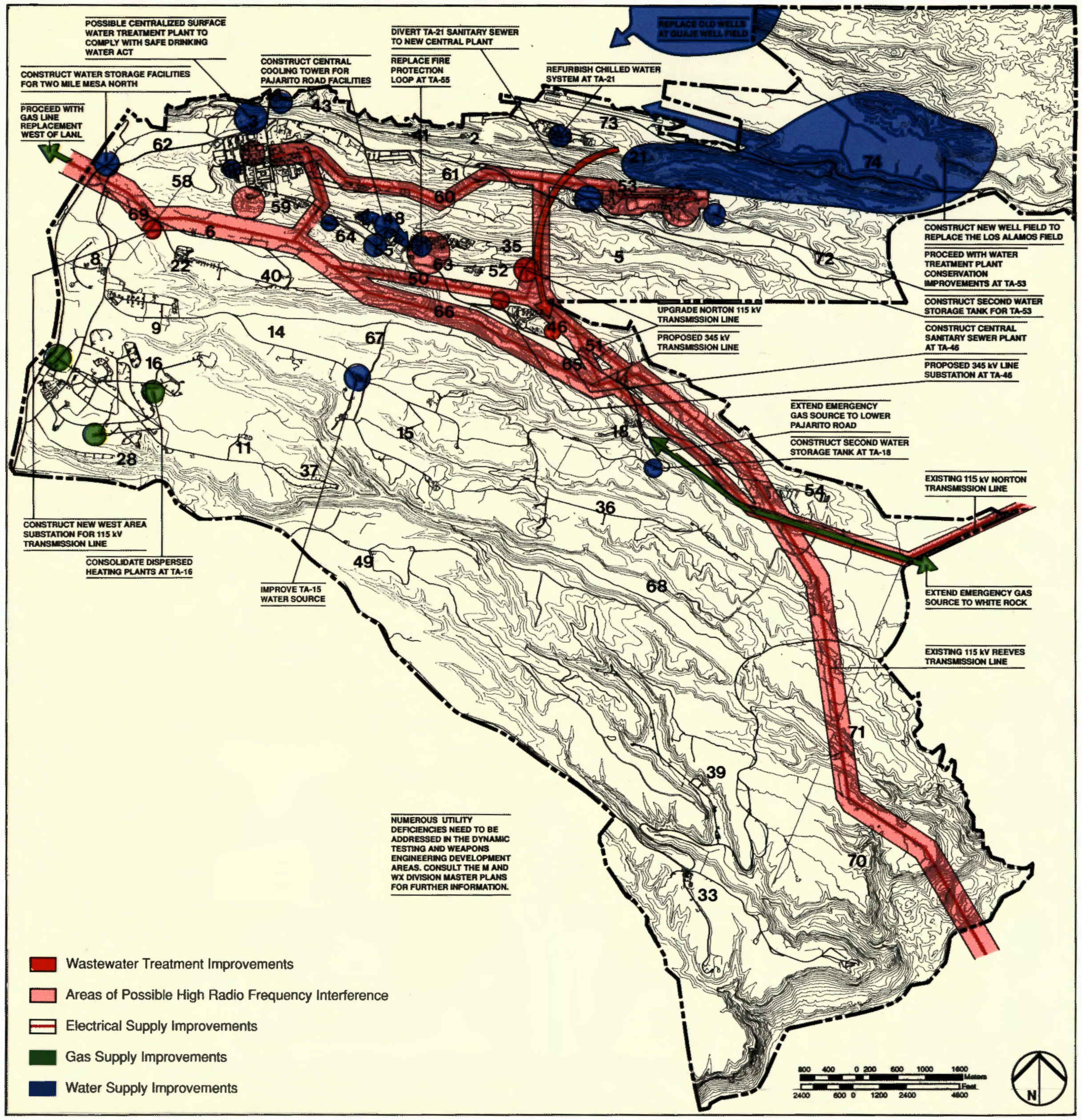
Utility issues at the Laboratory are both Laboratory-wide and utility-specific. The general Laboratory-wide utility issues are discussed below followed by individual systems issues.

- Utility lines have been installed throughout the Laboratory as required. This seemingly haphazard siting of utilities has resulted in a maze of tangled utility lines. As a result, high development costs occur when utilities must be relocated for construction of new facilities. By locating utilities only in corridors planned to accommodate future expansion and planning developments accordingly, the Laboratory would be able to grow efficiently and to better achieve its mission.

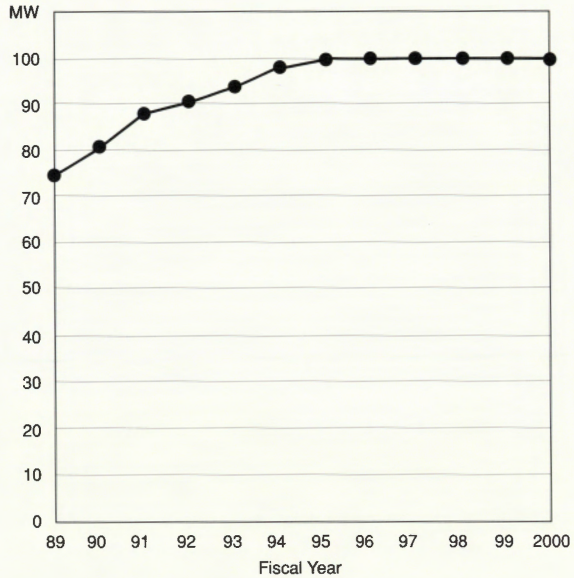
- The existing layout and size of the Laboratory has resulted in the decentralization of utility systems and service. This decentralization has resulted in reduced efficiency and increased costs. Focusing growth in development areas serviced by major utility corridors and providing infrastructure in areas projected to grow would permit the cost-efficient and effective development and maintenance of the utility system.

- The incremental nature of development at the Laboratory along with programmatic changes has resulted in the piecemeal retrofitting of utilities to accommodate expansion. This has been excessively expensive, energy inefficient, and has resulted in utility downtime. Planning and constructing looped utility systems to accommodate needs projected for the expansion of any development site would eliminate the costly and inefficient retrofitting of systems.

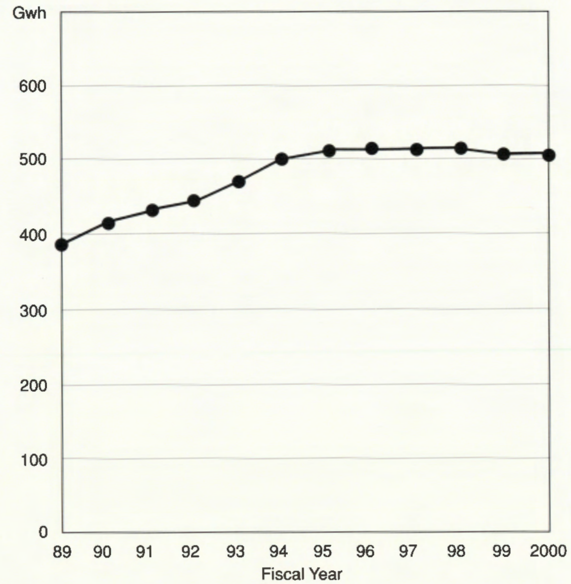
*Utilities Planning Initiatives*



Electrical Capacity Requirement




Annual Electrical Use




- The Laboratory's major utility systems are aging. Deterioration of these systems could cause service disruptions and create safety hazards. Modernizing of the Laboratory's utility infrastructure is therefore important.

**Electricity**

Los Alamos County has contracted to supply the Laboratory with power and ensure that the peak demand can be met. The Laboratory is responsible for transmitting power within the site. The Laboratory's projected peak electrical requirement and annual electrical use are shown on the two graphs above. The instantaneous peak requirement now exceeds 75 MW. The Laboratory's electrical system can accommodate an increased demand. However, external transmission capacity limits the power the Laboratory can receive from external sources. The external transmission capacity will need to increase at least at the same rate as demand if the Laboratory is to continue to function effectively. This increased capacity is especially important as the Laboratory's use of computers increases.

Construction of a 345-kV line proposed by the Public Service Company of New Mexico would increase the transmission capacity available to the Laboratory. The preferred alignment, selected after careful study, will provide the greatest benefit for the least development cost. Reference should be made to the draft Long Range Utilities Development Plan for further information on the alternative alignments considered.

Facility siting must consider the potential effects of the 345-kV line, which include

- The potential for interference to voice, data, radio, and security communications, telemetry, computing facilities, or other sensitive instrumentation;
- The potential impact the new line would have on the safe use of firing devices; and
- The potential effects on personnel, land use, or future facilities in the vicinity of the line.

**Telecommunications**

With much of the Laboratory's existing telecommunications systems operated by outside interests, security of the transmitted information is a concern. As more information is conveyed via telephone the risks increase. The security of lines within the Laboratory is also a concern.

The completion of LAICS will increase control over Laboratory communications resources as all major communications elements, including the switching system, will be on Laboratory property and operated and maintained by Laboratory personnel.

The expansion of Laboratory programs, particularly into those areas currently undeveloped, will necessitate considerable expansion of the telecommunications system.

**Water Supply**

The Laboratory cannot meet projected water demands without providing the following improvements:

- Drilling four Los Alamos Canyon replacement wells and installing well equipment;

- Drilling four Guaje Canyon replacement wells to maintain the production capacity of the well field;
- Drilling of an additional Pajarito Canyon well;
- Constructing new transmission, pumping, and storage facilities at TA-15 and TA-36;
- Providing water storage improvements at TA-53;
- Continuing to perform preventive maintenance on the existing well fields to ensure the long-term reliability of operations; and
- Producing adequate revenues from water sales to defray water production costs.

A major 40-year program is under way to replace the water wells in the three well fields that serve the Laboratory and the residential communities in Los Alamos County. Work is currently ongoing in the Otowi well field as part of this effort. Existing wells are being abandoned as they reach their life expectancy or lose economic yield and cannot be revitalized. Large cooling water systems are the largest water users at the Laboratory. These systems are being converted from potable water to treated waste water through a multiyear program that will result in significant water conservation.

According to Laboratory records, a number of technical areas have potential water shortage problems with respect to fire protection. Technical Area 51 has an inadequate water supply, while fourteen others, TAs 5, 6, 8, 11, 14, 15, 28, 33, 35, 37, 39, 40, 49 and 53, have water supply and/or fire alarm deficiencies.

**Sanitary Sewer**

The Laboratory has begun implementation of the Sanitary Wastewater System Consolidation Project – a central waste water collection system and treatment plant to comply with current state and federal regulations. It will be located near TA-46. This system will serve a majority of the technical areas and eliminate eight old, high-maintenance plants. If the service area of this facility only required gravity transport of waste water, significant economies and efficiency would be realized. Pump stations are costly in terms of energy, maintenance, and potential downtime. Significant developments requiring sanitary sewer service should not therefore be located downstream from the central plant (elevation 7,000 feet). Facilities located in sparsely developed areas should continue to be served by individual systems.

**Radioactive Liquid Waste**

The extent of the Laboratory's radioactive liquid waste system is limited by security and cost considerations. For security reasons the Laboratory has been consolidating the areas using nuclear materials. The significant cost (as much as $800 per linear foot) of installing major radioactive liquid waste collection lines reinforces such consolidation and the clustering of system users.

A major issue facing the Laboratory is the condition of the existing 26-year-old treatment plant at TA-50. While this plant meets EPA discharge requirements, it does not meet the more stringent discharge limits in DOE Order 5400. Furthermore, EPA regulations will require the upgrading of all underground radioactive liquid waste tanks and piping during the next 10 years.

**Natural Gas and Steam Plants**

The Laboratory's natural gas and steam distribution system is aging. Parts of the system are over 40 years old. To pre-empt major replacement expenses, the Laboratory has undertaken an extensive preventive maintenance program that includes an intensive corrosion protection effort.

## Utilities Master Plan

The master plan sets forth strategies for addressing utilities issues at the Laboratory. The proposed Infrastructure Support Facilities line-item projects starting in FY91 will allocate $32.5 million over a five-year period to maintain and improve the Laboratory's utility infrastructure. This will benefit all Laboratory programs by providing the modern utilities required to support state-of-the-art science. Projects to be funded by the line-item include electric lines, gas pipeline, and mechanical systems restoration. This line-item will provide funding that would otherwise be difficult to obtain for these much-needed utilities improvements.

The draft Long-Range Utilities Development Plan proposes major utility corridors for the Laboratory. This Site Development Plan incorporates these corridors and proposes that all future major utility lines be located within them.

### Goal and Objectives

The Laboratory's utilities goal is to *develop and improve utility systems that are efficient and cost-effective in support of programmatic development.* This goal can be accomplished through the following objectives:

- Define, develop, and reserve utility corridors to minimize costs and conflicts with other site improvements.
- Modernize utility systems to provide safe, reliable, and cost-effective services for Laboratory facilities.
- Develop stable funding sources that can be used to modernize Laboratory utilities.

### Policies

The following policies have been proposed to guide the Laboratory's decision making process with respect to utilities.

- Establish utility siting guidelines to provide optimum efficiency and flexibility for future site development needs.
- Develop utility loop systems to provide redundancy and ease of repair.
- Continue coordinating utility planning, design, construction, and maintenance with site planning through one organization, the Facilities Engineering Division.
- Develop incentives for conservation of energy and resources to encourage cost efficiencies.
- Establish alternative funding mechanisms, as possible, to ensure adequacy of utilities for long-range Laboratory programmatic development.
- Promote energy and water conservation and efficiency measures that provide cost containment.

### Recommendations

The recommendations below suggest directions the Laboratory should take in support of its utilities goal.

*General*

- Finalize and implement the Laboratory Long-Range Utilities Development Plan and use it as a guide to prioritize Infrastructure Support Facilities funding.
- Prohibit major utility lines from being installed outside established utility corridors, and encourage development of major facilities along the corridors rather than in remote areas.
- Develop redundant utility systems in all development areas to enhance security, minimize outages, and expedite repairs.
- Establish a capital improvements planning process for utilities improvements.
- Develop technical areas in densities corresponding to available utility capacity.
- Utilize appropriate energy-conscious site design guidelines to reduce heating and cooling costs.

*Electricity*

- Increase electrical system carrying capacity to ensure adequate power for laboratory and computing demands.

*Telecommunications*

- Complete the Los Alamos Integrated Communications System improvements as planned.

*Water Supply*

- Continue water supply system improvements by drilling replacement wells and constructing new transmission, pumping, and storage facilities.
- Increase water supplies to meet fire protection needs at the following technical areas: TAs 5, 6,8,11,14,15,28,33,35,37,39,40,49, and 53.

## Sanitary Sewer

- Complete the sanitary waste water system consolidation project at TA-46. This system will serve a majority of the development areas. The remaining sparsely developed areas of the Laboratory should continue to be served by individual systems.

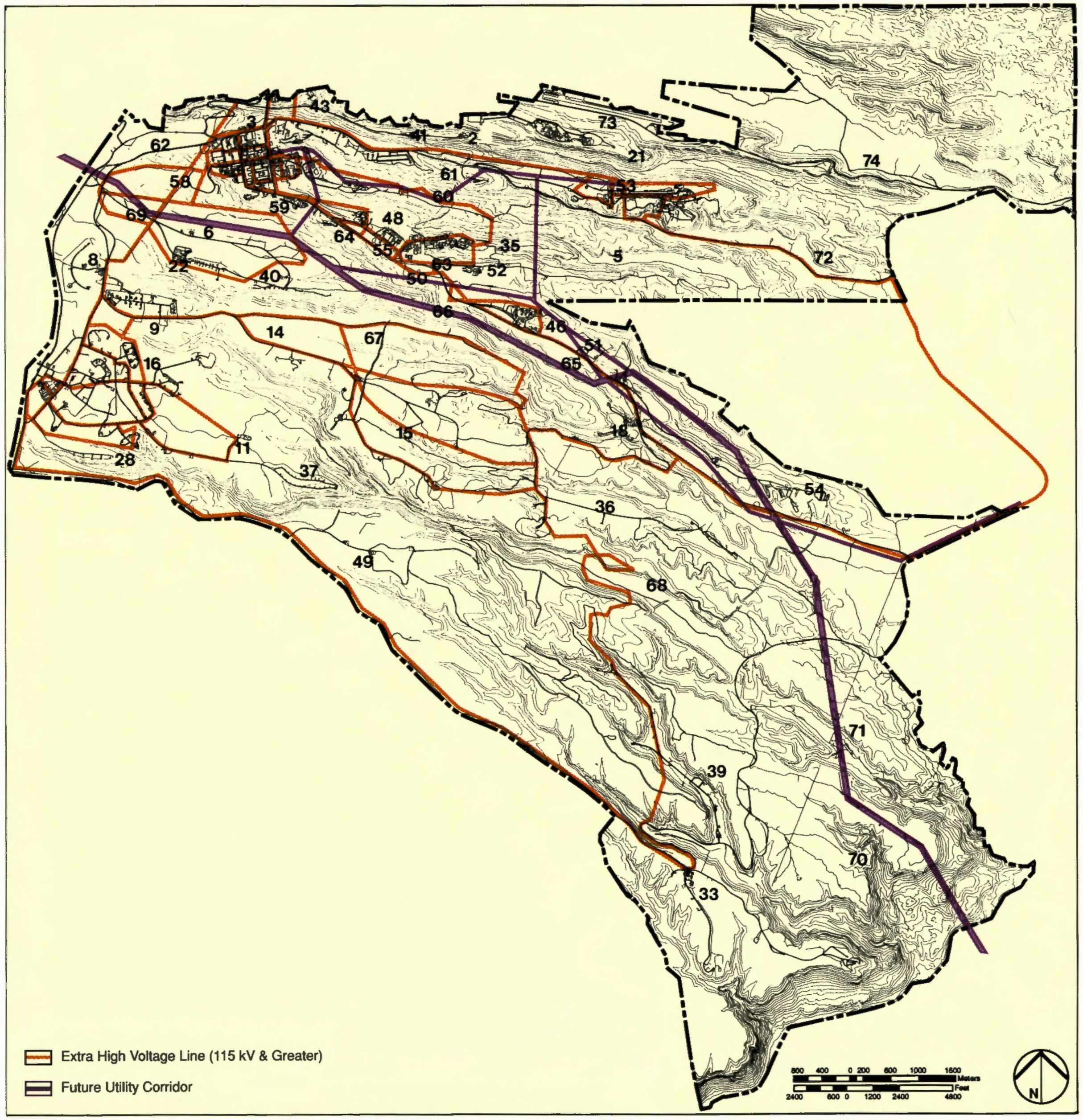
## Radioactive Liquid Waste

- Reserve and allocate lands along the radioactive liquid waste lines for uses specifically requiring such a location to minimize the cost of radioactive liquid waste treatment system expansion.
- Reserve a large site south of Pajarito Road in the TA-50 area for the replacement of the existing radioactive liquid waste treatment plant.

## Natural Gas and Steam Plants

- Continue the rehabilitation of gas and steam lines throughout the Laboratory to pre-empt major replacement expenses.

*Utility Corridor Master Plan*



# Environment, Safety, and Health

## Existing Conditions

The Laboratory has long operated with a commitment to develop state-of-the-art methods for mitigating the impact of its primary work on the environment, both on- and off-site, while maintaining and enhancing the quality of the environment that it controls. The four main areas of emphasis include environmental resources, waste management, safety, and health.

The Laboratory has prepared an Environment, Safety, and Health Long-Range Plan in accordance with DOE Order 5480.1B. This plan contains detailed information about environmental management and the environmental protection program conducted at Los Alamos. The plan also presents specific information about proposed projects that are necessary to maintain and enhance the Laboratory's environment, safety, and health efforts in keeping with the Secretary of Energy's goal of being good stewards of the public's lands.

This planning element summarizes the major points of the Environment, Safety, and Health Long-Range Plan and relates these points to site development planning at Los Alamos National Laboratory. This was accomplished through a review of existing conditions and issues, and an analysis of future environment, safety, and health needs.

Policies and recommendations for improving environment, safety, and health programs are presented in this element. These policies and recommendations have been derived from the planning analysis, and the Environment, Safety, and Health, Long-Range Plan. In this manner the Site Development Plan complements the Environment, Safety, and Health Long-Range Plan.

### Environmental Resources

The land controlled by the Laboratory contains extensive and significant natural and archaeological resources under the Laboratory's stewardship, not the least of which is the land itself. The Laboratory assumed responsibility for these lands during the 1940s. More detailed information and environmental data reference maps are contained in Appendix A.

The Laboratory has established an environmental resource management strategy with three components:

- preservation;
- conservation; and
- restoration.

*Preservation* of the Laboratory's valuable nonrenewable resources requires direct Laboratory action within its borders and a commitment to active preservation of these resources. Resources such as archaeologically important Indian ruins, petroglyphs, and artifacts require active protection. Archaeological surveys of the site enable the Laboratory, in consultation with the State Historic Preservation Officer, to make informed decisions about whether to preserve a site or, if the site is within a construction project, to conduct an archaeological dig.

Invasive or destructive intrusion into these sites is discouraged by posting and fencing the sites, fencing the Laboratory perimeter, and regularly patrolling the perimeter fences. In addition, perimeter patrols decrease game poaching and the illegal cutting of piñon trees in areas where security fences do not limit public access.

*Conservation* of renewable resources is accomplished at the Laboratory through cooperative agreements with many state and federal agencies. The Soil Conservation Service has assisted the Laboratory with conducting inventories of soil types and the development of engineering practices to be used during construction to reduce soil loss and to decrease siltation caused by altering mesa tops.

The New Mexico Game and Fish Department has assisted the Laboratory in annual game inventories and habitat enhancement projects that benefit elk, deer, bear, turkey, and small game. The department, with the assistance of the Laboratory and Los Alamos County, has also begun a program designed to reintroduce beaver to White Rock Canyon, Water Canyon, and Guaje Canyon.

The U.S. Forest Service provides consulting service to the Laboratory through the Department of Energy in such matters as timber management, fire and fuel breaks, and erosion and disease control. The Laboratory also manages its piñon and ponderosa pine forests as part of its efforts to conserve the region's important watersheds and aquifiers.

*Restoration* has rightfully become a high priority not only for the Laboratory, but for the DOE weapons complex and the nation as a whole.The Laboratory has an Environmental Restoration (ER) Program that is now identifying potentially contaminated sites, verifying the presence or absence of contamination, characterizing contaminants, and beginning initial restoration efforts. The first phase study, conducted in 1987, identified over 500 potentially contaminated sites consisting of active and inactive lagoons, septic systems, firing sites, pits, sumps, outfalls, abandoned structures, underground storage tanks, berms, industrial waste lines, landfills, debris areas, and waste management areas. The ER phases to follow will include site characterization as appropriate, feasibility studies, and remedial actions.

## Waste Management

Los Alamos National Laboratory generates two basic categories of solid waste: operational waste and municipal waste. Waste management is considered to be a very important function at the Laboratory. Failure to comply with applicable state and federal laws may result in the shutting down of Laboratory operations.

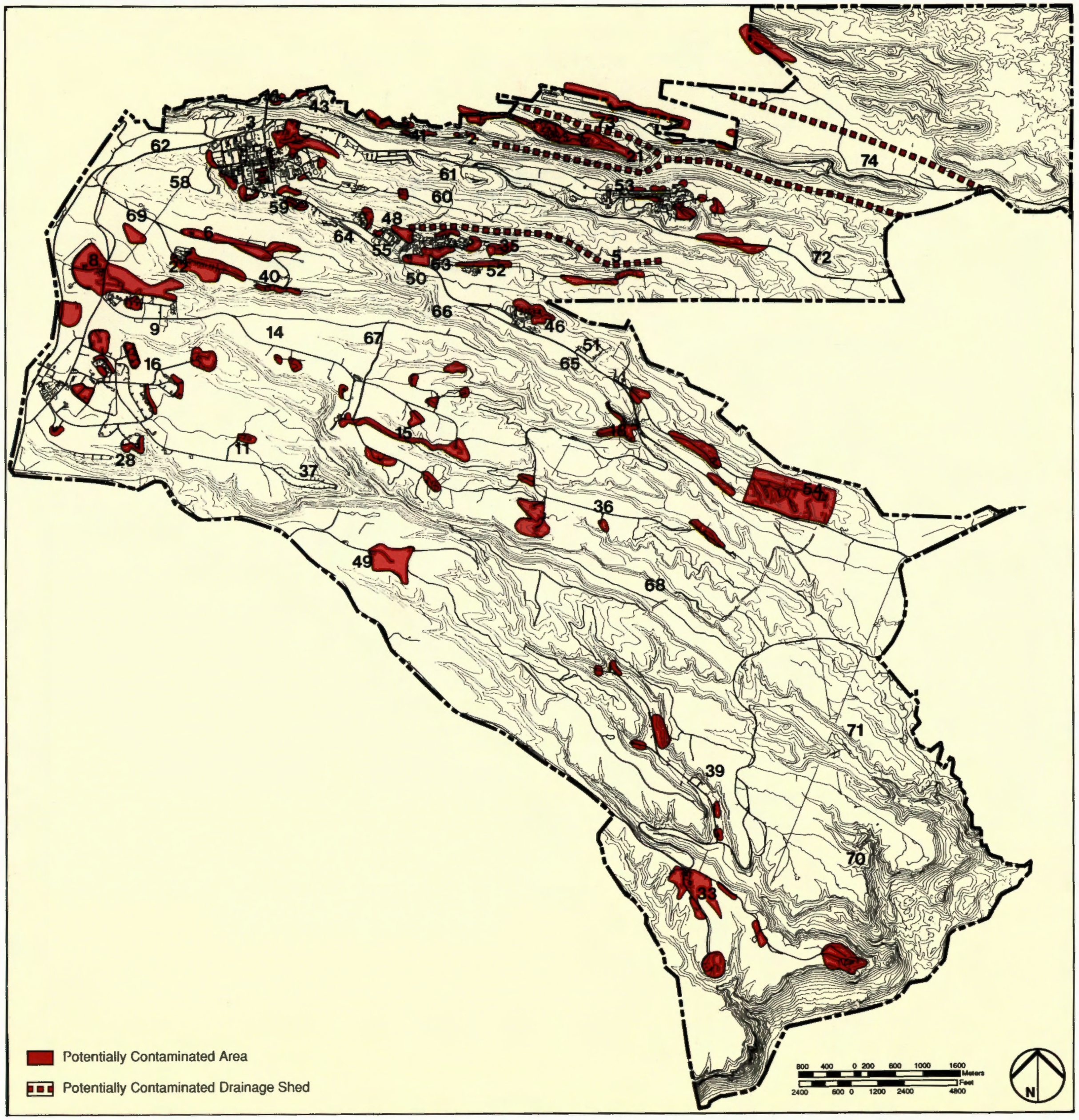
The nuclear programs and the high-explosives programs produce some wastes that are particularly difficult operational wastes to process. These include radioactive, toxic, hazardous, biological, medical, and mixed wastes.

Municipal solid waste is waste that can be legally disposed of in a sanitary landfill. No radioactive waste is disposed of at the sanitary landfill. These wastes are defined in the discussion on future land use zones in the land use element of this plan.

Two kinds of liquid waste are generated by the Laboratory: radioactive liquid waste and sanitary liquid waste. Treatment and handling of liquid wastes is discussed in the utilities element of this plan.

The Laboratory and Los Alamos County share a sanitary solid waste landfill located on site at TA-61. DOE has contracted with Los Alamos County to operate this landfill. This area is valuable in terms of its future development potential given its proximity to TA-3, access to East Jemez Road, and the availability of utilities. As a result, the Facilities Engineering Division has completed a landfill relocation study that evaluated possible new sites for this facility. This study used numerous environmental, economic, social, political and land use criteria to rank 24 potential sites. The study has recommended that two sites be permitted as a new sanitary landfill; these sites are the

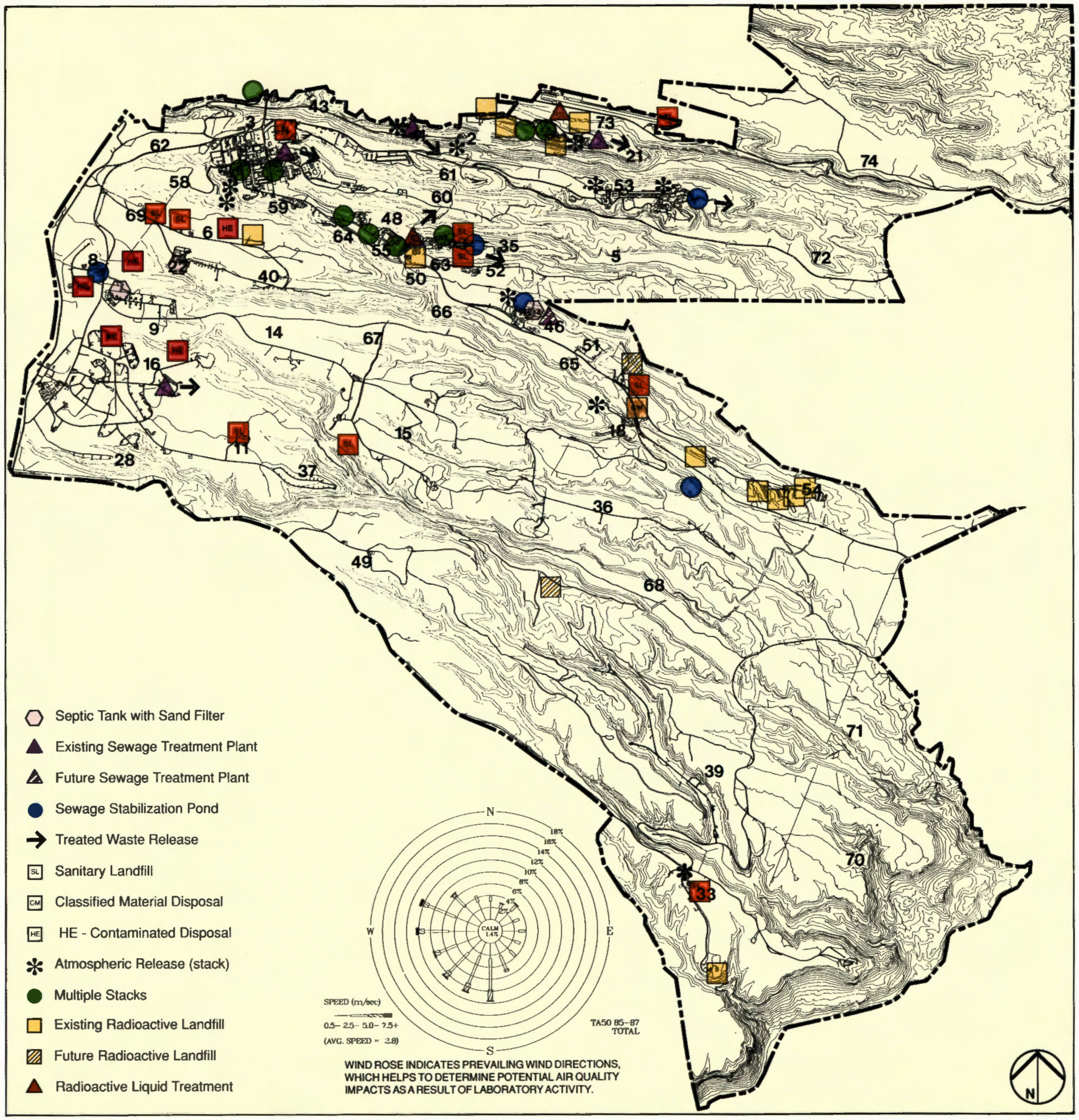
*Potentially Contaminated Areas*



old quarry located on East Jemez Road across from the entrance to TA-53, and the eastern end of Sigma Mesa, TA-60. Together these two sites comprise approximately 70 acres.

The Laboratory operates a low-level radioactive and suspect waste disposal facility at TA-54 on Mesita del Buey. A mixed-waste storage area and a PCB solid waste disposal site also operate at this technical area. The Laboratory has a radioactive liquid waste treatment plant, and a size reduction facility at TA-50.

*Existing and Proposed Waste Facilities*



## Safety

The nature of Laboratory work creates specific and unique safety concerns. Research with high-explosives materials, a broad range of radioactive materials, and other hazardous and toxic materials requires that strict and specific safety precautions be taken at all times. Los Alamos National Laboratory has established a good reputation for researching and establishing safety requirements for weapons, munitions, and other hazardous materials.

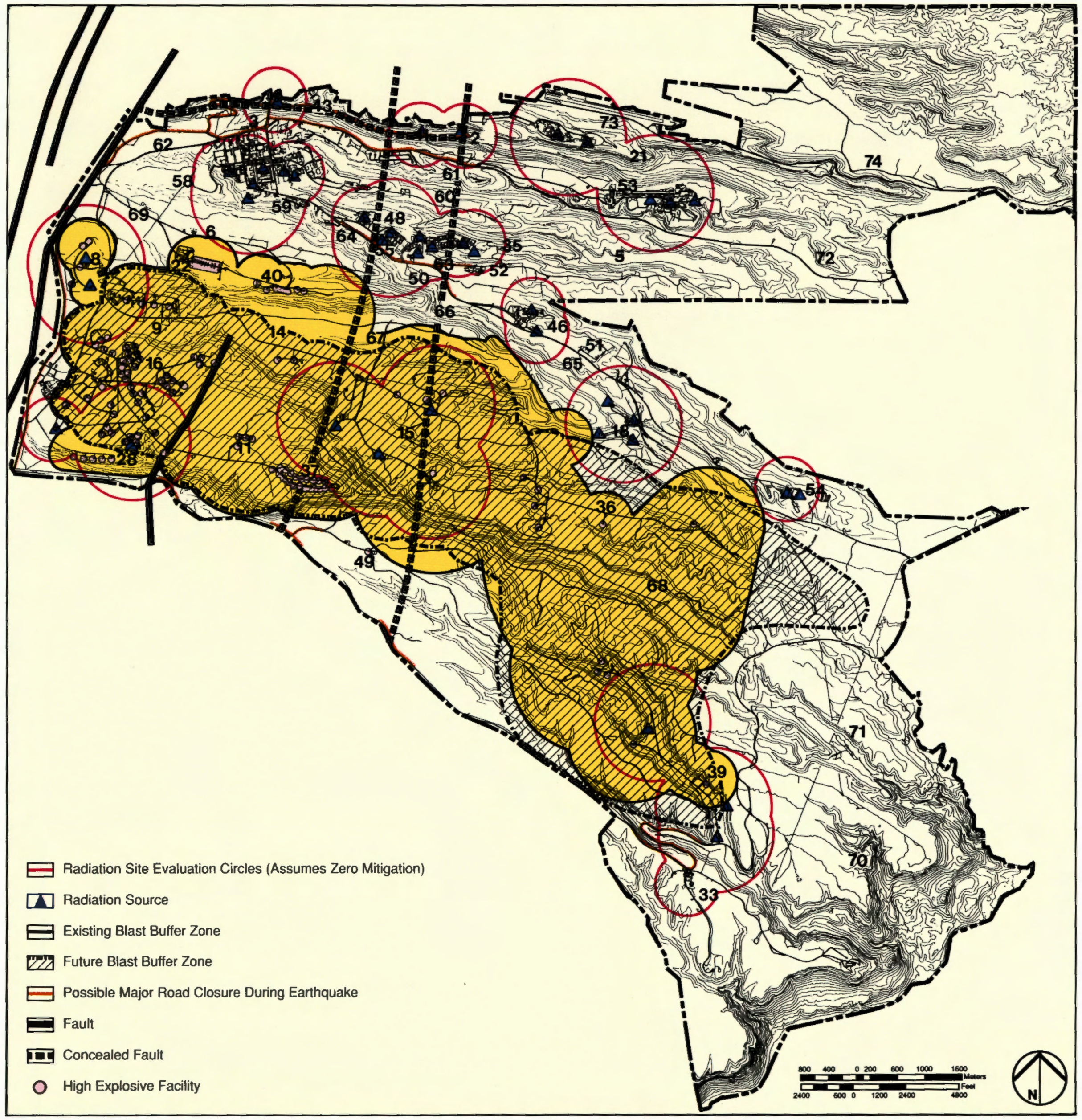
One of the most important safety features used at the Laboratory is the blast fragment hazard buffer zone. The diameters of these zones are based on the quantity of high-explosives located at the facility. Typical buffer zones have a 1,250 foot radius centered on the facility. Other buffer zones are associated with the Dynamic Testing and Weapons Engineering organizations' research, development, and testing facilities.

Where defined buffer zones exist, development is limited to high-explosives uses and facilities occupied only by high-explosives program-related personnel. These zones necessarily consume a great deal of the Laboratory's land.

Radiation is a potential hazard at the Laboratory. Radiation site evaluation circles are based upon preliminary radiation safety evaluations. They provide distance between facilities to protect nonproject personnel from potential radiation exposure resulting from facility operations and potential accidents. These circles encompass large areas and are centered on individual facilities that house sources of radiation. These circles are depicted on potential hazard maps found in each of the development area master plans. There are currently areas such as TA-3 where sources of radiation should be relocated to minimize safety and health risks associated with exposure. It is important to note that the circles assume no mitigation, such as shielding, within the impact area. If a facility is proposed to be sited within a radiation site evaluation circle the potential radiological impacts and possible mitigation techniques must be evaluated and addressed during the siting process.

The Laboratory has an Emergency Response Plan and established methods to respond to safety emergencies. The Laboratory, through Los Alamos County, is served by five fire stations with emergency response facilities. The Emergency Management Office plans for contingencies such as hazardous materials releases and other such emergencies. These plans include notification and cooperation with all federal, state, and local agencies concerning on-site accidents.

*Potential Hazards*



## Health

The Laboratory maintains an environmental surveillance program, as required by DOE. This surveillance program maintains routine monitoring for radiation, radioactive materials, and chemical substances on the Laboratory site and in the surrounding region. The monitoring program implements the Laboratory's goal of protecting the public, the environment, and Laboratory personnel and facilities.

Monitoring and sampling of the environment is organized into three categories: the region at large, the areas adjacent to the Laboratory, and areas within the Laboratory. Air, water, soils, sediments, and foodstuffs are sampled for study. External radiation from cosmic, terrestrial, and Laboratory sources is also monitored. The data gathered are compared with national and local standards, as well as with background levels. Dose calculations and the interpretation of the relative risks associated with Laboratory operations are then determined.

The Laboratory has taken a very active role regarding the health of its employees. An occupational medicine clinic is located in TA-3, which offers a wide variety of job-related employee health services. The Laboratory also strongly endorses good health habits by sponsoring wellness programs which encourage employees to lead a healthy lifestyle.

## Issues/Planning Analysis

### Environmental Resources

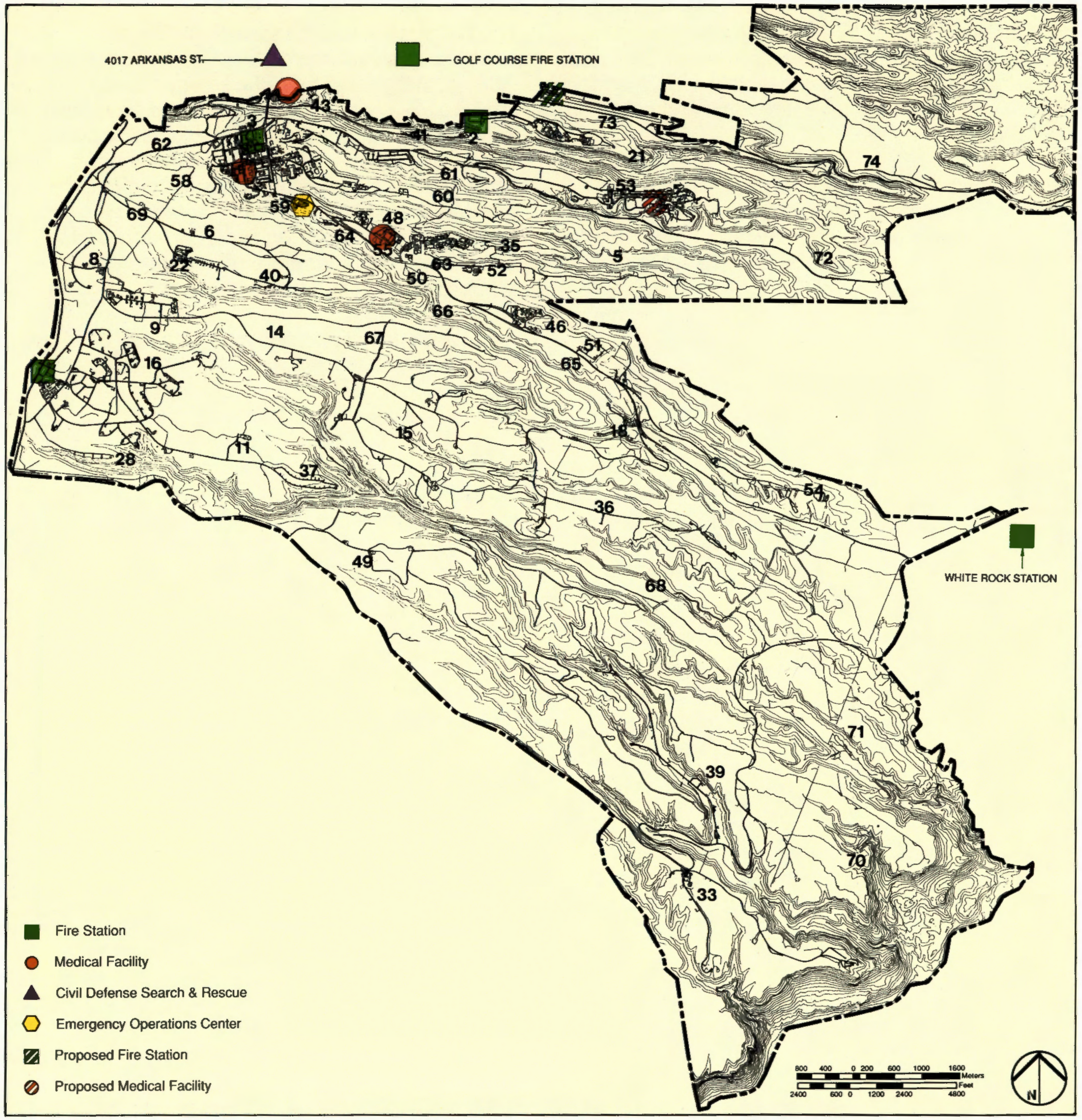
The Laboratory can use its resources in basic and applied research to take the lead in developing methods to clean up contaminated nuclear weapons production facilities in accordance with the Secretary of Energy's mandate to be good stewards of the environment. This leadership could focus on four specific areas:

- The development of new methods to minimize the amount of hazardous and radioactive waste generated at DOE facilities;
- The development of chemical extraction techniques or methods using microorganisms to reduce current environmental and health hazards at DOE facilities including bioengineering of organisms that could neutralize toxic compounds that are already in the environment;
- The development of robotics to reduce hazards to the public and workers involved in the cleanup; and
- The investigation of research technologies used in oil and gas exploration, chemical and laser separation of compounds, soil melting methods, and other innovative heating technologies, to determine if these processes might be adaptable to environmental uses.

### Waste Management

The TA-54 radioactive waste disposal facility will eventually require expansion and/or relocation into an area that shares similar geological and hydrological attributes. The Pajarito Corridor Central Development Sites map proposes one such area

*Existing Emergency Facilities*



near the existing site. TA-49 is another such area. Preliminary siting studies are also being conducted for permiting a RCRA/mixed-waste disposal facility to receive Environmental Restoration and operational wastes.

Consolidation of the Laboratory's sanitary liquid waste water treatment system is under way and will result in the elimination of many discharges. It will be in full compliance with state and EPA regulations.

A new hazardous waste treatment facility is planned for TA-50. This facility will replace and upgrade the facilities and operations that are presently located at TA-54, Area L.

A new radioactive liquid waste treatment plant is proposed at TA-50 to achieve compliance with EPA and state EID regulations. This major line-item project is discussed further in the utilities element and the Pajarito Corridor West master plan.

**Safety**

Zones of potential safety risk are found throughout the Laboratory and are considered constraints to siting new facilities. These safety zones involve the use of radiation, high explosives, and toxic materials such as gases.

The Laboratory's liquid and compressed gas storage facility is located close to areas of TA-3 that have recently experienced an increase in population. This facility should be relocated to a more remote site before the area develops further.

The Laboratory is currently researching the size of blast fragment hazard buffer zones and trying to ascertain whether these zones can vary from the presently defined 1,250 foot radius.

The Laboratory is also researching the size of radiation site evaluation circles, and it is expected that many of them could be reduced upon careful safety analysis. Sources of radiation should be removed from areas where radiation site evaluation circles remain and overlay large populations of nonradiation workers. Sources of radiation should be relocated to areas like the Pajarito Corridor, which is zoned for and is better equipped to handle such activities and to other more remote and less densely populated areas of the Laboratory.

An environmental chemistry building has been proposed at TA-50. Radioactive and nonradioactive samples would be analyzed for compliance with applicable safety regulations in this facility.

Some technical areas do not have a means of secondary access. Specifically, several technical areas (e.g. TAs 35 and 53) only have one point of ingress/egress. This situation can lessen the effectiveness of emergency response or evacuation efforts. Because emergency vehicles can range in size up to a 43-foot fire truck, emergency vehicle access requirements must anticipate the maximum foreseeable need.

Some technical areas, such as TA-18 and TA-15, have inadequate water pressure. In case of fire this deficiency could cripple emergency response efforts. Other technical areas including TAs 8, 33, and 39, have deficient alarm systems, thereby limiting the emergency response team's ability to deal expeditiously with problems.

There are currently many Environmental, Safety, and Health Compliance initiatives of Laboratory-wide importance being implemented. These projects will upgrade and improve existing Laboratory facilities and systems to comply with federal and state environmental regulations. These projects include the following subprojects:

- Establishment of a new RCRA/mixed-waste disposal site, possibly at TA-49;
- Spill prevention control compliance measures (SPCC) at TAs 3, 16, 35, and 57;
- Modifications of the process isotope separation facility at TA-46 to eliminate large volumes of acids;
- A solvent recovery/recycling facility for high-explosives contamination control at TA-16;
- Ventilation improvements at the TA-50 waste process facilities; and
- Replacement of transformer substations containing polychlorinated biphenyls at TAs 2, 3, 9, 15, 16, 21, 33, 35, 48, 50, 52, 53, 55 and 59.

**Health**

The Laboratory environmental surveillance program has concluded that the Laboratory is effectively minimizing adverse effects on health and the environment. These efforts should continue and be strengthened. Environmental regulations will become more restrictive and the Laboratory is committed to meeting or exceeding all such environmental and health requirements.

The annual report, Environmental Surveillance at Los Alamos National Laboratory, covering calendar year 1988, reached the following conclusions:

- The estimated maximum individual dose of radiation was less than half that permitted by EPA standards. The Laboratory's potential contribution to cancer risks within its immediate area was calculated to be less than the cancer risk attributable to natural background radiation.

- The doses from external penetrating radiation, including X-rays, gamma rays, and charged particle contributions from cosmic, terrestrial, and manmade sources measured at the Laboratory, were about 11% of the DOE standard and 45% of the EPA standard for airborne radiation.

- Tested airborne radioactive emissions declined from 1987 due to changes in the operations of LAMPF. Only tritium air concentrations showed any measurable increase resulting from Laboratory operations. Still, annual concentrations were less than 0.1% of the DOE standard, and posed no environmental or health problems.

- Concentrations of radioactivity in treated liquid effluent discharge were well below the DOE standard; however, the discharge of tritium at the TA-53 (LAMPF) lagoons has been on an upward trend. Radioactivity in concentrations above natural terrestrial and worldwide fallout levels was found only in surface and shallow groundwater in on site effluent release areas. These concentrations were below 0.1% of the DOE standard for on site areas. As these waters are not a source of industrial, agricultural, or municipal water supplies, there are no significant effects on the surrounding areas. The potable water supply met all EPA radiochemical and chemical standards.

- Several soil and sediment monitoring locations within the Laboratory, particularly those in canyons, had concentrations of radioactivity slightly higher than those attributable to natural background or worldwide fallout. No monitoring sites outside the Laboratory have had above-background levels of radioactivity. However, small amounts of radioactivity from pre-1964 sediments have been transported from the Laboratory to the Rio Grande during storms. Measurements of Rio Grande sediments indicate that this transported incremental radioactivity is insignificant compared to the natural background radioactivity.

- No foodstuff samples from off-site sources showed radioactivity above background level. Some produce samples from on-site sources showed increased levels of tritium; still, these levels were less than 2% of the DOE standard.

Finally, electromagnetic pulse does not constitute a health problem at the Laboratory because of the absence of experiments that would generate such effects and the remoteness of surrounding populations.

## Environment, Safety, and Health Master Plan

Land use planning must consider the potential effects proposed facility developments will have on the environment and attempt to minimize stress on natural systems. Land use decisions must be made in accordance with government regulations and carefully coordinated with environmental monitoring and restoration efforts. This is especially important concerning the handling, transport, treatment, storage, and disposal of various hazardous materials.

Planning should emphasize minimal impact on ecosystems and maximum concern for public safety. The goals, objectives, policies, and recommendations that follow complement the Laboratory's Environment, Safety, and Health Long-Range Plan. More specific guidance can be found in that document. Current Laboratory environment, safety, and health initiatives are illustrated on pages 76 and 77.

### Goal and Objectives

The Laboratory's primary environment, safety, and health goal is to *continue to protect the environment, the public, and Laboratory personnel and facilities*. This goal can be accomplished through the following objectives:

- Minimize the effect of Laboratory operations on the environment.
- Minimize safety risks to protect Laboratory personnel and the public.
- Minimize the amount of waste being generated by the Laboratory.
- Continue Laboratory health monitoring and regulatory compliance efforts.

### Environmental Resources

The Laboratory has implemented a three-part resource management strategy that can carry it into the twenty-first century. Appropriate preservation, conservation, and restoration activities can enable the Laboratory to continue to accomplish its mission while minimizing its effects on the environment.

*Policies*

- Ensure that siting and design of new facilities and operations minimizes impacts on natural resources on Laboratory lands.
- Avoid or mitigate adverse effects on cultural resources in accordance with state and federal regulations.
- Avoid siting roads, utilities, or other structures on or near potentially contaminated release sites until the sites have been fully characterized by the Environmental Restoration Program and regulatory compliance concerns have been addressed.

*Recommendations*

- Proceed with restoration projects to reclaim lands and improve the environment and decontamination and decommission (D and D) projects to renovate and reuse facilities.
- Provide the safest routes for transporting hazardous materials on and off site.
- Require line-item projects to pay for clean up and upgrade of facilities they replace.
- Implement state-of-the-art erosion control practices as in facility design, construction, and routine maintenance.

### Waste Management

Provisions should always be made to minimize risks to Laboratory personnel and the public when planning facility sites where operational radioactive and nonradioactive toxic wastes are collected, handled, treated, stored, transported, or disposed.

*Policies*

- Ensure that the integrity of waste management facilities (e.g. discharge areas, storage areas, or landfill areas) will not be compromised by the siting and design of new facilities and operations.
- Ensure that waste handling facilities are clearly marked, accessible from service roads, and separated from public traffic.
- Ensure that there are adequate Laboratory waste management facilities to store, treat or dispose of wastes in an environmentally sound manner by coordinating all landfill location and siting efforts.

*Recommendations*

- Adhere strictly to the Laboratory's On-Site Transportation Manual when shipping or transporting hazardous waste, on or off site, so that continued public use can be made of Pajarito Road and other Laboratory roads.
- Implement the recommendations of the Sanitary Landfill Site Locations Study and permit new sites at TAs 60 and 61 as expeditiously as possible.
- Implement Laboratory waste minimization efforts as expeditiously as possible, including a comprehensive recycling program.

- Expand radioactive waste treatment, storage, and disposal functions at TA-54 into adjacent areas sharing similar geologic and hydrologic attributes, such as TA-50 and other developable parcels within the Pajarito Corridor.

- Identify and permit a site for a RCRA/mixed waste landfill.

- Identify a site for disposal of materials that are below regulatory concern (suspect).

- Install redundant spill containment measures for facilities handling radioactive or nonradioactive toxic materials.

- Coordinate and consolidate the siting of various Laboratory landfill and disposal facilities, as permitted by applicable federal regulations, and draft a comprehensive plan for all Laboratory landfill needs.

- Identify and isolate hazardous operating and storage situations by establishing safety buffer zones around facilities.

- Construct the new radioactive liquid waste treatment plant, and the hazardous waste treatment facility at TA-50, and the sanitary waste water treatment plant at TA-46.

- Prepare closure plans for permitted waste management facilities, as required.

**Safety**

Development should continue to integrate safety concerns. All Laboratory equipment and facilities must be designed, constructed, and operated to provide the lowest possible risk within acceptable economic and operational limitations, within applicable laws, and within the context of the work environment. The Laboratory has established safety buffer zones responsive to the requirements of its mission. These buffers should be maintained.

*Policies*

- Continue to consolidate category I &II special nuclear materials into as few sites as possible to enhance safety, reduce costs, and improve security. Similarly, concentrate storage of high-explosives and toxic materials away from areas of high visibility or high population density.

- Design safety buffer zones for safe and effective separation of people from hazardous activities and areas.

- Restrict nonhigh-explosives personnel from working within blast fragment hazard buffer zones.

- Address the nature and potential of radiological risks to personnel and incorporate appropriate mitigation technology when siting facilities within a radiation impact zone.

- Provide at least two ingress/egress routes for all technical areas in case of emergency.

*Recommendations*

- Maintain and encourage Laboratory research into the safety requirements for explosives hazards.

- Complete safety analyses of facilities that are sources of radiation pursuant to DOE Order 5480.1B.

- Consider radiological site concerns during site selection and facility planning efforts in accordance with Division 2 of the General Design Criteria, DOE Order 6430.1A.

- Relocate the liquid and compressed gas plant to a more remote area.

- Provide fire lanes wherever necessary to ensure adequate access.

- Provide emergency vehicle access to all sides of a facility and never to fewer than two sides.

- Limit use of pedestrian/bicycle paths for emergency vehicles unless absolutely necessary.

- Provide secondary access to TAs 35 and 53.

- Construct an environmental chemistry facility.

**Health**

It is imperative that the Laboratory carry out an effective health program.The following policy and recommendations will further Laboratory health and environmental monitoring and compliance efforts as part of the site development process.

*Policy*

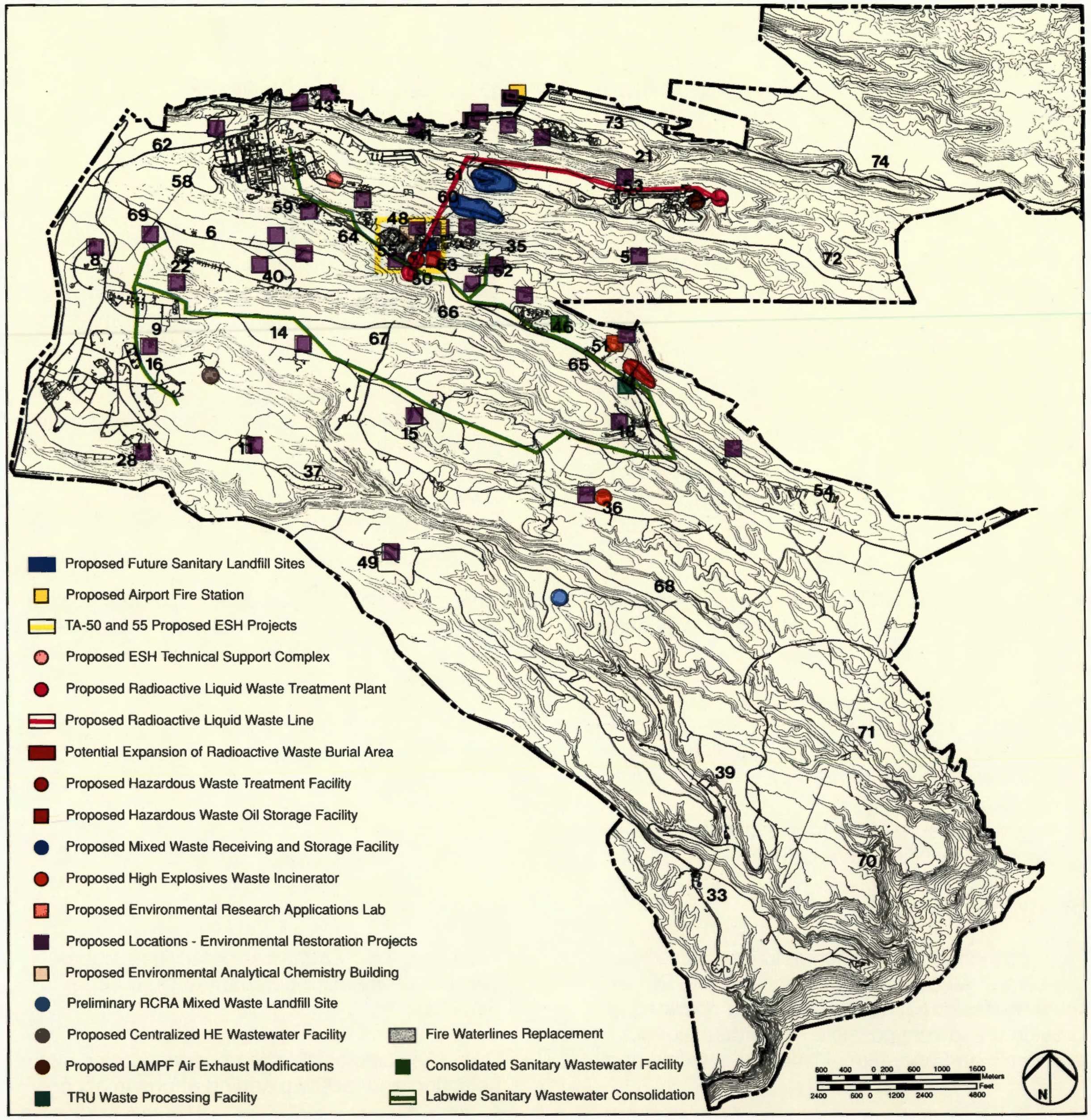
- Ensure that siting and design of new facilities and operations allows the Laboratory to meet environmental guidelines, standards, and other regulatory requirements.

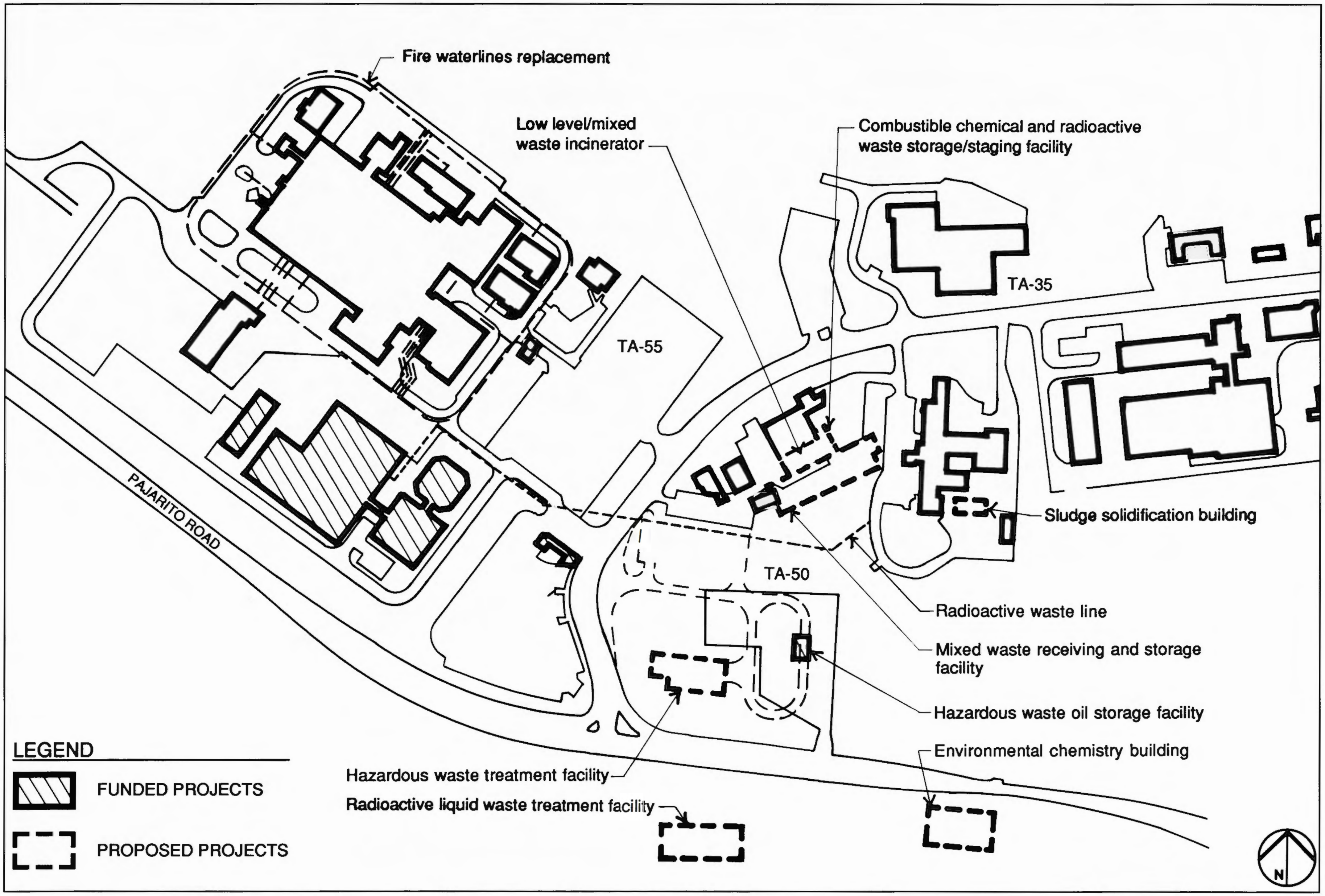
*Recommendations*

- Continue to carry out state-of-the-art health monitoring and surveillance efforts throughout the Laboratory and its facilities.

- Consolidate and improve dispersed wellness facilities to promote employee health.

*Environment, Safety and Health Planning Initiatives*




Fire waterlines replacement
Low level/mixed waste incinerator
Combustible chemical and radioactive waste storage/staging facility
TA-35
TA-55
PAJARITO ROAD
Sludge solidification building
TA-50
Radioactive waste line
Mixed waste receiving and storage facility
Hazardous waste oil storage facility
Environmental chemistry building
Hazardous waste treatment facility
Radioactive liquid waste treatment facility
LEGEND
FUNDED PROJECTS
PROPOSED PROJECTS
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# DEVELOPMENT AREA MASTER PLANS

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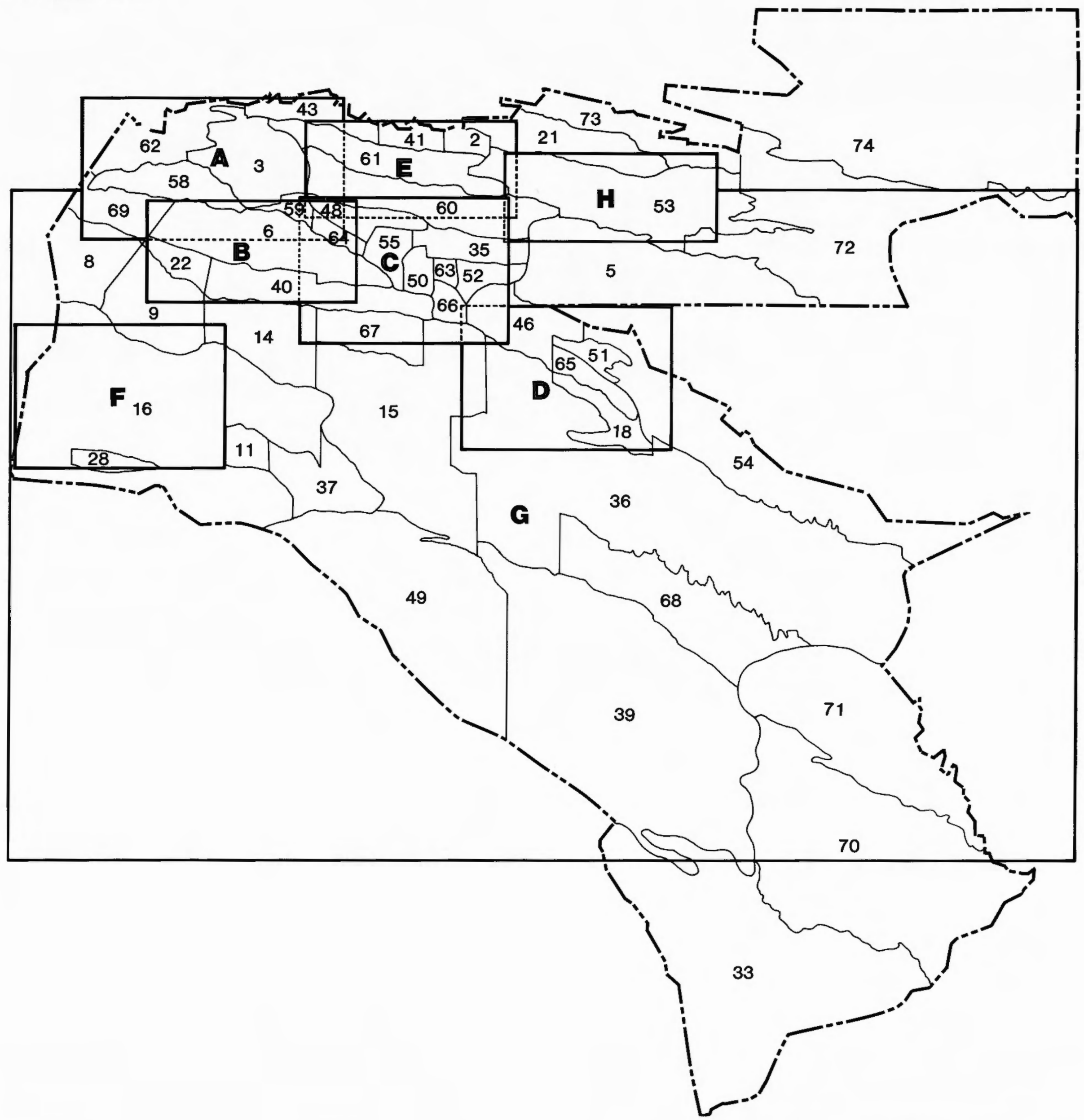
# DEVELOPMENT AREA MASTER PLANS

## Development Areas

*Development Areas*




The Site Development Plan has identified the following eight development areas within the Laboratory.

A: Core Area and Two-Mile Mesa North (TAs 3, 43, 58, 59, 62)

B: Two-Mile Mesa South (TAs 6, 22,40)

C: Pajarito Corridor West (TAs 35, 48, 50, 52, 55, 63, 64, 66)

D: Pajarito Corridor Central (TAs 18, 46, 51, 65)

E: East Jemez Corridor and Sigma Mesa (TAs 2, 41, 60, 61)

F: Weapons Engineering (TA-16)

G: Dynamic Testing (TAs 8, 9, 14, 15, 22, 36, 39, 40, 67, 68)

H: LAMPF (TA-53)

Together the development areas account for 93% of the total Laboratory population, 93% of the total facility net square footage, and approximately three-fifths of the total Laboratory land area.

In the Laboratory planning model, (page 3) the Core Area, remains as the Laboratory administrative and functional center. Three main development corridors emanate from the Core Area, each with its own major programmatic emphasis and unique characteristics.

Master plans for each of the eight development areas follow. Each master plan reviews existing conditions; identifies opportunities and constraints to development; discusses future land uses and facilities; and addresses transportation/circulation, security, utilities, and environmental,safety, and health, issues.

A development sites map for each development area identifies opportunities for new construction or redevelopment. The accompanying development sites evaluation tables detail site characteristics, development possibilities, and associated constraints.

## Core Area and Two-Mile Mesa North (TAs 3, 43, 58, 59, 62)

The Core Area and Two-Mile Mesa North Development Area contains the Laboratory's major concentration of administrative staff and facilities. The technical areas included in this development area are

TA- 3: Core Area or central business district;

TA-43: Life Sciences Division (LS) facilities;

TA-58: Two-Mile Mesa North, an undeveloped technical area;

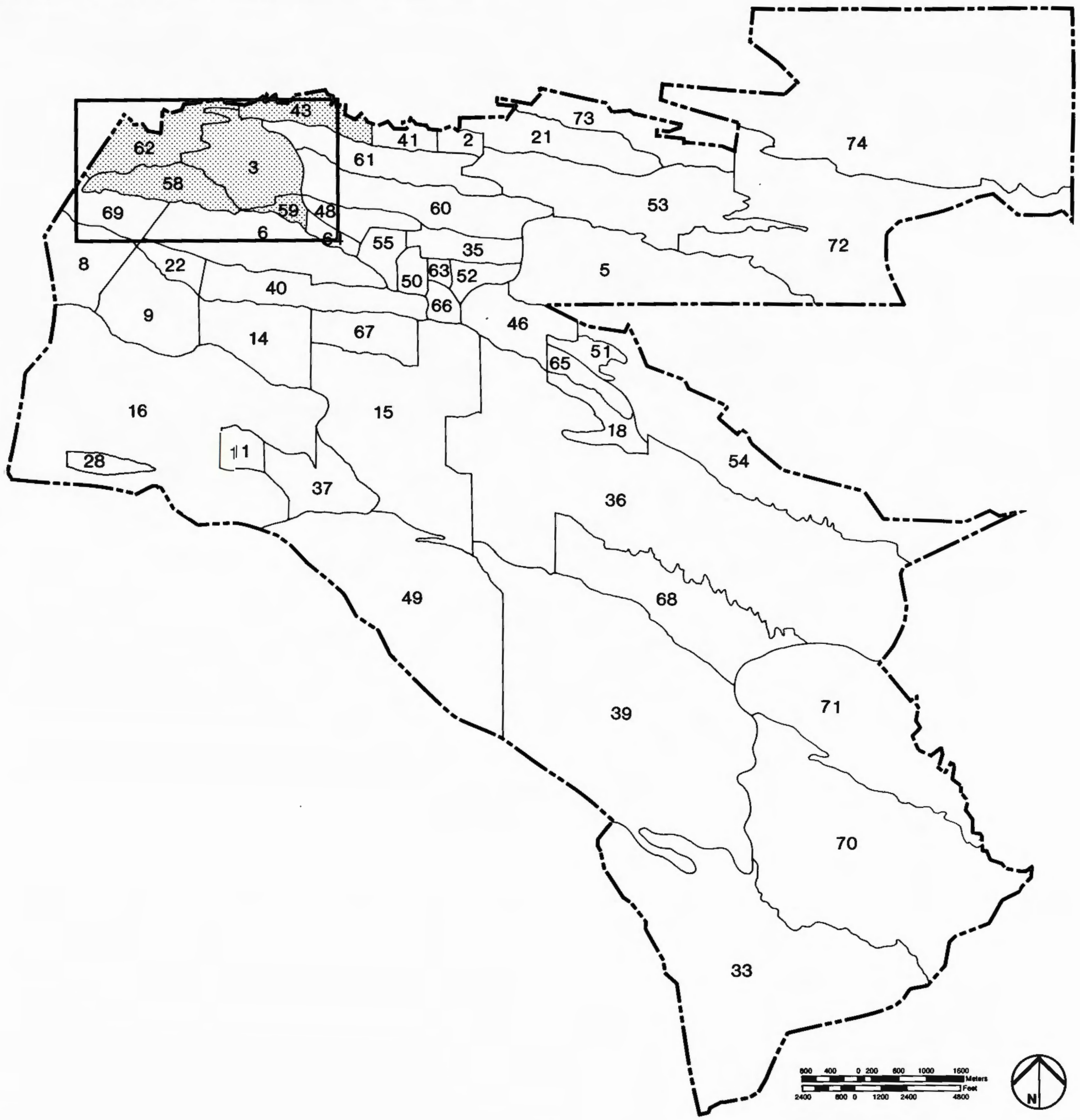
TA-59: Health, Safety, and Environment Division (HSE) facilities; and

TA-62: An undeveloped technical area.

To maintain a consistent scale of maps throughout all development areas (except for this development area and the Dynamic Testing Development Area), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include all portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical areas that make up this development area and not the area defined by the development area map borders.

*Development Area Window for the Core Area and Two-Mile Mesa North*



## Existing Conditions

The Core Area and Two-Mile Mesa North Development Area houses 6,980 employees, or 57% of the total Laboratory population; contains 3.1 million square feet, or about 45% of total laboratory net square footage; and encompasses 995 acres, or 4% of the the total Laboratory land area. The bar chart to the right illustrates the current acreage of each land use in this development area. This chart can be contrasted with a similar one included in the master plan section that shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

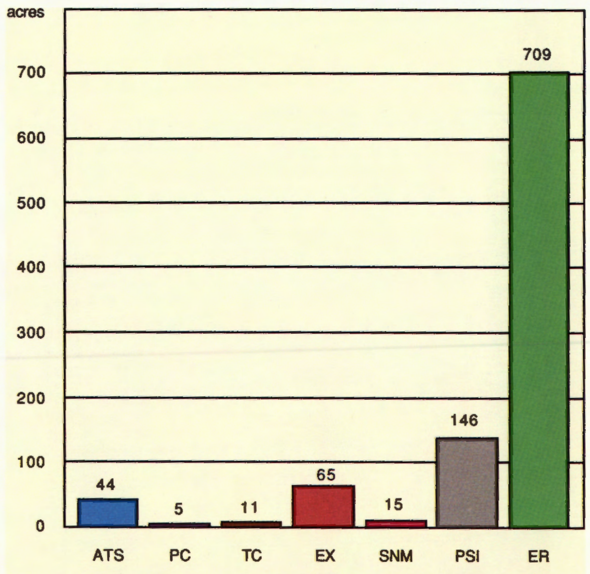
The existing land uses within the technical areas that make up the Core Area and Two-Mile Mesa North Development Area are shown on the existing land use map.

The dominant land uses within the Core Area are as follows:

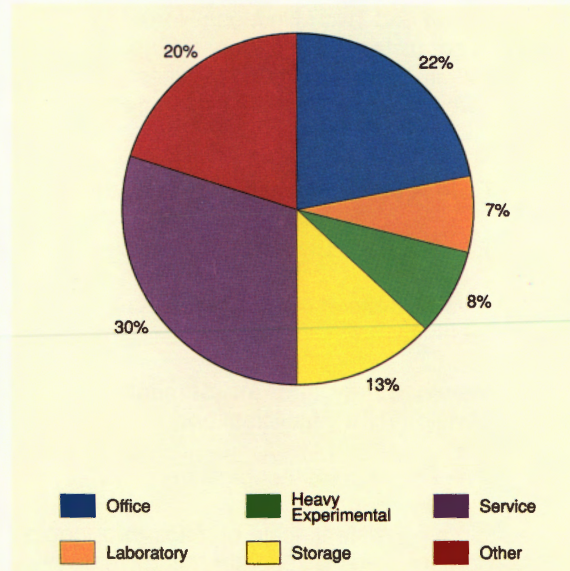
- Administration/technical services;
- Experimental science;
- Physical support and infrastructure;
- Theoretical/computational sciences (including the Central Computing Facility); and
- Special nuclear materials.

The majority of Laboratory facilities and manpower is located in TA-3. This technical area is considered the Laboratory's central business district as it has many similarities to the core area of a city.

*Existing Land Use Analysis*




*Existing Space Categories*




These similarities include high density development, parking and circulation congestion, high land value, the potential for multistory construction, and the opportunity for the redevelopment of some areas.

Two-Mile Mesa North (TA-58) is included in this development area because TA-3 functions are planned to expand to the southwest onto this mesa.

### Trends

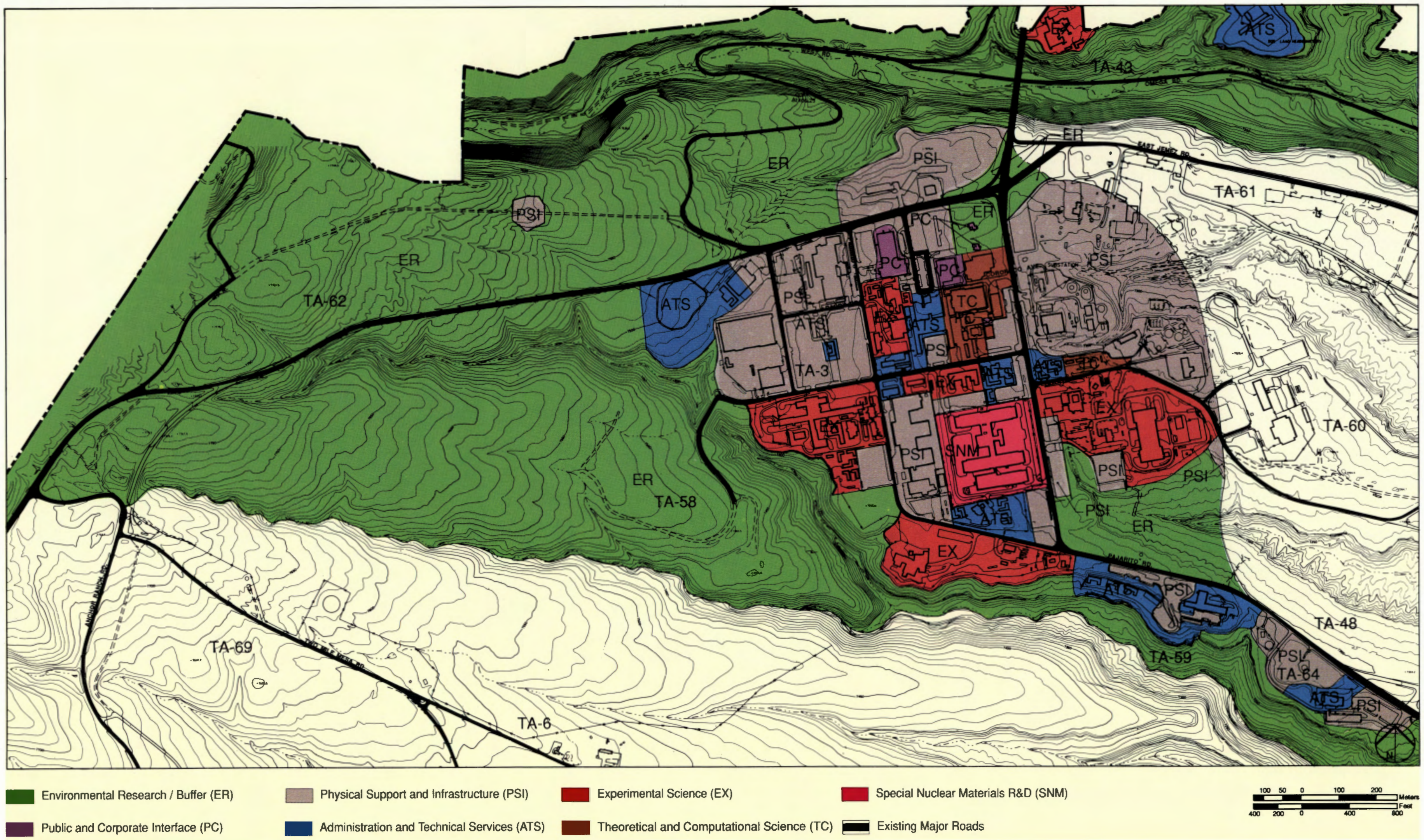
The existing office and storage space shortage in TA-3 has resulted in a proliferation of substandard buildings. Auditoriums and temporary spaces are in high demand in TA-3, and existing wellness facilities are overcrowded and currently housed in transitional structures that are costly to maintain.

The infrastructure in TA-3 needs upgrading. This is particularly true with the transportation network in which severe parking deficiencies, congestion, and vehicle and pedestrian conflicts are commonplace.

The developable land in TA-43 and TA-59 is fully utilized. TA-59 is also experiencing a shortage of permanent space. While the undeveloped lands at TA-62 are presently environmental research/buffer areas, they may accommodate expansion from TAs 3 and 58 over the long term.

The main complex at TA-43, building HRL-1, is an old structure, poorly suited to modern life sciences research. Consequently, large sums of money have been spent numerous times to upgrade space and the building's utility systems. Inadequate space has led to the siting of many temporary buildings around HRL-1 thereby exacerbating an existing shortage of parking spaces.

*Existing Land Uses*



## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the map on the facing page. Reference page 22 for an explanation of the three levels of constraints.

The development constraints that exist in TAs 3, 43, and 59 mainly involve difficulties inherent in redeveloping existing sites – particularly the cost of relocating or upgrading facilities, roads, and utility corridors. Some radiation sources, radio frequency interference zones, and contaminated sites are also of concern. Two-Mile Mesa North (TA-58) is constrained by moderate slopes but presently lacks only servicing infrastructure. TA-62 is typified by moderate topographic constraints to building facilities and a lack of servicing infrastructure.

Developable areas can be created in TA-3 between existing buildings by relocating roads and parking. Other major opportunities for redevelopment may occur with the relocation of special nuclear materials functions to more appropriate technical areas and the relocation of technical service, physical support, and infrastructure facilities to outlying sites. This will result in the release of many parcels of redevelopable land and reusable facilities that could accommodate any required expansion of administrative and programmatic work in the Core Area.

Significant acreage is available for near-term development and relocation of facilities and land uses to the southwest of TA-3, primarily on Two-Mile Mesa North (TA-58). Technical and physical support facilities can relocate at TA-61 to the east along East Jemez Road and at TA-60 on Sigma Mesa. Development over the long-term can occur at TA-62.

*Opportunities and Constraints*


Severe Constraints
Moderate Constraints
Minimal Constraints
Potentially Contaminated Area
Future Road
Existing Blast Buffer Zone
Fault
Concealed Fault

## Core Area and Two-Mile Mesa North Master Plan

### Future Land Uses

Proposed future land uses for this development area are indicated on the accompanying map. Reference should be made to the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses indicated.

The future land use plan retains TA-3 as the primary administrative center for the entire Laboratory. It is centrally located at the confluence of the three major development corridors. It is also functionally well related to a myriad of ancillary organizations and facilities, such as the Otowi Building, the Oppenheimer Study Center, large auditoriums, and the University House. Were administration to be moved out of TA-3, it is likely that these other functions would have to follow eventually, thereby creating potential funding and security problems.

All special nuclear materials research and development will be moved from the Chemistry/Metallurgy Research Building (CMR) to the TA-55 SNM complex. Fusion science (EX-3) will be relocated to TA-35. These relocations will foster improved safety and security while lessening risks in densely populated TA-3. Administration, theoretical science, and some essential technical computational support functions will be retained in the vicinity of the Administration Building. The public interface area immediately to the north should be expanded and landscaped pedestrian areas incorporated to enhance functional interactions, aesthetics, and wellness activities.

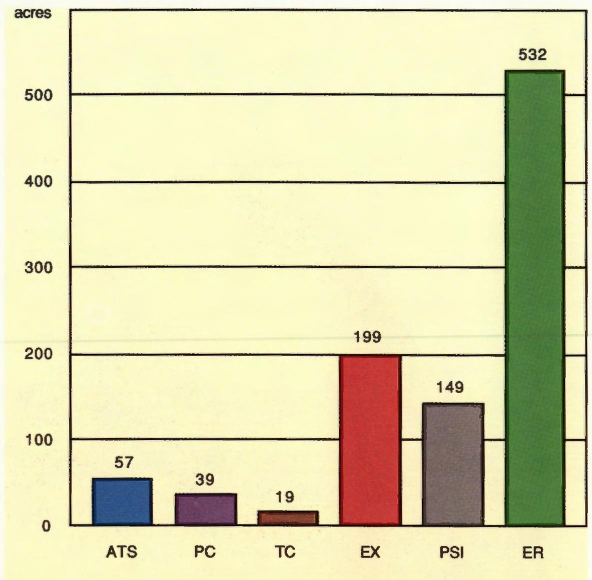
Support services subcontractors, Laboratory supply and distribution, other physical support functions, and some technical services (including the Facilities Engineering Division) will no longer be appropriate for an area experiencing heavy demands for more research, experimental and administration space. These support functions are planned to be relocated to Sigma Mesa and East Jemez Road. The areas vacated and related parking areas could then be converted to experimental science, theoretical/computational science, or public and corporate interface functions, as funding permits.

Two-Mile Mesa North (TA-58) is characterized by gradual to moderate forested slopes. This area is one of the few remaining large sites at the Laboratory that is developable for expanding TA-3 functions. The site should be reserved for multi-use experimental science (EX-4) requiring close functional ties to uses currently expanding at TA-3. Access to TA-58 is provided by the existing canyon crossing from TA-3; however, a western bypass around TA-3 will be necessary in the future to accommodate traffic. Alternate access will be provided from West Jemez Road and Anchor Ranch Road.

Technical area 43 is fully developed and is no longer suitable for the experimental science work undertaken there. The life sciences research located here would be more appropriately relocated to TA-58 as the program expands. Existing facilities at TA-43 could then be adapted for public and corporate interface functions that have close ties to Los Alamos townsite. These changes are warranted given TA-43's proximity to the townsite and its position adjacent to one of the main entry portals of the Laboratory.

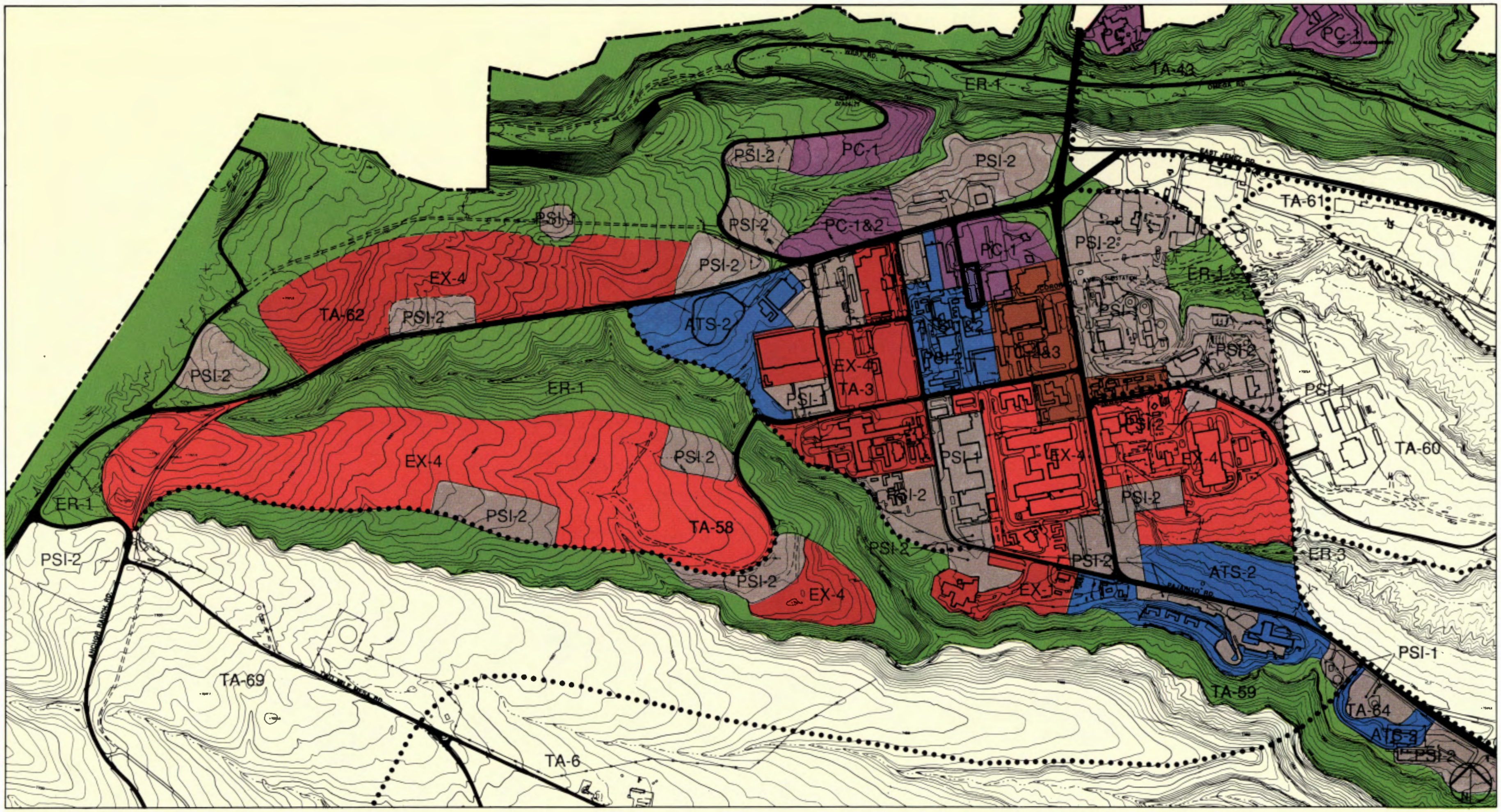
Technical area 59 is fully developed. It is occupied by health, safety, and environment-related technical services. As these functions continue to expand, either geographic dispersal or relocation and consolidation will be required, possibly onto Sigma Mesa with other Laboratory support functions.

*Future Land Use Analysis*




TA-62 (north of West Jemez Road and northwest of TA-3) is currently undeveloped. Future long-term uses for this area include multi-use experimental science, unrestricted public and corporate interface functions, physical support and infrastructure, and environmental research/buffer.

*Future Land Uses*




Environmental Research / Buffer (ER)
ER-1: Security and Safety Buffers
ER-3: Environmental/Cultural Resource Protection and Study Areas

Physical Support and Infrastructure (PSI)
PSI-1: Physical Plant
PSI-2: Transportation and Circulation

Experimental Science (EX)
EX-1: Accelerator Related Technology
EX-4: Multi-Use Experimental Science

Administration and Technical Services (ATS)
ATS-1: Administration
ATS-2: Technical Services

Public and Corporate Interface (PC)
PC-1: Public and Corporate Interface - Unrestricted
PC-2: Public and Corporate Interface - Restricted

Theoretical and Computational Science (TC)
TC-1: Theoretical/Computational Research - Unclassified
TC-2: Theoretical/Computational Research - Classified
TC-3: Computational Facilities and Support

Existing Major Roads

Future Circulation Improvements

### Future Trends – Population and Facilities

Although the Laboratory's projected long-term net growth rate may be up to 1%, Core Area growth is projected to be significantly higher. This is due to a higher demand for office facilities and space at the Laboratory's center. New facilities currently being planned, funded, or under construction reflect this trend. Since 1986, the percentage of Laboratory workers housed in office space has increased by about 13%. It is anticipated that space usage will change as office and laboratory space use increases, while the amount of storage, heavy experimental, other space, and service areas decrease or remain steady.

The major proposed facility improvement in the Core Area is the Material Sciences Laboratory. The Materials Science Laboratory is a funded FY88 project that will provide an enhanced ability to respond to emerging national security program needs. It will accommodate visitor programs with other governmental institutions, universities and industry. It will enable the transfer of materials technology expertise from the weapons programs to industry and the academy. The project will be located in the nonsecure southeast area of TA-3 a developing materials science complex. The two-story structure will house laboratory, heavy experimental, office, and support space. The project also includes infrastructure upgrades such as a large parking lot in the southeast section of TA-3.

### Development Sites

The development sites map identifies sites in the Core Area and Two-Mile Mesa North Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.
- "Future parking" sites are best suited for parking needs of future buildings.
- "Buildings to buildings" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.
- "Parking areas to buildings" means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects, and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

*Recommendations*

- Move physical support and technical service functions out of the Core Area. Redevelop and fill in with administrative, theoretical/computational science, experimental science, and public and corporate interface functions.
- Design facilities within the Core Area to be a minimum of two stories and able to accommodate additional stories as needed.
- Relocate TA-43 functions to Two-Mile Mesa North and renovate TA-43 for public and corporate interface functions; relocate functions at TA-59 to the Sigma Mesa Technical Support Complex, and renovate TA-59 for experimental science functions.
- Relocate SNM and other hazardous activities to more appropriate locations in the Pajarito Corridor that are more remote and less densely populated.
- Prepare a site-specific master plan for the Core Area to address future planning needs for all users of this area.

| Undeveloped Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 1 | 60 ac | Controlled/ Limited | EX-4 | Two-Mile Mesa North (TA-58) is the major expansion area for the Core Area. It is suitable for small-scale multi-use experimental science that has close functional ties to the Core Area, (i.e. life science/human genome research, Physics Division consolidation, or earth/space science expansion. TA-58 requires major infrastructure improvements. Moderate topographic constraints will add to site development costs. A utility corridor bisects the site. |
| 2 | 6 ac. | Controlled | EX-4 | Future site for small-scale multi-use experimental science with close functional ties to the Core Area. This site is partially within a radiation impact zone from the Van de Graaff accelerator that may necessitate shielding of facilities constructed within the zone. |
| 3 | 4 ac | Controlled | EX-4 | Future site for an isolated nonsecure multi-use experimental science facility. Future alignment for the proposed 345-kV line runs through this site. A high radio frequency interference area would be associated with the 345-kV line. |
| 4 | 42 ac. | Buffer | EX-4 | TA-62 is partially developable for multi-use experimental science having minimal access restrictions. This TA is a possible long term expansion site for the Core Area. The northern and western portions should remain as buffer areas. Moderate topographic constraints will add to site development costs. |
| 5 | 5 ac. | Buffer | PC-1 | Future site for a temporary/transitional facilities park that could be used for public and corporate interface and technology transfer activities with minimal access restrictions. A utility corridor runs through the eastern edge of the site. |
| 6 | 3 ac. | Controlled | PC-2 | Future site for public and corporate interface activities that require restricted access and close functional ties to the Core Area. Moderate topographic constraints will add to site development costs. |
| 7 | 5 ac. | Controlled | ATS-2 | Future site for expansion of technical services (such as wellness center) uses. Located adjacent to existing Wellness Center. A utility corridor bisects the site. Potential contamination may impose constraints to development. |
| 8 | 1 ac. | Controlled | EX-1 | Future site for expansion of SM-316 functions. Site is partially within a utility corridor. |
| 9 | 4 ac. | Controlled | EX-4 | Future site for expansion of a materials science complex. Moderate topographic constraints and the need for improved access will add to site development costs. Potential contamination may impose constraints to development. |
| 10 | 5 ac. | Controlled | ATS-2 | Future site for expansion of technical service functions with ties to TA-59 (HSE). Moderate topographic constraints will add to site development costs. A utility corridor is adjacent along Pajarito Road. Potential contamination may impose constraints to development. |
| Total | 135 ac. | | | |

| Redevelopable Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 11 | 1 ac. | Controlled | ATS-2 | Redevelop SM 142 site for expansion of wellness uses. |
| 12 | 4 ac. | Controlled | EX-4 | Renovate the remainder of SM 30 warehouse for multi-use experimental science. Relocate existing PSI uses to East Jemez Road. |
| 13 | 1 ac. | Controlled | EX-4 | Renovate SM 31 warehouse for PSI office uses. |
| 14 | 4 ac. | Controlled | EX-4 | Renovate the SM 38 site for multi-use experimental science. Relocate existing support services subcontractor administration and crafts to Sigma Mesa. |
| 15 | 5 ac. | Limited | ATS-1 & 2 | Redevelop CTR complex as a permanent location for administration and technical services functions. Alternate land uses in future could include multi-use experimental science or classified theoretical/computational science. |
| 16 | 2 ac. | Limited | EX-4 | Redevelop site for arms control and verification functions. |
| 17 | 18 ac. | Limited | EX-4 | Renovate SM 29 (CMR building) for multi-use experimental science functions. Extensive decontamination and remodelling will be required. |

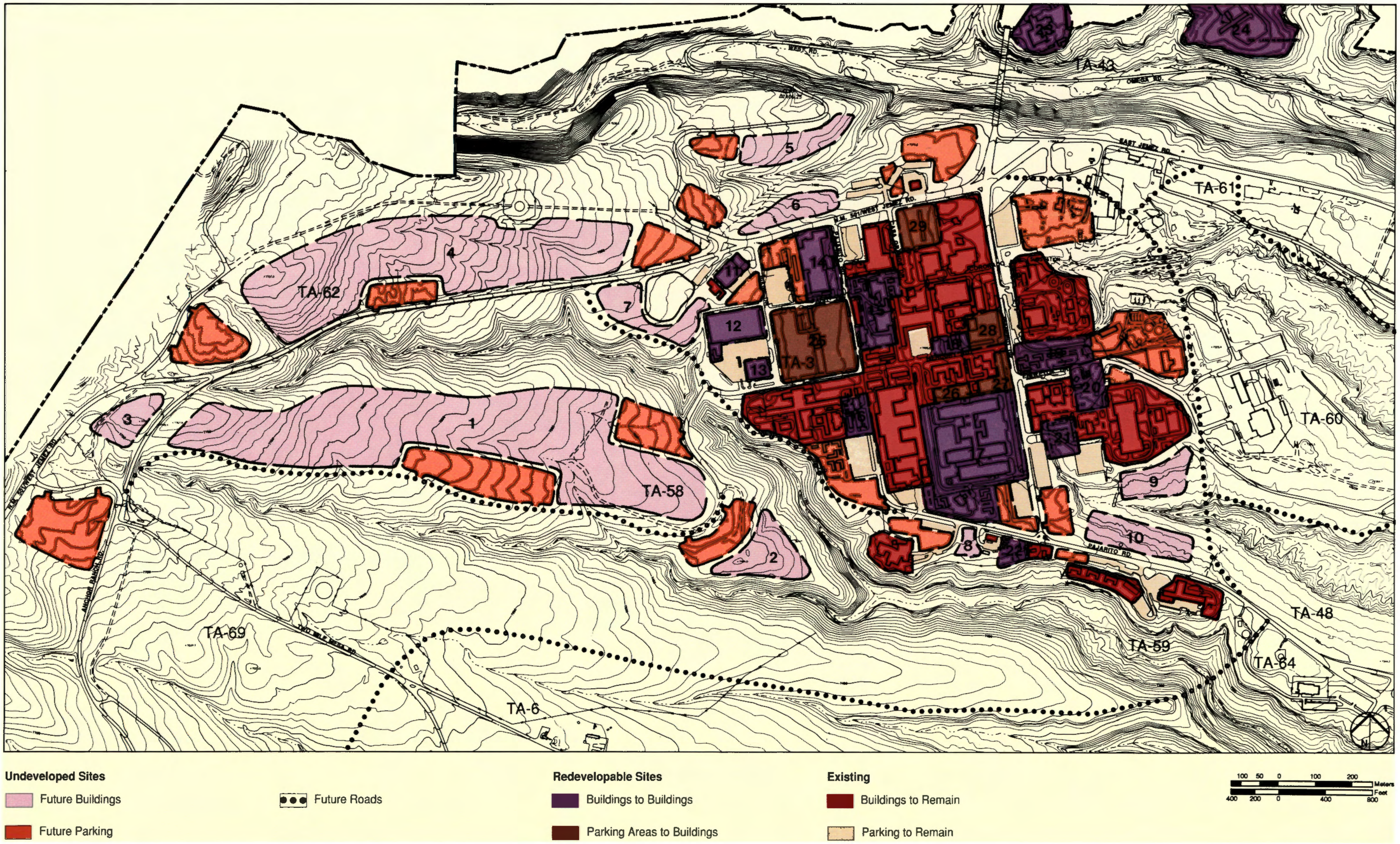
*Core Area and Two-Mile Mesa North Development Sites Evaluation-Continued*

| Redevelopable Sites (Continued) | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 18 | 1 ac. | Limited | TC-2 & 3 | Renovate for expanded theoretical/computational science functions. Remove existing transportables. |
| 19 | 4 ac. | Controlled | TC-1 | Redevelop site for permanent theoretical/computational science facilities. Remove existing trailers and transportables within high radio frequency interference area. |
| 20 | 2 ac. | Controlled | EX-4 | Redevelop site as part of a permanent materials science complex. Remove existing trailers. |
| 21<br>this | 2 ac. | Controlled | EX-4 | Redevelop site adjacent to the funded Materials Science Laboratory as part of materials science complex. Topographic constraints on part of site and access problems will add to site development costs. |
| 22 | 1 ac. | Controlled | ATS-2 | Redevelop site as an expansion area for administration and technical services functions with ties to TA-59. Relocate existing storage yard and trailers. |
| 23 | 4 ac. | Public | PC-1 | Renovate TA-43 (43-1 and related facilities) for public and corporate interface activities with minimal access restrictions. |
| 24 | 8 ac. | Public | PC-1 | Consider future reuse of this site for public and corporate interface activities with minimal access controls. |
| Total | 57ac. | | | |

| Redevelopable Sites - Parking to Buildings | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 25 | 9 ac. | Controlled | EX-4 | Redevelop existing parking lot for expansion of permanent multi-use experimental science functions. Construct replacement parking in the periphery of the TA-3 northwest quadrant. Relocate existing gas station to the motor pool area at TA-60. |
| 26 | 1 ac. | Limited | EX-4 | Redevelop existing parking lot for expansion of permanent multi-use experimental science facilities requiring restricted access. |
| 27 | 2 ac. | Limited | TC-2 & 3 | Redevelop existing parking lot for expansion of permanent theoretical/computational science facilities requiring access restrictions. Partially within high frequency radio interference area. |
| 28 | 2 ac. | Limited | TC-2 & 3 | Redevelop parking lot for permanent theoretical/computational science facilities requiring restricted access. Area is located within a utility corridor. Some parking must remain until the science museum is relocated. |
| 29 | 3 ac. | Controlled | PC-1 | Redevelop parking lot for permanent public and corporate interface activities with minimal access restrictions. Relocate parking to TA-3 periphery. |
| Total | 17 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for explanation of security definitions.

*Development Sites*



**Transportation/Circulation**

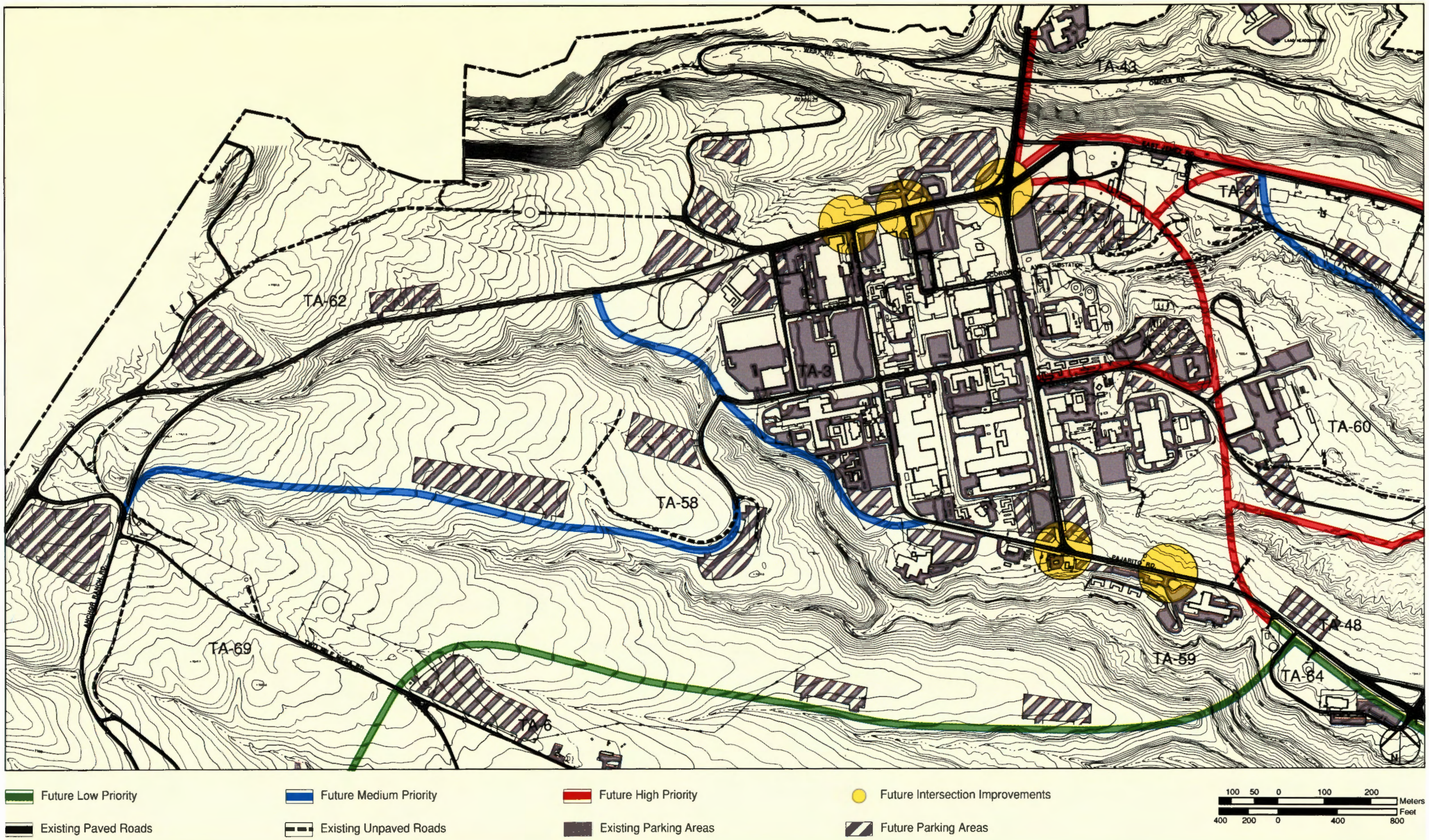
Existing facilities in TA-3 are separated by many roads and parking lots. The relocation of major vehicular circulation and parking to outlying areas north of West Jemez Road and east of Diamond Drive would permit the development of new programmatic facilities in the Core Area and allow it to function as a cohesive unit.

Parking and circulation at TA-43 and TA-59 is severely constrained by continual growth. Existing parking is approaching 85% capacity at TA-43, which means that it is functionally at capacity.

*Recommendations*

- Develop East Jemez Road as the major public access route from the east and reduce public use of Pajarito Road.
- Widen East Jemez from NM 4 to Diamond Drive.
- Construct the five key intersection improvements shown on the facing map, including the Diamond/Jemez intersection, and the entry to TA-59, as near-term, low-cost ways to enhance traffic safety and roadway functioning and capacity.
- Provide an eastern bypass around TA-3. This would divert heavy traffic from Diamond Drive and its congested intersections, improve access to Sigma Mesa, and improve safety and security at TA-3.
- Provide a western bypass around TA-3, diverting heavy traffic from Pajarito Road and its congested intersections, improving access to Two-Mile Mesa, and consolidating limited-security areas at TA-3.
- Widen Eniwetok Drive from Diamond Drive to TA-60 (Sigma Mesa) to accommodate increased growth and traffic in this area and to facilitate further development.
- Improve TA-58 road to allow development of Two-Mile Mesa North.
- Expand peripheral parking lots north of West Jemez Road and east of Diamond Drive to provide much-needed parking in TA-3.
- Cooperate with Los Alamos Medical Center to address TA-43 parking needs for the near-term.
- Relocate life sciences functions or provide necessary additional parking in the long-term as part of line-item and/or GPP projects.

*Existing and Future Transportation/Circulation Improvements*



## Security

Existing security in the Core Area consists of the following:

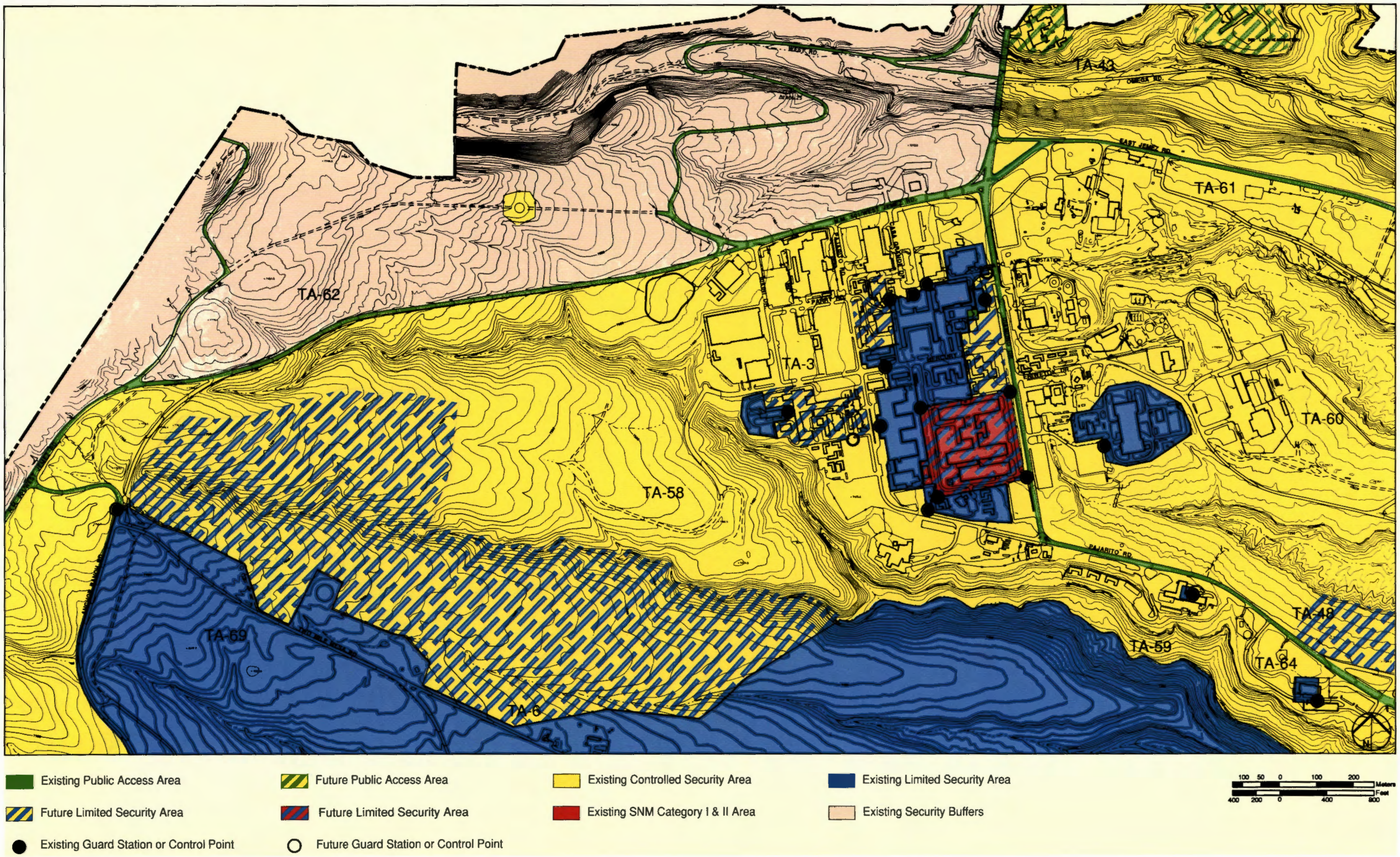
- One special nuclear materials area (CMR Building) bounded by a cohesive limited-security area on the west and north, and a large controlled-security area to the east;
- Two limited-security areas separated from the central limited-security area by public access roads; and
- A large buffer area to the northwest.

The Core Area and Two-Mile Mesa North will primarily remain as limited-security areas surrounded by controlled areas and security buffers. The closure of Pajarito road to public access may be required to enhance and consolidate security. This could only be accomplished with the concurrent construction of a bypass road.

*Recommendations*

- Consolidate the TA-3 limited-security islands into one expanded limited-security area.
- Relocate the existing SNM functions to TA-55 and convert the area to limited security. All programs requiring category I & II SNM security should be eliminated from the Core Area and Two-Mile Mesa North Development Area.
- Develop Two-Mile Mesa North similar to the Core Area with one expandable limited-security area surrounded by controlled-security areas.
- Develop TA-43 into a public access area as current functions are moved to Two-Mile Mesa North.
- Retain TA-59 as a controlled access area with a small internal limited-security area.

*Existing and Future Security*



## Utilities

Utilities in this development area are routed both along all roads and independently within their own corridors. As obsolete lines are replaced, they are being consolidated into the major utility corridors designated in this plan.

TA-3's service area for the radioactive liquid waste disposal system is adequate. The system will continue to be maintained in TA-3 as service warrants. Future connections are encouraged when appropriate and necessary.

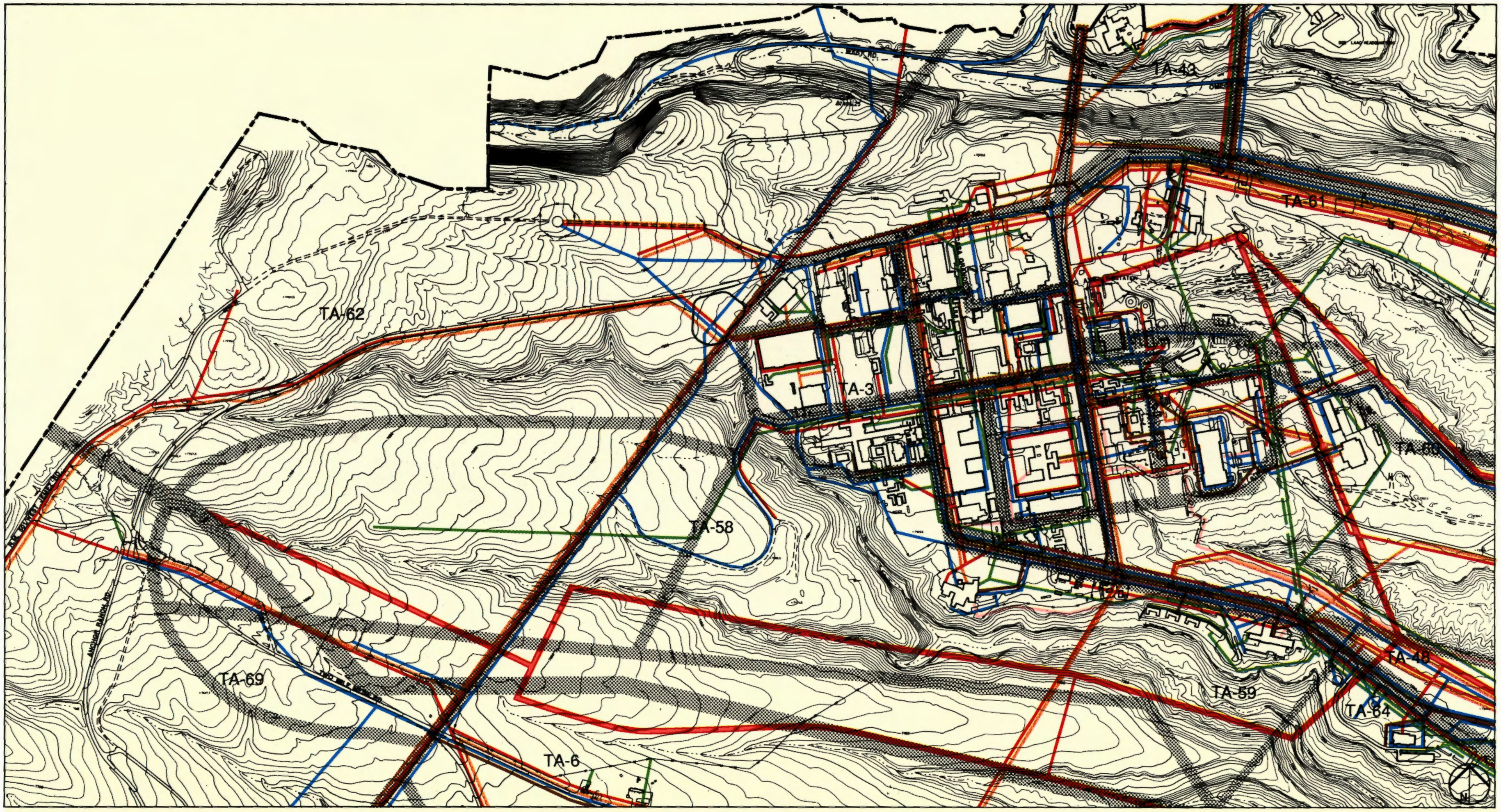
Sanitary waste water treatment facilities in TA-3 are being relocated to the central waste water treatment facility near TA-46.

Development of Two-Mile Mesa North and TA-62 will require a new water distribution system to provide the water pressure and volumes necessary for process uses and fire protection. Additional tanks and pumps will also be required.

*Recommendations*

- Locate facilities requiring radioactive liquid waste disposal line service outside of TA-3 and within the radioactive liquid waste line service area.
- Redevelop the land that will be vacated by relocating the TA-3 sanitary waste water treatment facilities as parking for TA-3.
- Anticipate growth at TAs 58 and 62 and provide necessary water system infrastructure to assure adequate supply and distribution for daily use and for fire protection.

*Utilities and Utility Corridor Master Plan*




| | | | |
|---|---|---|---|
| Major Electric Lines 115 kV | Major Electric Lines 13.2 kV | Major Water Lines | Major Gas Lines |
| Major Telecommunications Lines | Major Sewer Lines | Treated Wastewater for Cooling Systems | Major Radioactive Liquid Waste Lines |
| Future Utility Corridors | | | |

Meters: 100 50 0 100 200
Feet: 400 200 0 400 800

**Environment, Safety, and Health**

There are several areas of probable contamination in this development area that would require remediation before they could be redeveloped. The CMR facility is a large building in one of these areas.

There are seven radiation site evaluation requirement circles centered around six sources of radiation at TA-3 and one source at TA-43. Some of these circles may be reduced upon careful safety analysis. Ultimately such facilities should be relocated to areas where there is less risk of exposure to nonradiation workers, or additional shielding or operating limits may be required. Particular attention must be paid to emanations from building 3-16 (the Van de Graaf Accelerator) and the impact these emanations may have on future facilities and populations at TAs 6 and 58. It would be more appropriate to relocate these facilities along the Pajarito Corridor, at Two-Mile Mesa South, or at isolated places in the Weapons Engineering and Dynamic Testing Development Areas.

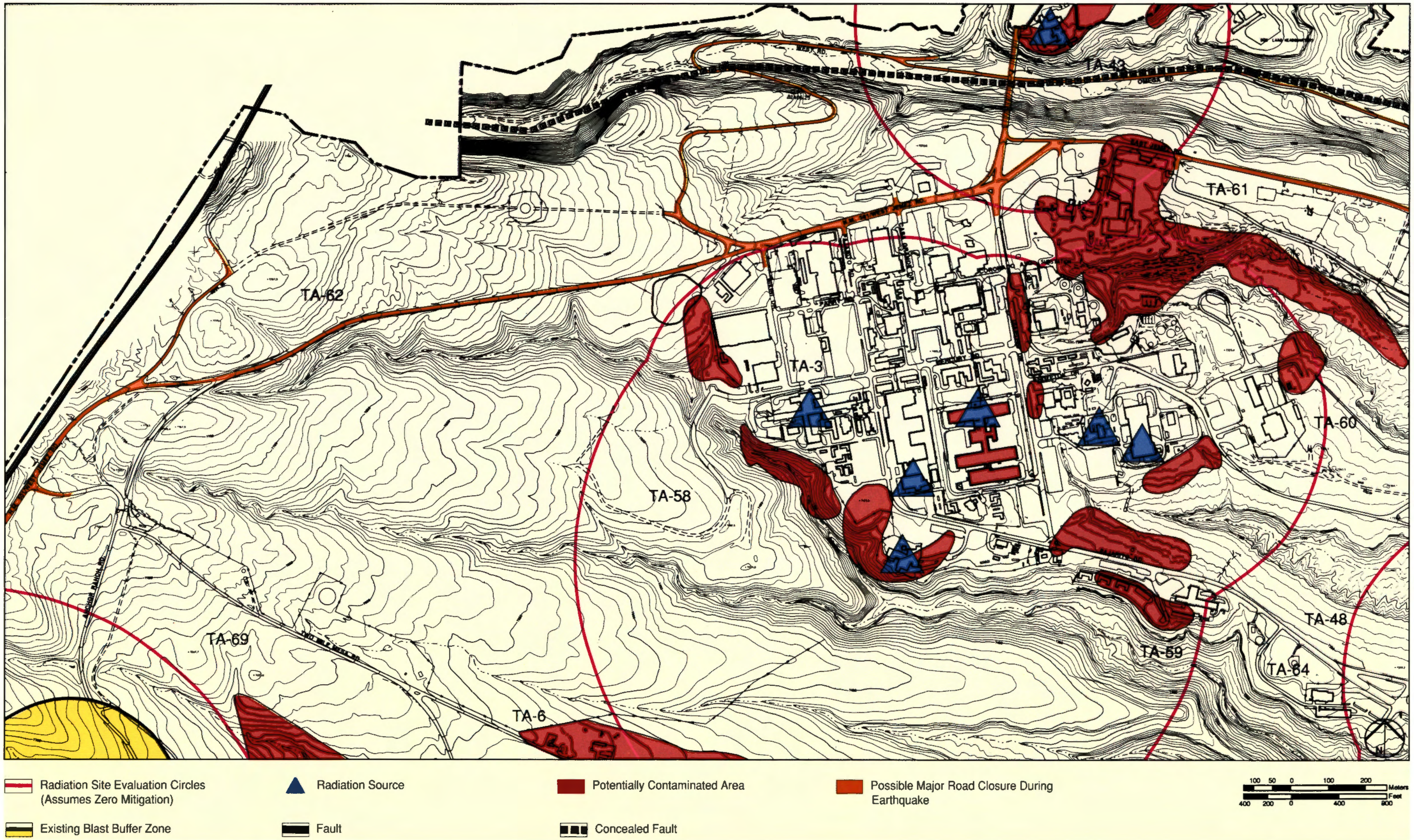
The central Laboratory wellness facility will continue to be located in TA-3, providing health and fitness opportunities for Laboratory employees.

The major Laboratory environmental monitoring facilities, medical facilities, and emergency facilities are located in this development area. The environment, safety, and health technical services functions are also located here and are growing rapidly.

*Recommendations*

- Decontaminate the CMR building for adaptive reuse for other functions and programs.
- Expand and improve wellness center facilities to provide for additional health and fitness opportunities for Laboratory personnel, and for maintenance cost savings.
- Conduct detailed safety analyses for all sources of radiation to determine appropriate size for radiation site evaluation circles. In the future, relocate those sources of radiation determined to be inappropriate for this area by HSE Division to more suitable areas or provide adequate shielding or operating limits to protect nonradiation workers.

*Potential Hazards*



## Two-Mile Mesa South
## (TAs 6, 22, 40)

The Two-Mile Mesa South Development Area has historically been used for high-explosives-related functions and includes the following three technical areas

TA-6: An inactive technical area;

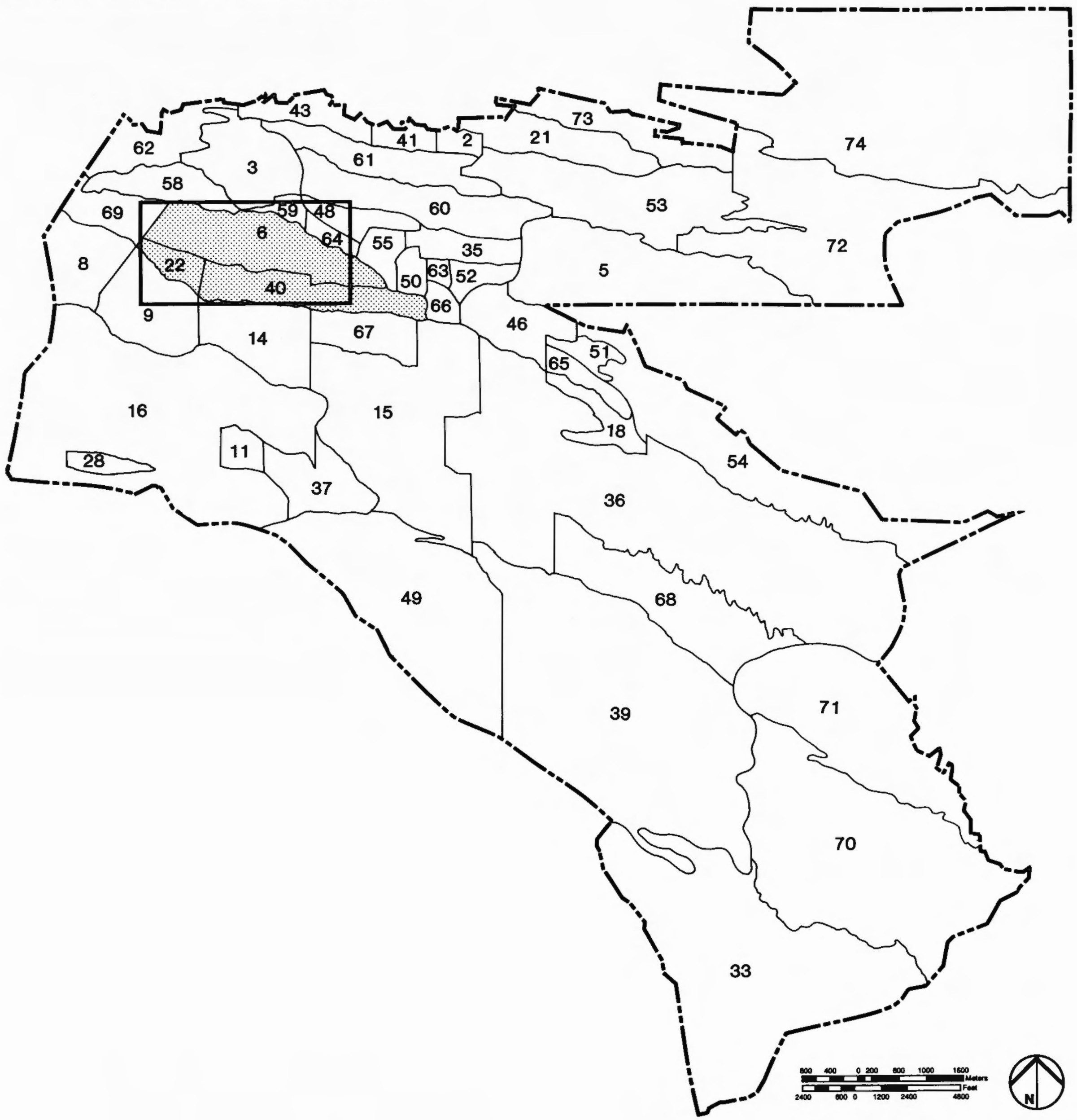
TA-22: Detonator development for high-explosives; and

TA-40: Explosives testing and characterization.

To maintain a consistent scale of maps throughout all development areas (except for the Core Area and Two-Mile Mesa North, and Dynamic Testing Development Areas), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical areas that make up this development area and not the area defined by the development area map borders.

*Development Area Window for Two-Mile Mesa South*



## Existing Conditions

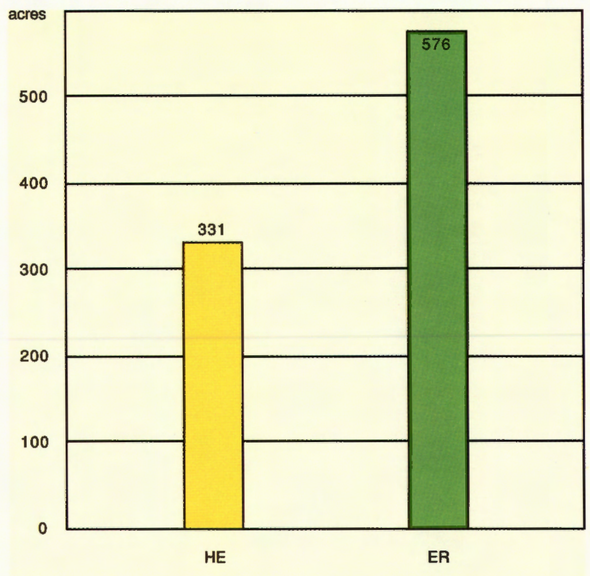
The Two-Mile Mesa South Development Area accounts for 120 employees, or 1% of the Laboratory's total on-site population; 100,000 square feet or 1.5% of the total net facility space; and encompasses 907 acres, or about 3% of the total Laboratory land area. The bar chart to the right illustrates the current acreage of each land use in this development area. This chart can be contrasted with a similar one included in the master plan section that shows the future acreage. Much of the land is designated as environmental research/ buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

The primary existing land use in the Two-Mile Mesa South Development Area is high-explosives research, development, and testing.

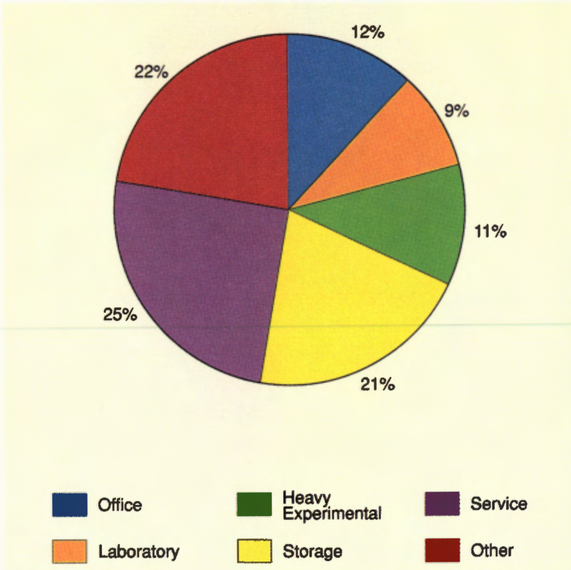
**Trends:**

The Dynamic Testing Division Long-Range Plan proposes the relocation of existing land uses in the Two-Mile Mesa South Development Area in the long-term. Two-Mile Mesa South has a substantial utility system in place. This will allow for the more cost-effective redevelopment of sites in this development area than at other undeveloped sites at the Laboratory.

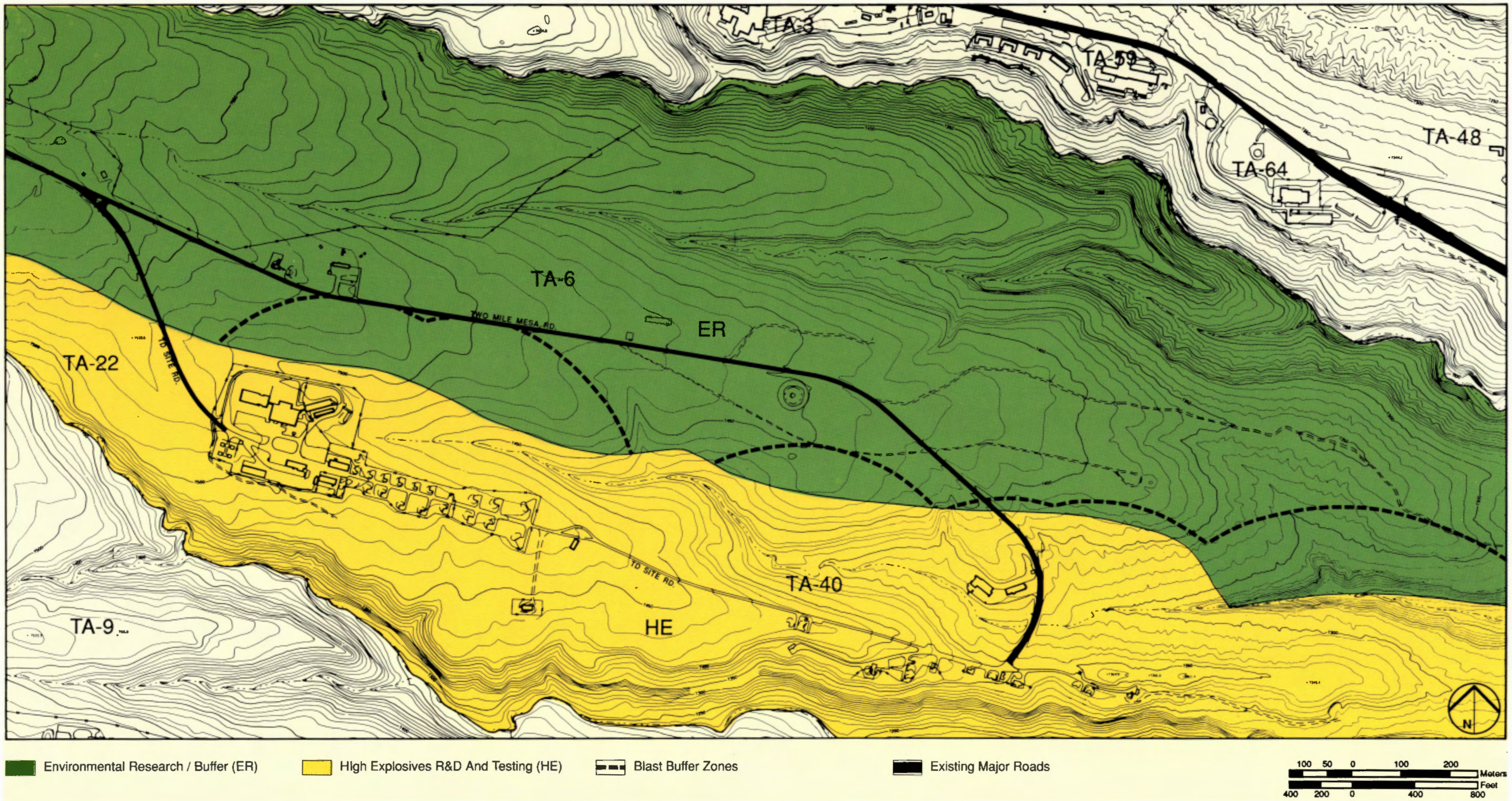
*Existing Land Use Analysis*




*Existing Space Categories*



*Existing Land Uses*



## Opportunities and Constraints

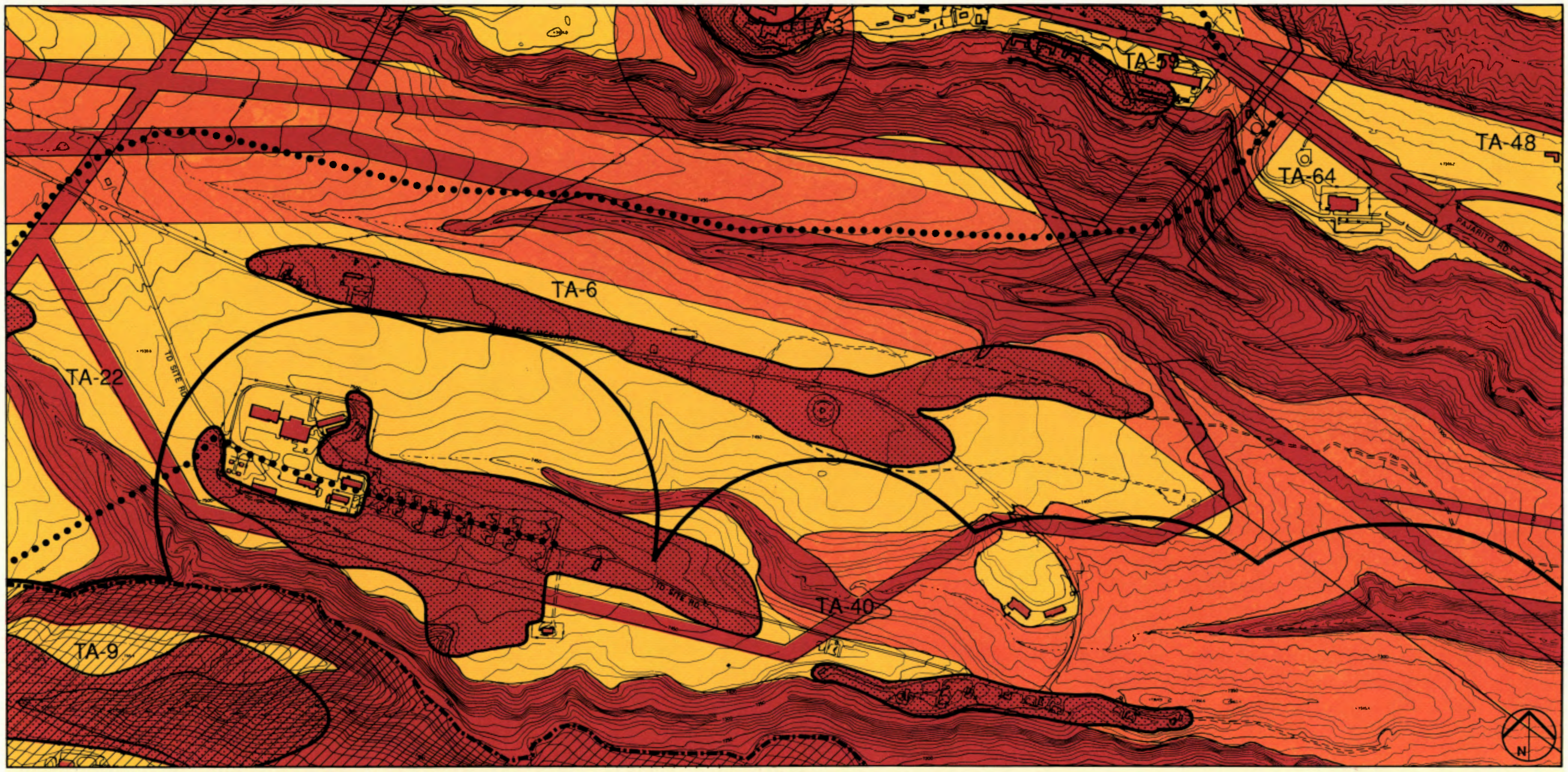
Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints.

Two-Mile Mesa South is one of the few remaining large sites at the Laboratory that is flat and easily accessible. Existing facilities at TAs 6, 22, and 40 can be relocated in accordance with the Dynamic Testing Division Long-Range Plan to allow for the development of large, linear facilities. Contaminated sites will need to be decontaminated prior to developing the area with new experimental science facilities.

Programs with facilities located on Two-Mile Mesa South will need to assess the impact on their operations of the 345-kV electric line planned by the Public Service of New Mexico and the potential corridor of high radio frequency interference that will surround the line. Construction and relocation of utilities and other infrastructure improvements are a prerequisite to reuse of this site by non-high-explosives facilities.

Archaeological sites in this development area pose a significant constraint to development. Surveying will be required to best determine how they should be managed.

*Opportunities and Constraints*




Severe Constraints
Moderate Constraints
Minimal Constraints
Potentially Contaminated Area
Future Road
Existing Blast Buffer Zone
Future Blast Buffer Zone

100 50 0 100 200 Meters
400 200 0 400 800 Feet

## Two-Mile Mesa South Master Plan

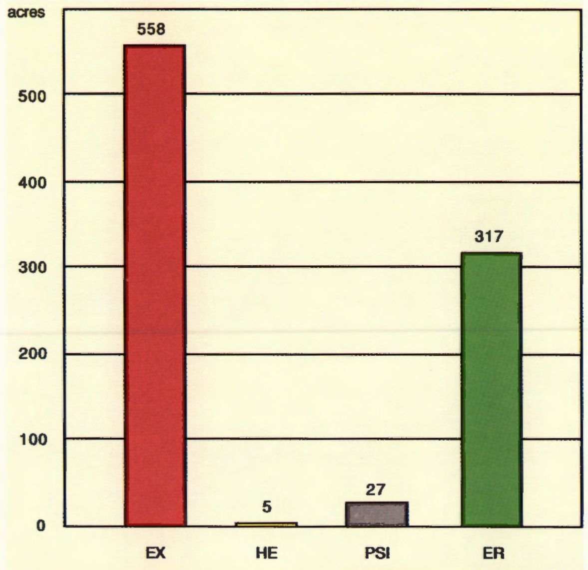
### Future Land Uses

Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (pages 24 and 25) for definitions of the uses.

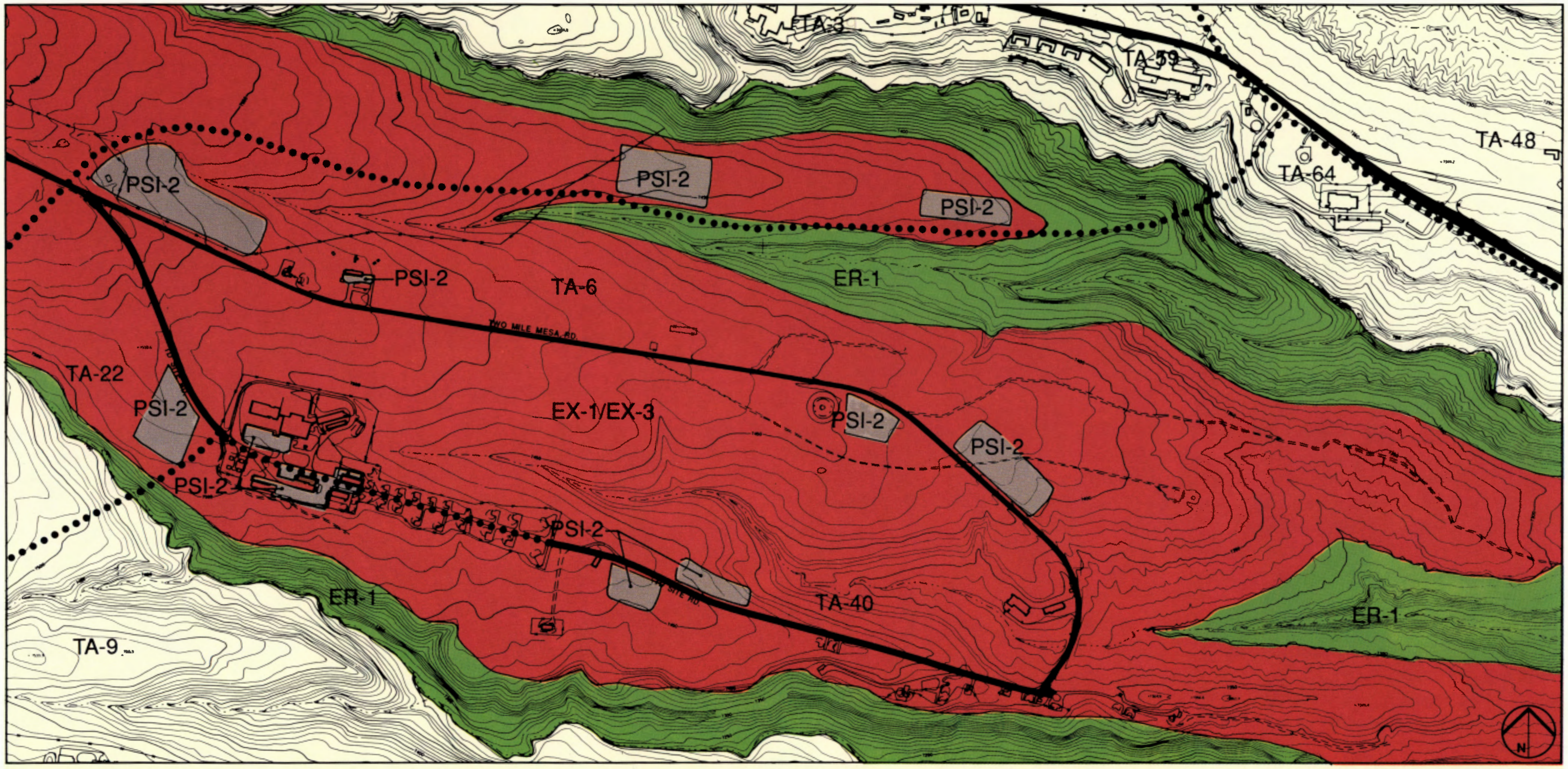
Large portions of Two-Mile Mesa South are either undeveloped or are currently used for high-explosives research and testing. In the future, Two-Mile Mesa South will become available for large-scale linear facilities and experimental science (EX-1, accelerator related science and/or EX-3, fusion and laser research and development) uses requiring large tracts of land, isolation, and the ample electrical capacity infrastructure already available here.

The high-explosives functions that currently occupy the area will be relocated and consolidated deeper into the Dynamic Testing Development Area and at the new central complex at TA-67. Therefore, land and/or facilities can be rehabilitated, demolished or reused as a Laboratory resource for other functions such as experimental science expansion. New road and utility construction will require that some existing roads and utilities be relocated.

*Future Land Use Analysis*



*Future Land Uses*




Environmental Research / Buffer (ER)
ER-1: Security and Safety Buffers

Physical Support and Infrastructure (PSI)
PSI-2: Transportation and Circulation

Experimental Science (EX)
EX-1: Accelerator Related Technology
EX-3: Fusion and Laser R&D

Existing Major Roads

Future Circulation Improvements

**Future Trends – Population and Facilities**

The existing population at Two-Mile Mesa South is small and will be relocated in accordance with the Dynamic Testing Division Long-Range Plan. The future population is projected to remain small and of low-density given that the area is planned for large-scale accelerator, fusion, and laser-related experimental science uses. As the area develops, an increase in all space categories will occur, with particular growth in laboratory, heavy experimental, and office space.

TA-6 contains few facilities at present. All of these are eligible for decontamination and decommissioning.

TA-22 facilities are a mix of old and new laboratory and office space, bunkers, firing sites, and other small, high-explosives-specific structures. The laboratory and office space can be renovated, upgraded, and reused for other functions. The high-explosives structures are candidates for decontamination and decommissioning.

Facilities at TA-40 include substandard laboratory and office space as well as concentrations of small, high-explosives-specific structures. Rehabilitation and reuse of the laboratory and office space is likely. The high-explosives structures in this technical area are also eligible for decontamination and decommissioning.

**Development Sites**

The development sites map identifies sites in the Two-Mile Mesa South Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.
- "Future parking" sites are best suited for parking needs of future buildings.
- "Buildings to buildings" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.
- "Parking areas to buildings" means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group ENG-2.

*Recommendations*

- Relocate high-explosives (Dynamic Testing Division) functions to TA-67.
- Retain Two-Mile Mesa South as a possible site for large research facilities such as linear accelerators or lasers.
- Use this development area for limited-security activities, however the northern finger could be fenced for controlled activities.

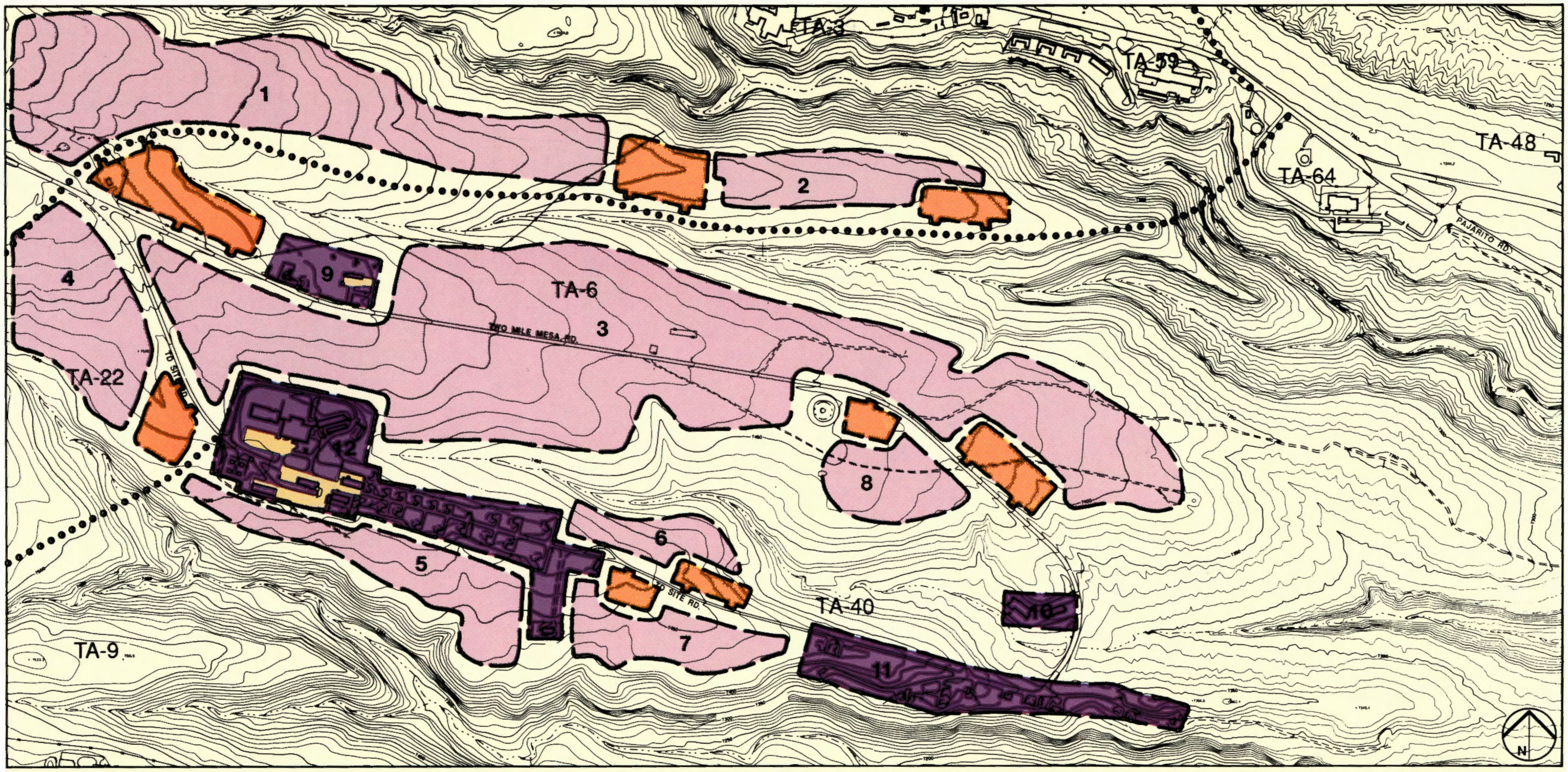
*Two-Mile Mesa South Development Sites Evaluation*

| Undeveloped Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 1 | 50 ac. | Limited | EX-1 & 3 | Reserve for large, linear facilities. High radio frequency interference area related to future 345-kV line. Utility corridors traverse the site. Moderate topographic constraints will add to site development costs. |
| 2 | 10 ac. | Limited | EX-1 & 3 | Reserve for large, linear facilities. High radio frequency interference area related to future 345-kV line. Utility corridors traverse the site. Moderate topographic constraints will add to site development costs. |
| 3 | 106 ac. | Limited | EX-1 & 3 | Reserve for large, linear facilities. Two-Mile Mesa Road could be realigned to accommodate future development. High radio frequency interference area related to future 345-kV line. Moderate topographic constraints will add to site development costs. Potential contamination may pose constraints to development. |
| 4 | 18 ac. | Limited | EX-1 & 3 | Reserve for support facilities functionally related to Site 3. A utility corridor bisects the site. Potential contamination may pose constraints to development. |
| 5 | 14 ac. | Limited | EX-1 & 3 | Reserve for functions related to redevelopment of Sites 11 and 12. Potential contamination may pose constraints to development. |
| 6 | 5 ac. | Limited | EX-1 & 3 | Reserve for support facilities functionally related to Site 3. A utility corridor bisects the site. Potential contamination may pose constraints to development. |
| 7 | 9 ac. | Limited | EX-1 & 3 | Reserve for functions related to redevelopment of sites 11 and 12. A utility corridor bisects the site. |
| 8 | 8 ac. | Limited | EX-1 & 3 | Reserve for support facilities functionally related to Site 3. A utility corridor bisects the site. Potential contamination may pose constraints to development. |
| Total: | 220 ac. | | | |

| Redevelopable Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 9 | 4 ac. | Limited | EX-1 & 3 | Redevelop site for a permanent office complex supporting Site 3. Existing substandard facilities require removal. Potential contamination may pose constraints to redevelopment. |
| 10 | 2 ac. | Limited | EX-1 & 3 | Renovate existing office and laboratory buildings. Moderate topographic constraints may add to site development costs. |
| 11 | 14 ac. | Limited | EX-1 & 3 | Redevelop site for accelerator-related uses to serve the Two-Mile Mesa South area. Existing high-explosives bunkers and firing sites require decontamination and decommissioning which may pose constraints to redevelopment. |
| 12 | 27 ac. | Limited | EX-1 & 3 | Renovate existing reusable office and laboratory buildings. Substandard facilities need to be decontaminated and decommissioned, which may pose constraints to redevelopment. |
| Total | 47 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.

*Development Sites*




**Undeveloped Sites**

Future Buildings

Future Parking

Future Roads

**Redevelopable Sites**

Buildings to Buildings

**Existing**

Parking to Remain

100 50 0 100 200 Meters

400 200 0 400 800 Feet

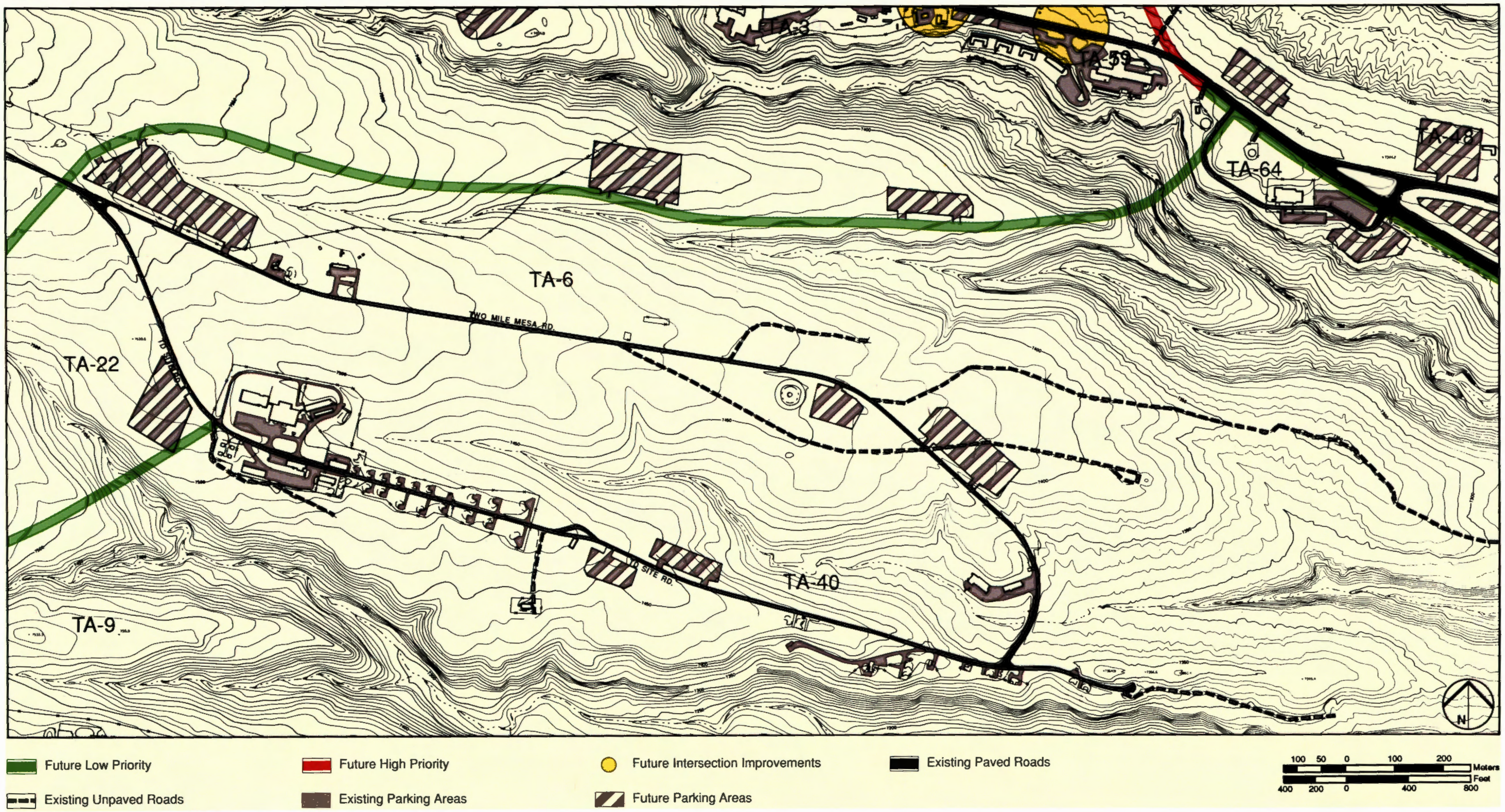
### Transportation/Circulation

Additional improved access to Two-Mile Mesa South can be provided by the construction of the proposed road along the northern edge of the mesa. The road would connect the mesa to Pajarito Road near the Central Guard Facility (TA-64), thereby facilitating improved security. The road would also provide for the safe and efficient transport of hazardous materials on an internal, non-public road. As yet undefined future facilities and activities will require internal parking and circulation improvements.

*Recommendation*

- Construct the proposed Two-Mile Mesa South Road to link this development area with Pajarito Road, the Pajarito Corridor, and the Core Area.

*Existing and Future Transportation/Circulation Improvements*



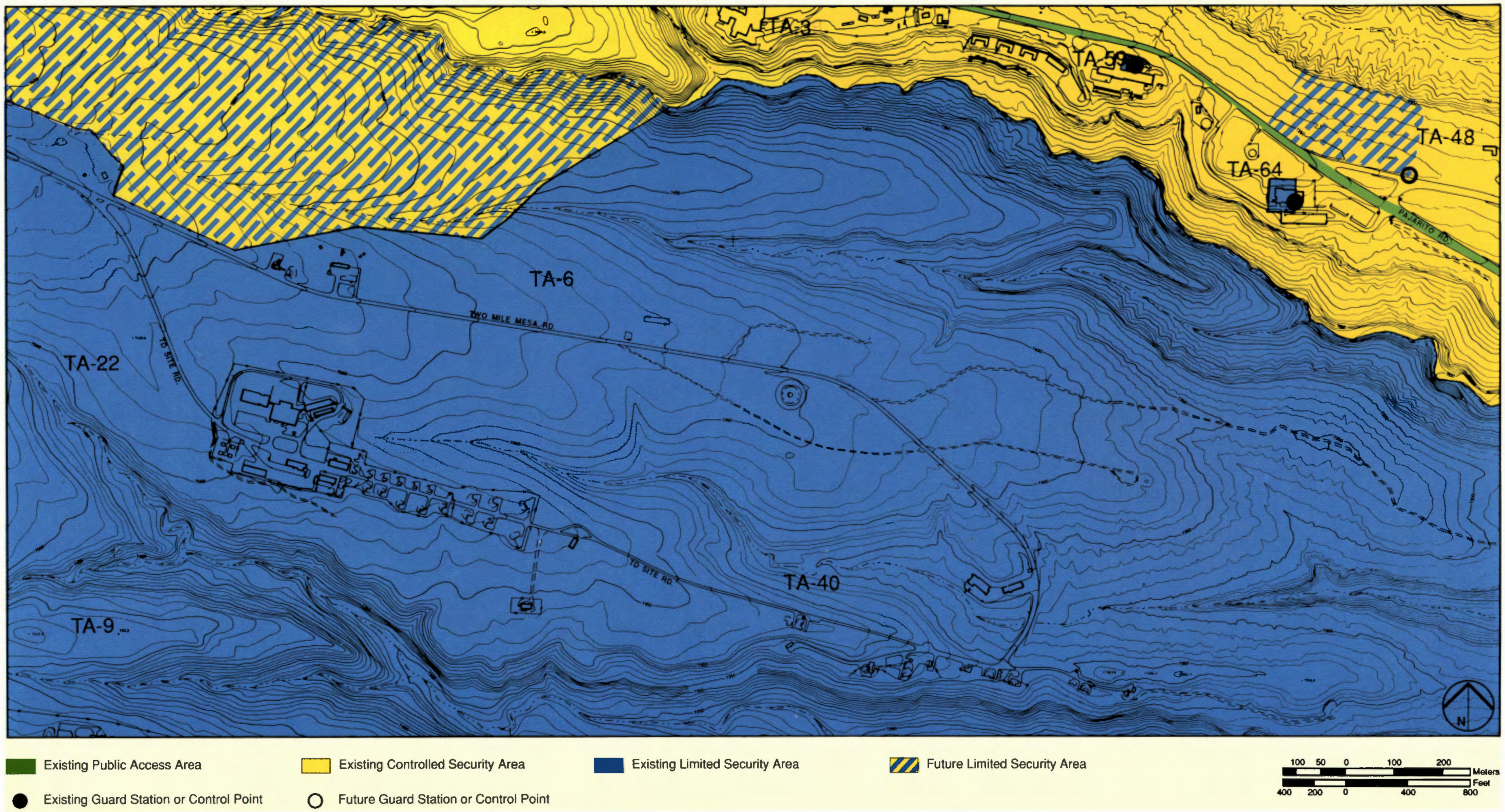
### Security

The Two-Mile Mesa South Development Area is designated a limited-security area. The location, deep within the Laboratory, makes it suitable for category I & II SNM security functions or other activities requiring protected areas or material access areas, over the long-term.

*Recommendation*

- Maintain Two-Mile Mesa South, as a limited-security area, with guard stations at Anchor Ranch Road and at some point along the proposed road between TA-6 and TA-64. The northern finger of the TA-6 area could be fenced and designated for controlled activities. To accomplish this it would be necessary to relocate the Anchor Ranch Road guard station and install a new guard station at the junction of Two-Mile Mesa Road and the proposed TA-6/64 connector road.

*Existing and Future Security*



### Utilities

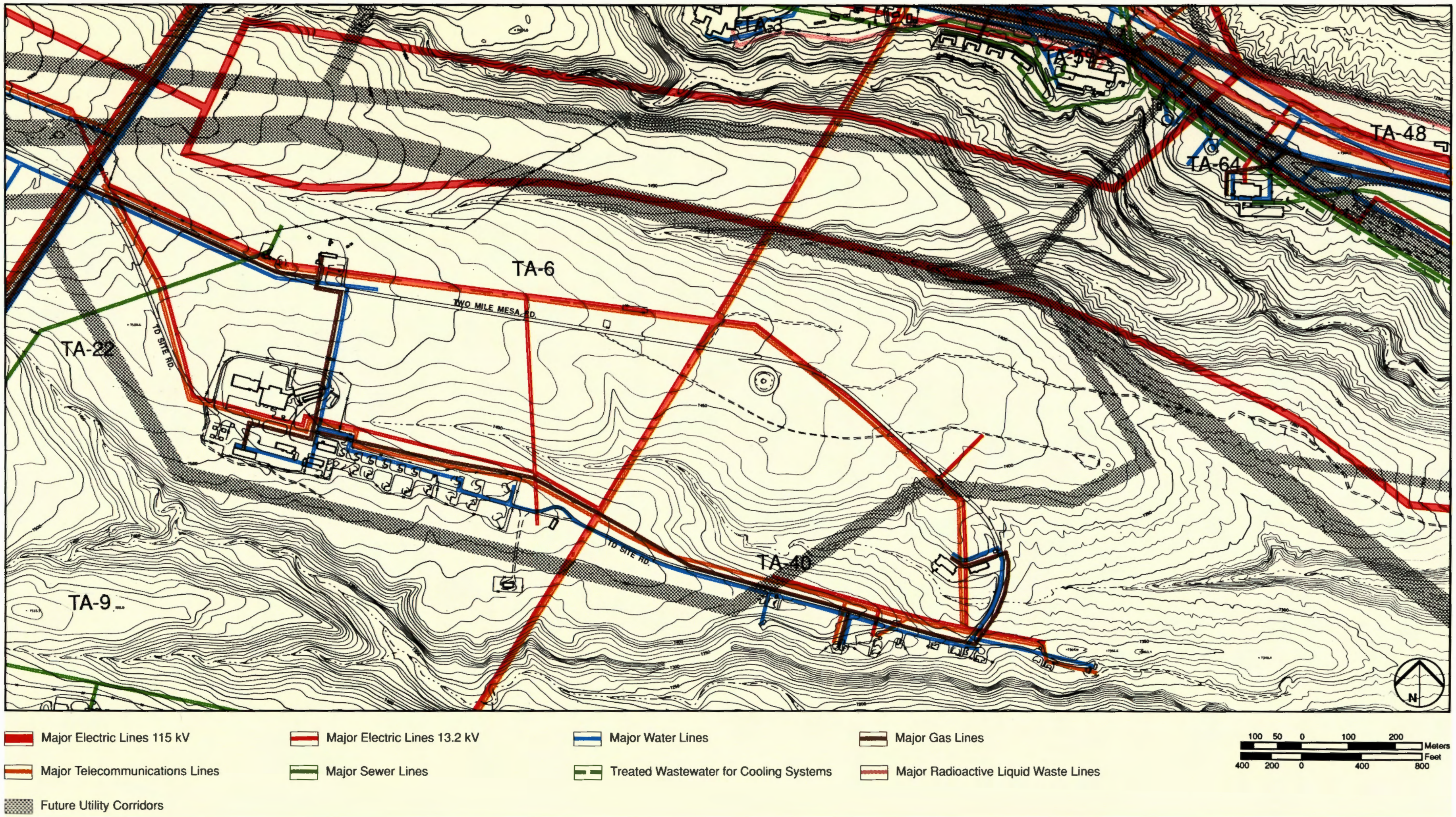
Two-Mile Mesa South is presently used for high-explosives functions. When these functions are relocated to TA-67, in the Dynamic Testing Development Area, a development area with substantial existing utilities will be available for new experimental science uses. Some upgrading of the utility system will be required, particularly the water supply and alarm systems in TA-6 and TA-40, which are potentially deficient should a fire occur.

The Public Service Company of New Mexico has proposed a 345-kV electric power line through the Laboratory. The line will occupy a 150-foot-wide easement through Two-Mile Mesa South and will generate a 2,000-foot-wide corridor of high radio frequency interference. Future users of the site could be affected by this interference.

*Recommendations*

- Relocate existing utility lines as needed to free prime central parcels of land for development.
- Remedy the TA-6 and TA-40 water shortage problems before occupancy.
- Remedy the TA-6 and TA-40 alarm deficiencies before occupancy.

*Utilities and Utility Corridor Master Plan*



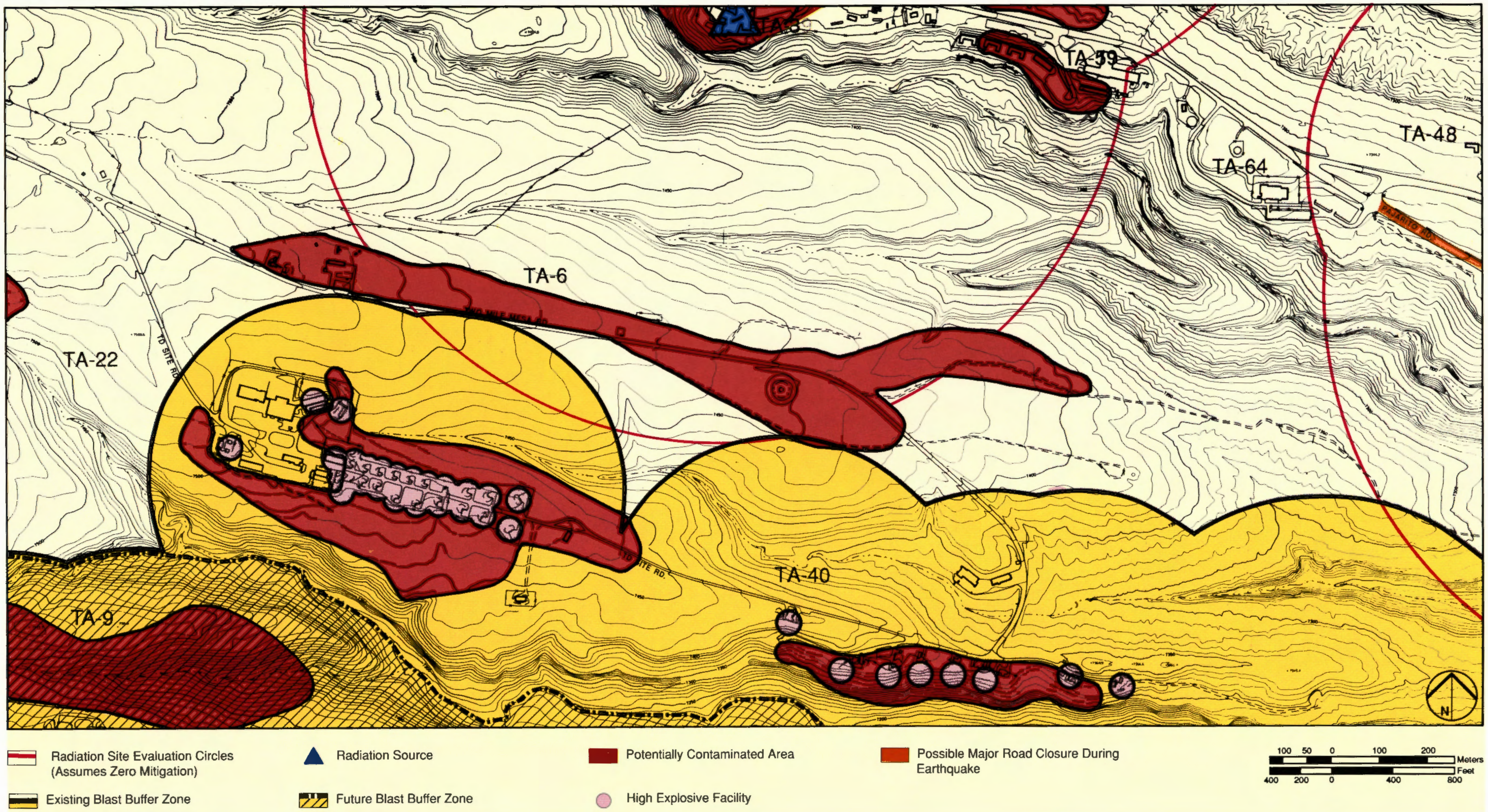
### Environment, Safety, and Health

There are a number of environment, safety, and health concerns at Two-Mile Mesa South. Numerous archaeological sites are scattered throughout the development area, and there are several potentially contaminated sites associated with former uses. Parts of Two-Mile Mesa South are within the radiation site evaluation requirement circle emanating from the Van de Graaff facility at TA-3 (building 3-16). Blast fragment hazard buffer zones require realignment once operations are relocated as per the Dynamic Testing Division Long-Range Plan. There will be a zone of high radio frequency interference along the alignment of the proposed 345-kV line that could affect future users of the development area. These concerns can be mitigated as a part of large-scale facility construction in the future.

*Recommendation*

- Consider Two-Mile Mesa South as a possible site for the relocation of sources of radiation from inappropriate sites such as the Core Area. Two-Mile Mesa South is a desirable location given its relative isolation from high concentrations of nonradiation employees, low population density, and the availability of land.

*Potential Hazards*



## Pajarito Corridor West
## (TAs 35, 48, 50, 52, 55, 63, 64, 66)

The Pajarito Corridor West Development Area contains a varied mix of functions and includes the following eight technical areas

TA-35: Experimental science - lasers and fusion;

TA-48: Experimental science - nuclear materials;

TA-50: Waste management area;

TA-52: Theoretical/computational science;

TA-55: Special nuclear materials park;

TA-63: Satellite services area;

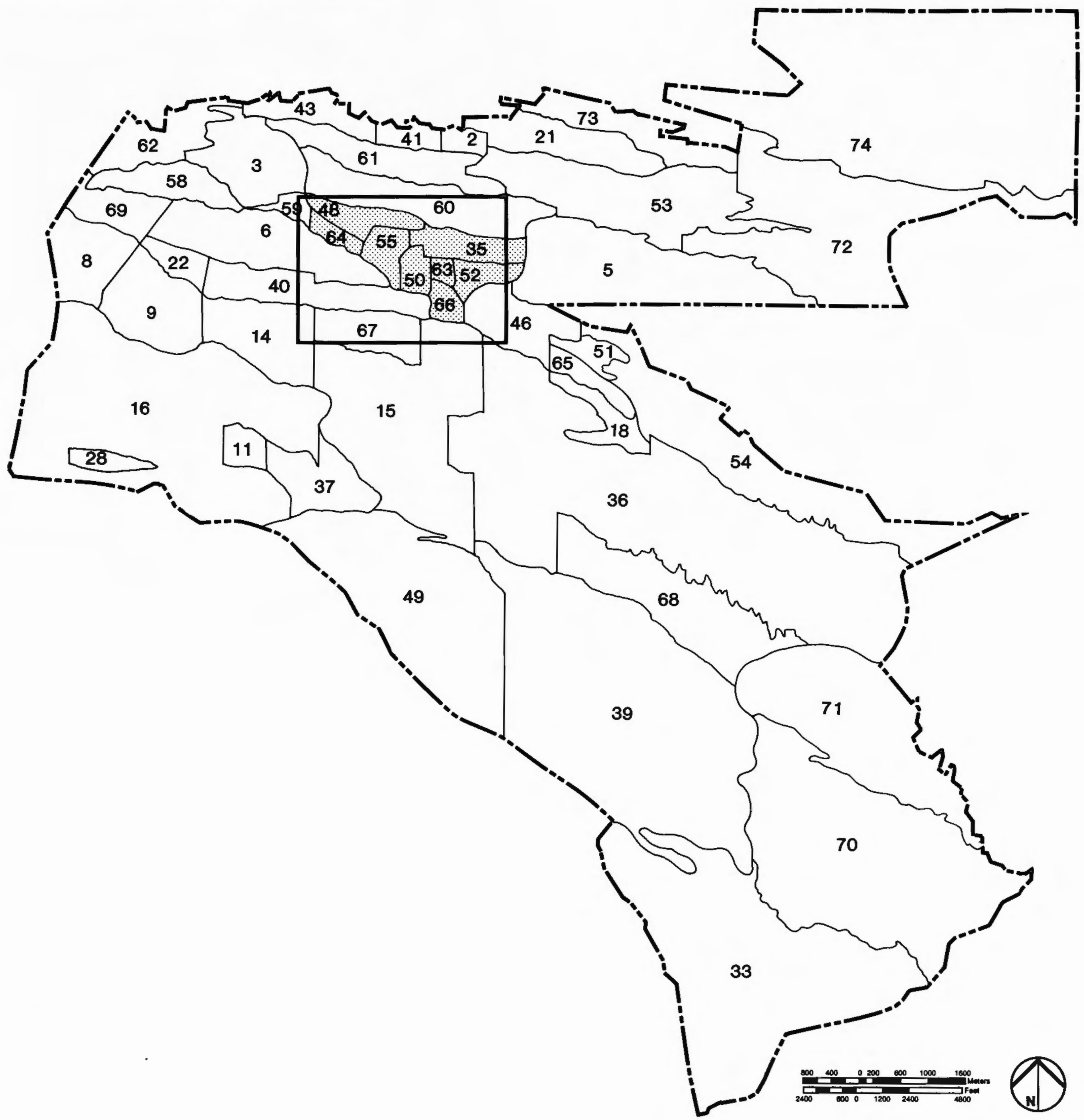
TA-64: Central Guard Facility; and

TA-66: Public and corporate interface functions.

To maintain a consistent scale of maps throughout all development areas (except for the Core Area and Two-Mile Mesa North, and Dynamic Testing Development Areas), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical areas that make up this development area and not the area defined by the development area map borders.

*Development Area Window for Pajarito Corridor West*



## Existing Conditions

The Pajarito Corridor West Development Area accounts for roughly 1,670 employees, or 13% of the Laboratory's total on-site population; about 1.1 million square feet or about 16% of the total net facility space; and 634 acres, or 2% of the total Laboratory land area. The bar chart to the right illustrates the current acreage of each land use in this development area. This chart can be contrasted with a similar one included in the master plan section that shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

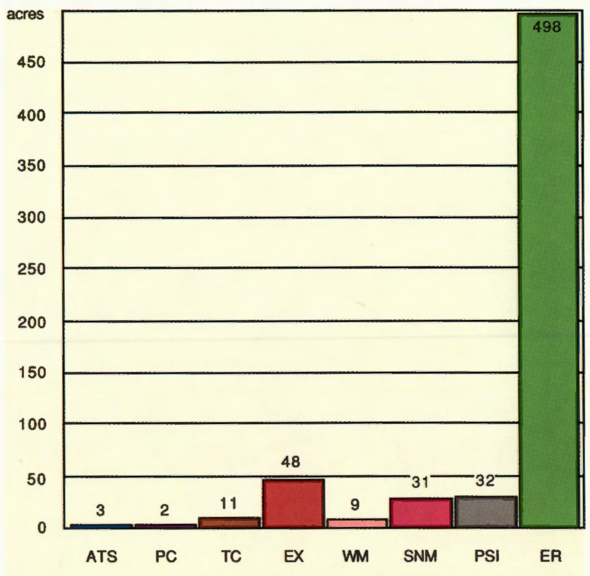
The dominant land uses within the Pajarito Corridor West Development Area are special nuclear materials research and development, fusion and laser research and development, and waste management.

Pajarito Corridor West is the most programmatically diverse and highly populated development area of the Laboratory, besides the Core Area. Sites located here are desirable because all required infrastructure is available, access to the Core Area is convenient, and functional interactions among most Laboratory technical programs are possible.

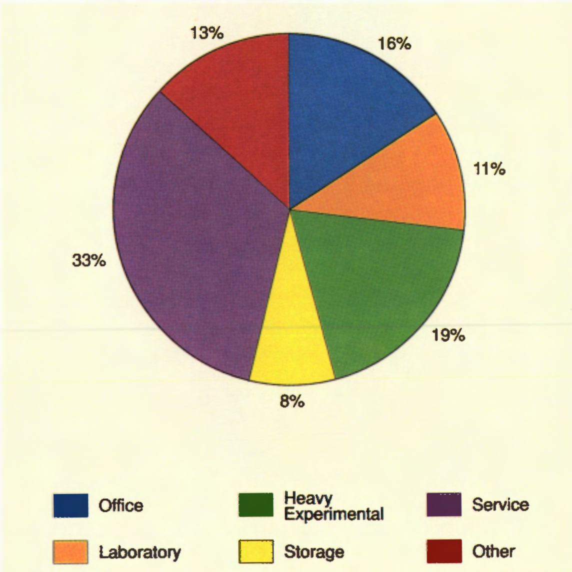
### Trends

Accommodating the large number of programs competing for the limited land and facility space in Pajarito Corridor West makes prioritized development and redevelopment of this development area essential. Programs in Pajarito Corridor West face a shortage of space to house uncleared and temporary personnel. Moreover, it has become necessary to accommodate both classified and unclassified modes of operation, which complicates security planning as many people and facilities in the Pajarito Corridor are concurrently involved in both kinds of projects.

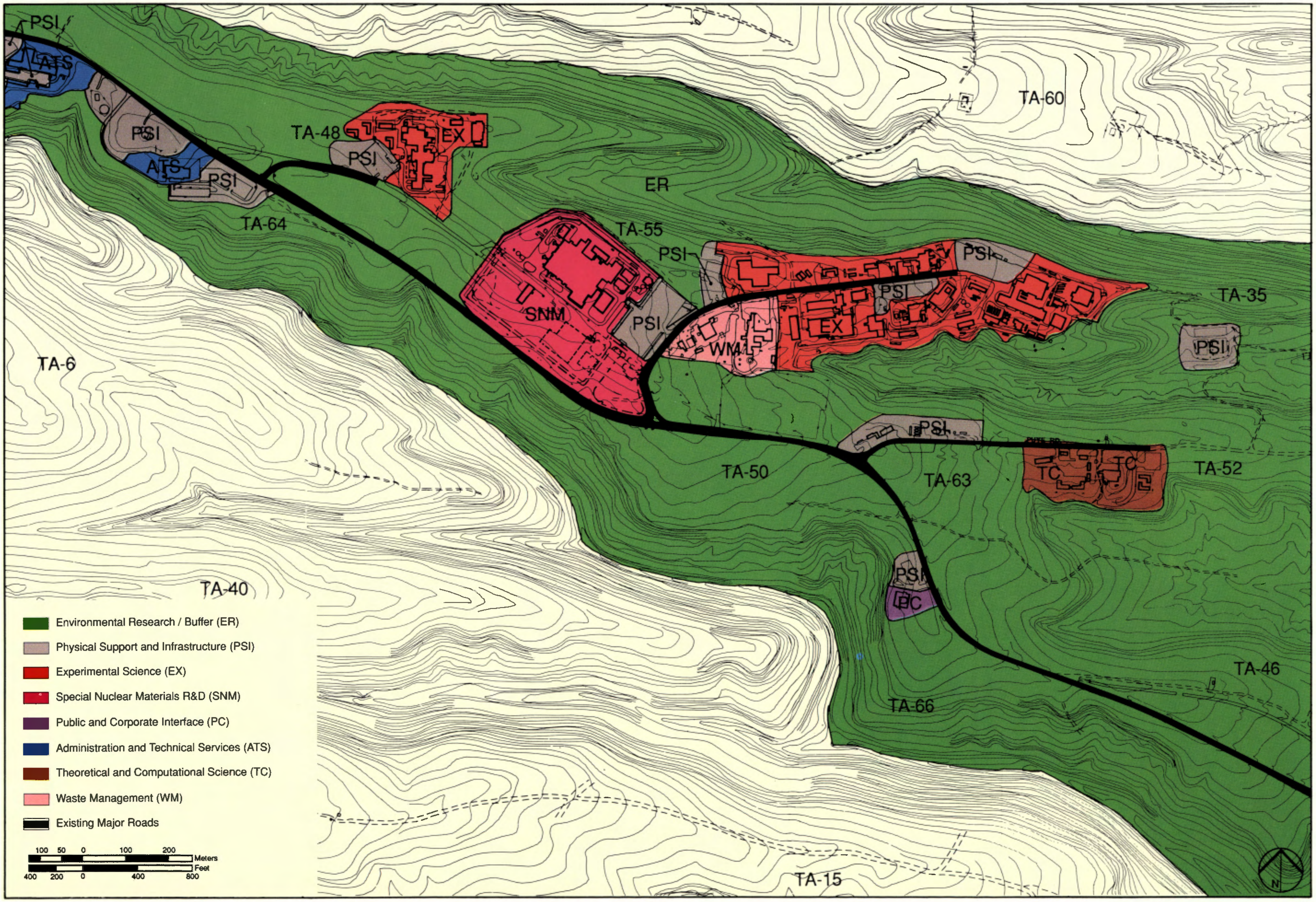
*Existing Land Use Analysis*




*Existing Space Categories*



*Existing Land Uses*



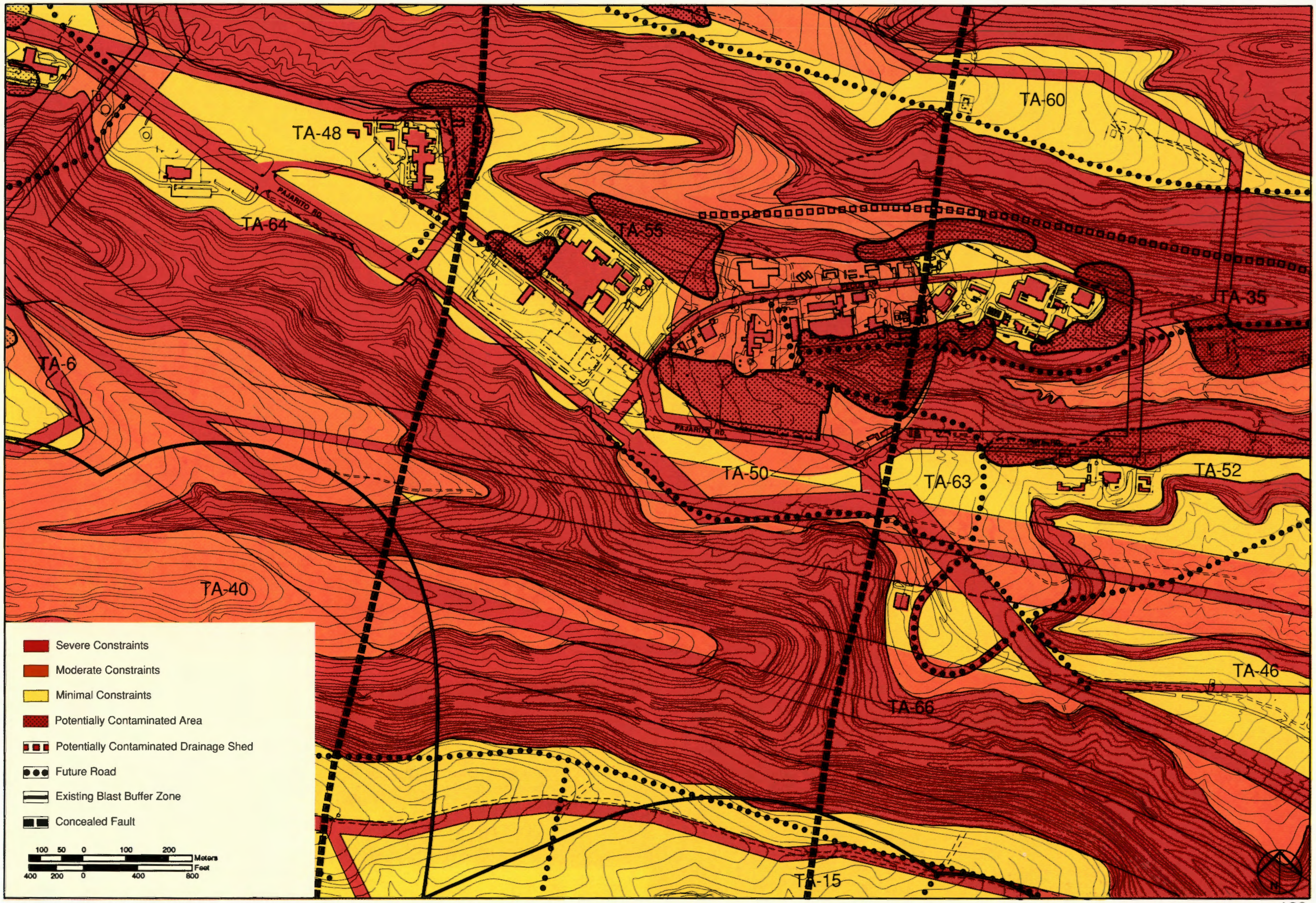
## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints indicated.

Several existing technical areas are essentially fully developed north of Pajarito Road, particularly TA-35 and TA-50. Utility corridors, particularly regional service high-voltage lines, also restrict development in this area. Potentially contaminated areas and steep slopes further limit expansion.

Although many of the flat mesa tops in the Pajarito Corridor West are already developed, opportunities for expansion still exist. With the second phase of the relocation of Pajarito Road, TA-50 can be expanded to the south and TA-66 can be expanded to the north.

Much of the remaining development area still offers considerable opportunity for new facilities expansion into undeveloped or redevelopable parcels adjacent to existing facilities. There are undeveloped sites east and west of TAs 48 and 52, and five smaller undeveloped sites around TA-55 for SNM activity expansion. TA-35 has redevelopment potential if some of the smaller and older structures are replaced by higher-density structures. There is also development potential for more office space at TA-66 and satellite services at the new TA-63.



TA-48
TA-60
TA-64
PAJARITO RD.
TA-55
TA-35
TA-6
PAJARITO RD.
TA-50
TA-63
TA-52
TA-40
TA-46
TA-66
TA-15
Severe Constraints
Moderate Constraints
Minimal Constraints
Potentially Contaminated Area
Potentially Contaminated Drainage Shed
Future Road
Existing Blast Buffer Zone
Concealed Fault
100 50 0 100 200 Meters
400 200 0 400 800 Feet
N

## Pajarito Corridor West Master Plan

### Future Land Uses

Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses.

Land uses in the Pajarito Corridor West Development Area will continue to focus on expanded special nuclear materials research at TA-55, experimental science at TA-35, and waste management at TA-50. Expansion of these programs will be accommodated by developing or redeveloping existing undeveloped, underutilized, or inappropriately used parcels and building clusters. The proposed uses for each technical area in this development area are set forth below.

TA-35 is zoned for EX-3 functions (fusion and laser research and development). Land in TA-35 is desirable to user groups because all major infrastructure has been installed, thereby reducing future development costs. Existing marginal structures are recommended to be priority redevelopment areas. The two existing major parking areas need to remain, and, a third lot is required to accommodate redevelopment.

TA-48 is zoned for EX-2 (nuclear materials research and development). This technical area is one of several on Pajarito Road containing large undeveloped parcels of land. TA-48 is long and narrow with expansion possibilities to the east and west. The westward expansion area is the larger of the two and is envisioned as a logical area for the expansion and replacement of aging radiochemistry facilities and as an alternative site for a research reactor to replace the Omega West reactor at TA-2. The isolated narrow mesa projection east of existing development could be used for a small linear accelerator or an alternative reactor site.

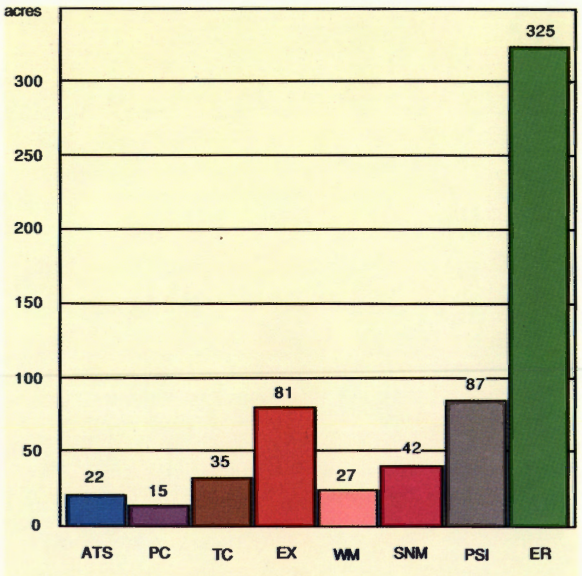
TA-50 is a waste management area planned to be the new home of a number of environmental compliance facilities designed to treat, package, and ship wastes. Pajarito Road will need to be relocated to create more expansion area for future TA-50 activities, because TA-50 is currently expanding into the only remaining developable parcel.

TA-52 is zoned for TC-1 and TC-2 (theoretical/computational research). Eastern expansion is appropriate for unclassified functions and westward expansion for classified functions. TA-52 will need additional office and computer space to accommodate growth of the TC-1 and TC-2 functions. There is room north of the TA-52 access road for the expansion of parking.

TA-55 facilities are used for special nuclear materials research and development. Because consolidation of SNM functions is a safety and security-driven Laboratory objective, land and facilities in this area are to be used only for SNM category I and II related functions. The SNM activities now housed at TA-3 will be relocated to TA-55, leaving only two major parcels to the west for future SNM programmatic expansion.

TA-63 has been designated as a satellite service area for the Pajarito Corridor. Pajarito Corridor is the second most populated area at the Laboratory, and a satellite services area located on Pajarito Road will relieve the heavily used support facilities at TA-3 and provide better service and convenience for Pajarito Corridor users. A cafeteria, wellness facilities, and an occupational health clinic are examples of possible services to be provided.

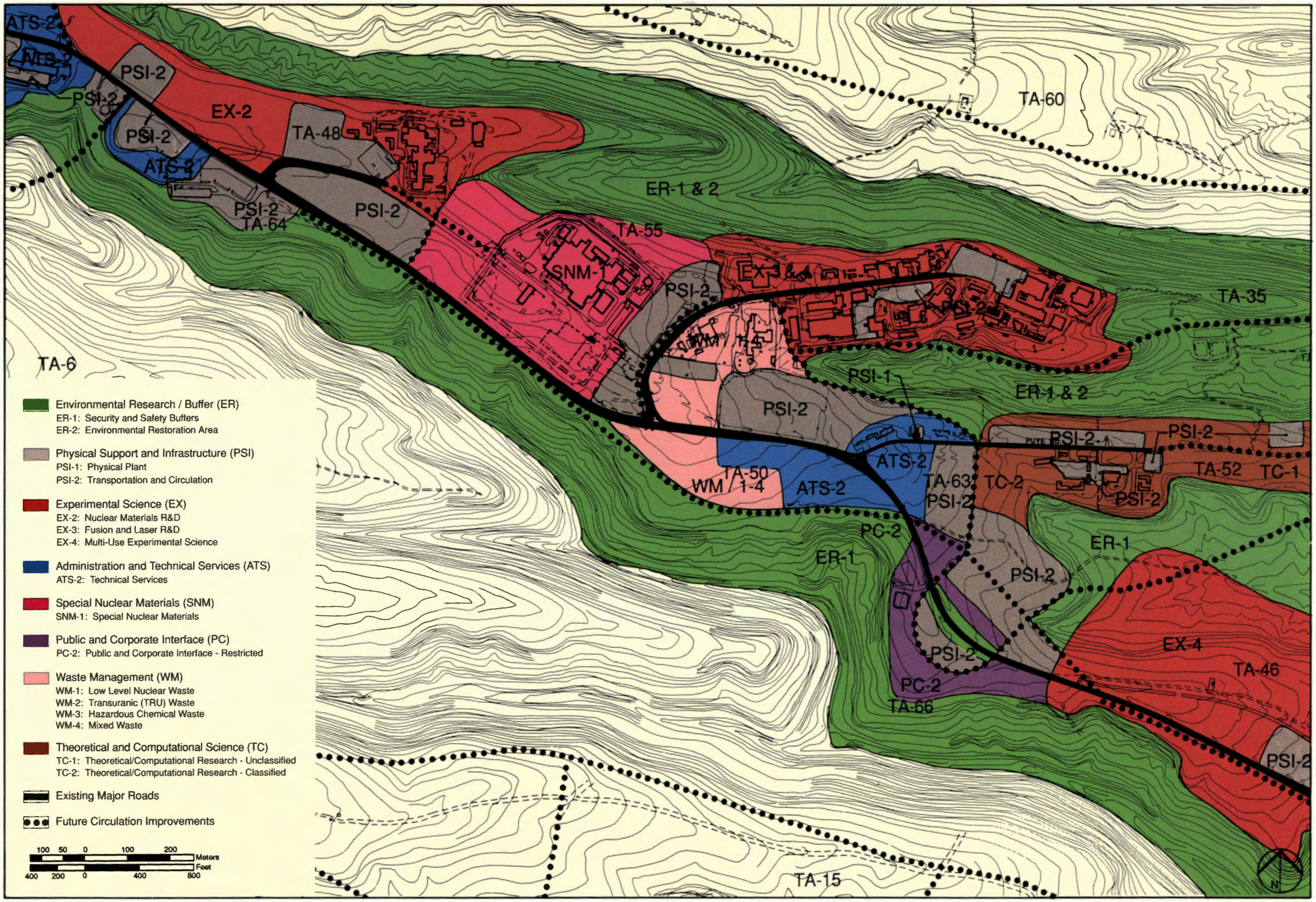
*Future Land Uses Analysis*




TA-64 will remain as the site of the Central Guard Facility. Some land is available to the east of the entrance to this technical area for the expansion of parking.

TA-66 is envisioned as a satellite office area supporting the technical activities in the Pajarito Corridor. Given the small size of the site, experimental activities are not recommended. Technology transfer activities and offices for summer employees, uncleared personnel, and visiting researchers would be appropriate in this technical area. Development of the site should make it possible for one or more buildings to be fenced for security without necessitating the enclosure of any parking lots. Additional acreage will be available when Pajarito Road is realigned.

*Future Land Uses*



**Future Trends – Population and Facilities**

The Pajarito Corridor West Development Area is projected to grow significantly faster than the Laboratory average. Several contributing factors are listed below.

- Undeveloped parcels are readily available.
- Several line-item projects are funded or planned in this development area.
- TA-3 programs, such as special nuclear materials activities are to be relocated here.
- Increasingly restrictive environmental compliance regulations are driving growth in waste management personnel and facilities in and around TA-50 and the Pajarito Corridor.
- Access is good and utilities are readily available.
- Much of the area is close to TA-3.

Pajarito Corridor West will continue to experience demands for all types of space.

The acquisition of a special nuclear materials research and development laboratory will replace the Chemistry and Metallurgy Research Building at TA-3. This will ensure the continued long-term, reliable, safe, and secure operation of essential chemistry and metallurgy research and development activities that support the Laboratory's Plutonium Facility and other national defense programs. The project will include the construction of the following:

- An SNM research and development laboratory building;
- A cold support building;
- An office building; and
- A utility building in the TA-55 SNM complex.

The decontamination and refurbishing of laboratory space in the CMR building for non-SNM category I and II functions is also part of this project.

TA-35 is the site of a massive new generator installed for confinement physics research. This facility will become a world-class pulsed-power source. Consequently, this may attract other related experiments to the TA-35 vicinity, increasing demands for office, light laboratory, and heavy experimental space.

It is anticipated that the proportion of Laboratory research involving uncleared or temporary personnel in work that interfaces with classified programs will continue to grow. Typical of these is the rapid growth in the environmental safety and health programs that emphasize remediation, waste management, and corrective activities. This increase parallels the expansion of unclassified programs on Pajarito Road. As these programs expand, the housing of uncleared personnel in a central office location such as TA-66 will ease security conflicts. As the Pajarito Corridor grows, the demand for services such as support subcontractor crafts, wellness centers, cafeterias, and auditoriums will increase. TA-63 is designed to address this trend.

The increase in population and facilities in this development area will aggravate the existing parking shortage and push the roads to their capacity.

*Recommendations*

- Prepare a site-specific master plan for TAs 35, 50, and 55 in order to address the future planning needs of all users.
- Consider concentrating environmental remediation, waste management, and corrective activities functions at selected sites in the Pajarito Corridor and expanding TA-50 to serve as the focus of such an environment, safety, and health research and development park.

**Development Sites**

The development sites map identifies sites in the Pajarito Corridor West Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.
- "Future parking" sites are best suited for the parking needs of future buildings.
- "Buildings to buildings" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.
- "Parking areas to buildings"means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects, and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

*Recommendations*

- Maintain and enhance TA-55 as the Laboratory's SNM complex.
- Study the feasibility of expanding TA-50 by relocating Pajarito Road, thereby making land available for establishing TA-50 as the focus of a Pajarito Corridor environmental remediation and waste management park for the Laboratory.
- Develop a satellite services center at TA-63.
- Locate new facilities in existing technical areas where possible when infrastructure is available in order to minimize development costs.
- Redevelop old areas typified by small, poorly utilized structures.

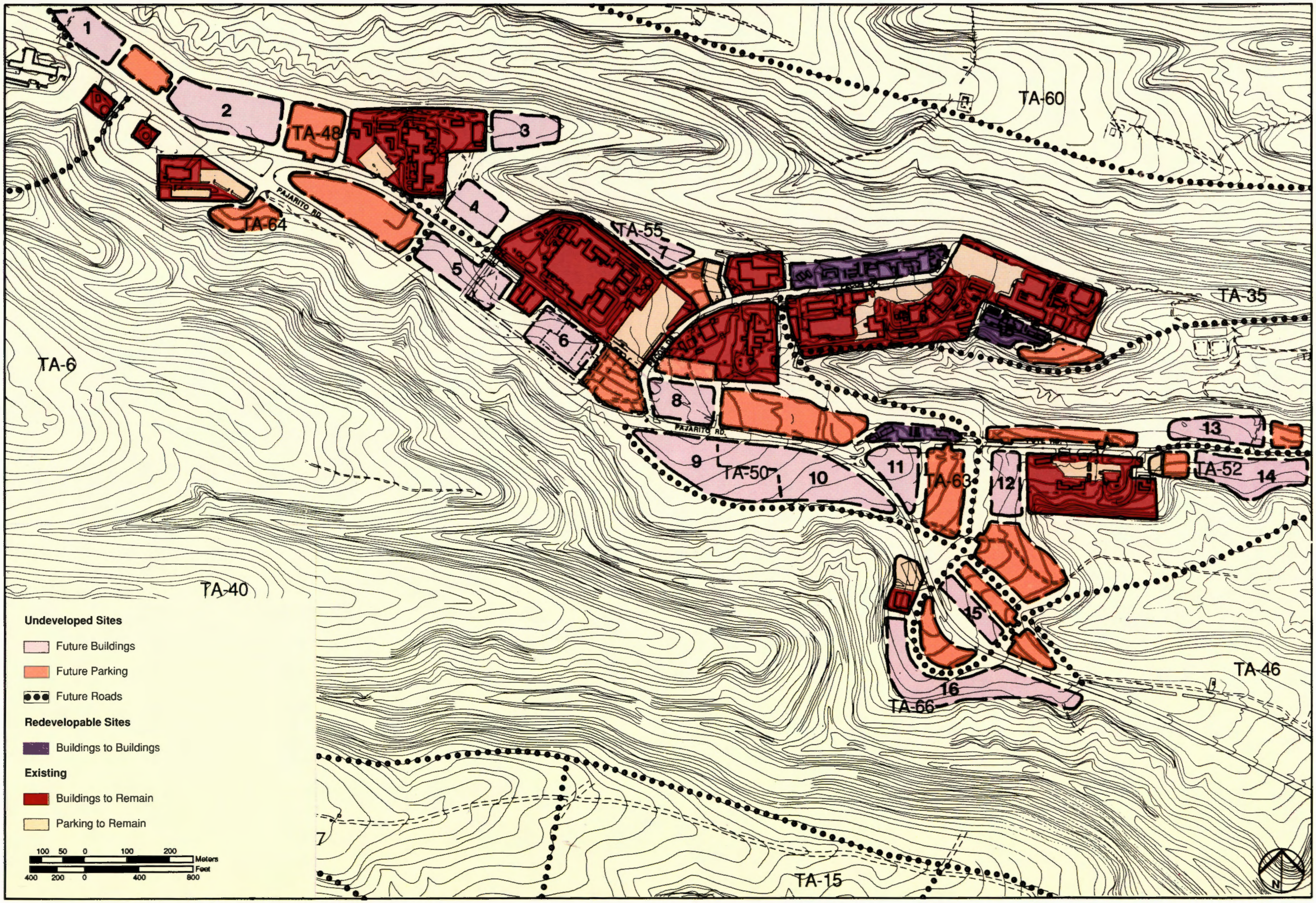
*Pajarito Corridor West Development Sites Evaluation*

| Undeveloped Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 1 | 3 ac. | Controlled | EX-2 | Planned reactor replacement site. Near Pajarito Road (and public traffic). Partially within a utility corridor and subject to high radio frequency interference from overhead electrical lines. |
| 2 | 6 ac. | Limited | EX-2 | Planned area for expansion of radiochemistry activities. Adjacent to utility corridor on north and south sides. |
| 3 | 3 ac. | Controlled | EX-2 | Alternative reactor replacement site if Site 1 is too close to publicly travelled Pajarito Road. Also potential site for small linear accelerator related to radiochemistry work. |
| 4 | 2 ac | SNM | SNM-1 | Planned category I & II uranium facilities. |
| 5 | 4 ac. | SNM | SNM-1 | Only parcel available at SNM complex not already assigned a facility. Last expansion area for plutonium activities within the SNM complex. |
| 6 | 3 ac. | SNM | SNM-1 | Future site of funded SNM research and development laboratory. |
| 7 | 2 ac. | SNM | SNM-1 | Planned site for Nuclear Safeguards Technology Laboratory. Triangular site is constrained on all sides by topography or existing development. Potential contamination may pose constraints to development. |
| 8 | 3 ac. | Limited | WM 1-4 | Proposed site of hazardous waste treatment line-item projects and other environmental compliance activities related to TA-50. Within high radio frequency interference area. Potential contamination may pose constraints to development. |
| 9 | 8 ac. | Limited | WM 1-4 | Expansion area for WTD activities. Subject to realignment of Pajarito Road. Within high radio frequency interference areas. Existing utilities would be relocated into a utility corridor along existing Pajarito Road. |
| 10 | 5 ac. | Controlled | ATS-2 | Phase II of Pajarito Corridor satellite services area, to be joined with Site 11 when Pajarito Road is realigned. Also possible area for WM expansion from TA-50. Utility corridor adjacent. Partially within high radio frequency interference area. |
| 11 | 3 ac. | Controlled | ATS-2 | Satellite services area to be joined with Sites 10 and 19 when Pajarito Road is realigned. Utility corridor adjacent on western edge. |
| 12 | 2 ac. | Limited | TC-2 | Expansion area for classified TA-52 activities. Potential contamination may pose constraints to development. |
| 13 | 3 ac. | Controlled | TC-1 | Expansion area for unclassified TA-52 activities. Potential contamination may pose constraints to development. |
| 14 | 4 ac. | Controlled | TC-1 | Expansion area for unclassified TA-52 activities. |
| 15 | 2 ac. | Limited | PC-1 | Phase II, Pajarito Corridor office complex expansion, and possible technology transfer activities. |
| 16 | 7 ac. | Limited | PC-1 | Primary office complex expansion area for Pajarito Corridor functions with possible technology transfer activities. Possible high radio frequency interference from 345-kV line to south. Moderate topographic constraints and a fault line to the west. |
| Total | 60 ac. | | | |

| Redevelopable Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 17 | 5 ac. | Controlled | EX-3 | Potential site for new permanent line-item project facilities related to fusion and laser research and development. Within a high radio frequency interference area. |
| 18 | 2 ac. | Controlled | EX 3 & 4 | Potential site for new permanent line-item project facilities. Fault line to west of site. |
| 19 | 2 ac. | Controlled | ATS-2 | Satellite services area expansion to be joined with Site 11 when Pajarito Road is realigned. Utility corridor adjacent along Puye Road. |
| Total | 9 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.

*Development Sites*



**Transportation/Circulation**

Pajarito Road currently cuts through two substantial developable parcels in this development area. Realigning the road will rectify this situation and create expansion areas south of TA-50 and north of TA-66.

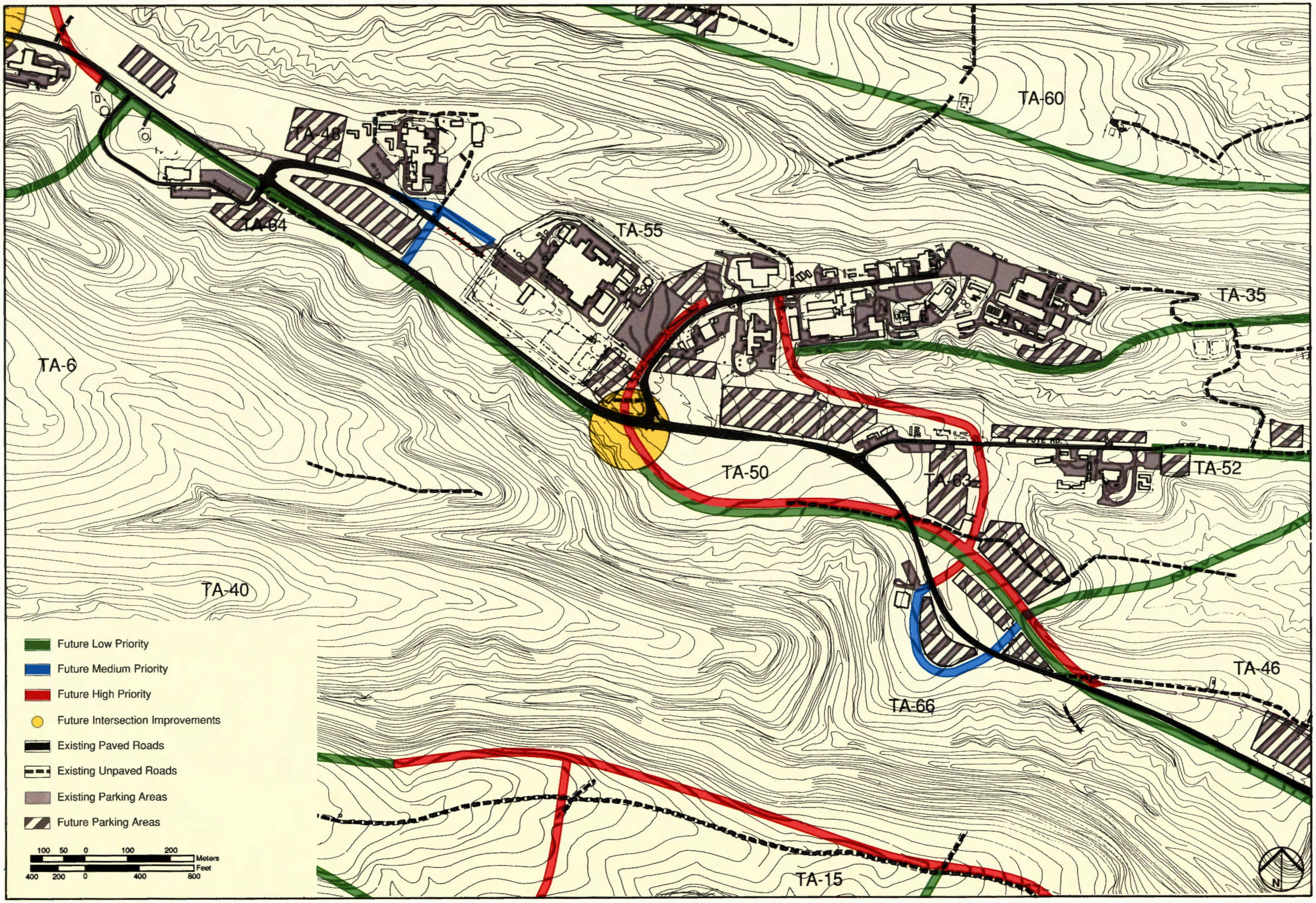
There is only one intersection providing access to TAs 35, 50 and 55 facilities. Together these technical areas employ over 1,200 people and contain many hazardous materials. Routing large numbers of personnel and a wide variety of hazardous materials through a single intersection creates a situation of risk. Furthermore, there is only one route into and out of TA-35. The lack of an alternate route makes travel to TA-35 both potentially hazardous in case of emergency and inconvenient.

Parking facilities are not adequate in the Pajarito Corridor West Development Area, especially in and around TAs 35, 50 and 55. Additional dedicated parking areas are an essential component of any future facilities plan.

*Recommendations*

- Provide additional parking lots to serve expanding activities at TAs 35, 50 and 55.
- Projects that bring additional people into the area should be required to pay the proportional cost of providing necessary parking and circulation improvements.
- Realign Pajarito Road between TA-50 and TA-66 to provide expansion areas for development.
- Widen Pajarito Road along its entire length to improve traffic safety and upgrade the level of roadway service.
- Seek funding to construct the Pecos/Pajarito connector road, which will provide secondary access into and out of TAs 35, 50, and 55.
- Study the feasibility of reusing all or part of the large waste burial site at TA-50 for parking.

*Existing and Future Transportation/Circulation Improvements*



## Security

The majority of functions in Pajarito Corridor West are classified basic and applied research requiring limited-security. These limited-security areas tend to be surrounded by controlled areas. One section of the development area requires category I & II special nuclear materials (SNM) security protection.

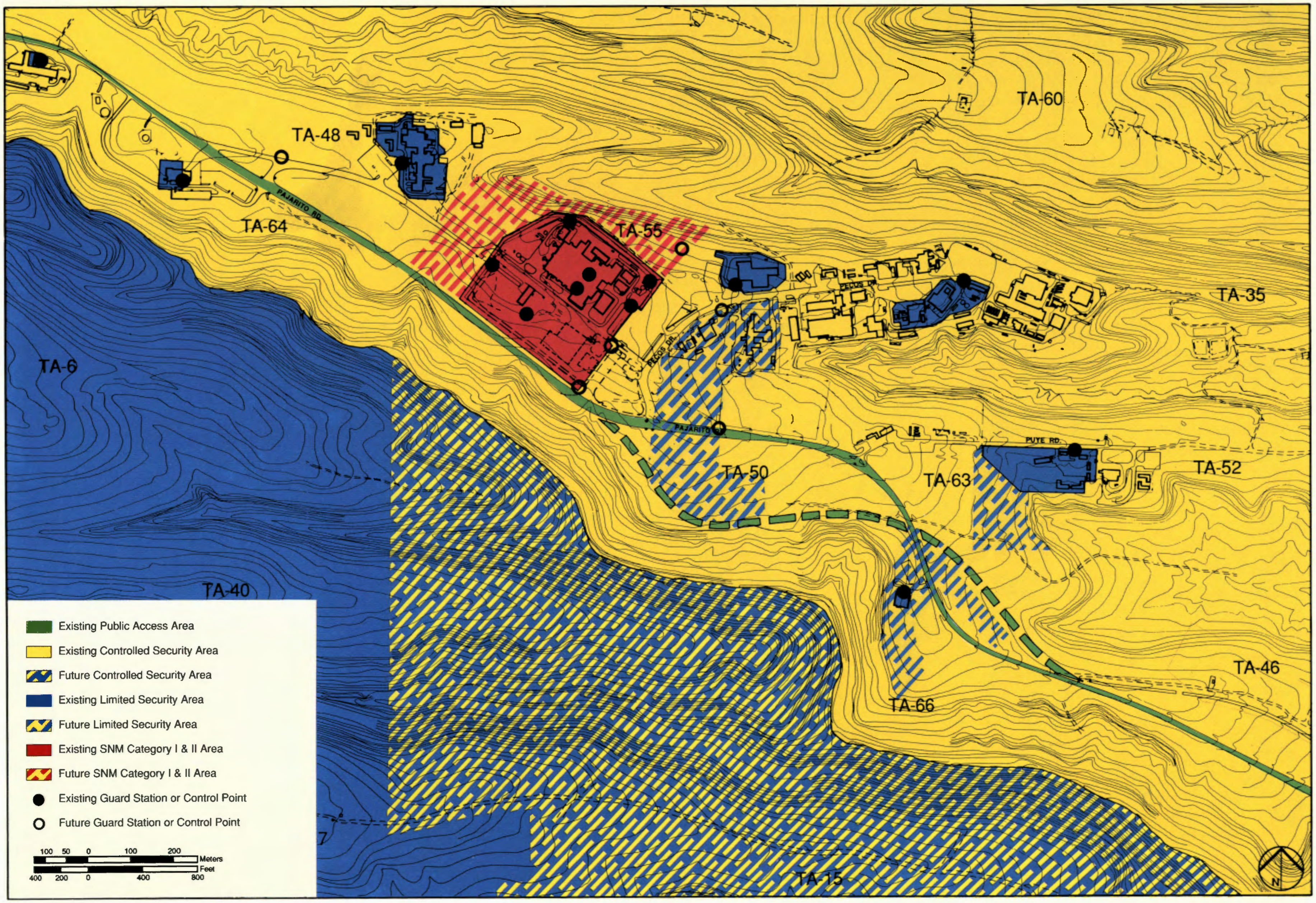
The Central Guard Facility for the entire laboratory is also located within this development area. It was placed here because it is close to both TA-3 and the SNM complex at TA-55.

*Recommendations*

- Site new programs and all expansion of existing programs requiring limited-security in existing limited-security areas, or expand existing limited-security areas, rather than creating small and separate new limited-security islands.

- Site additional programs containing materials access areas and requiring category I & II SNM security within the SNM complex.

*Existing and Future Security*



**Utilities**

Utilities in this development area are routed along all roads, canyon edges, and independently within their own corridors. As obsolete lines are replaced, they are being consolidated into the major utility corridors designated in this plan.

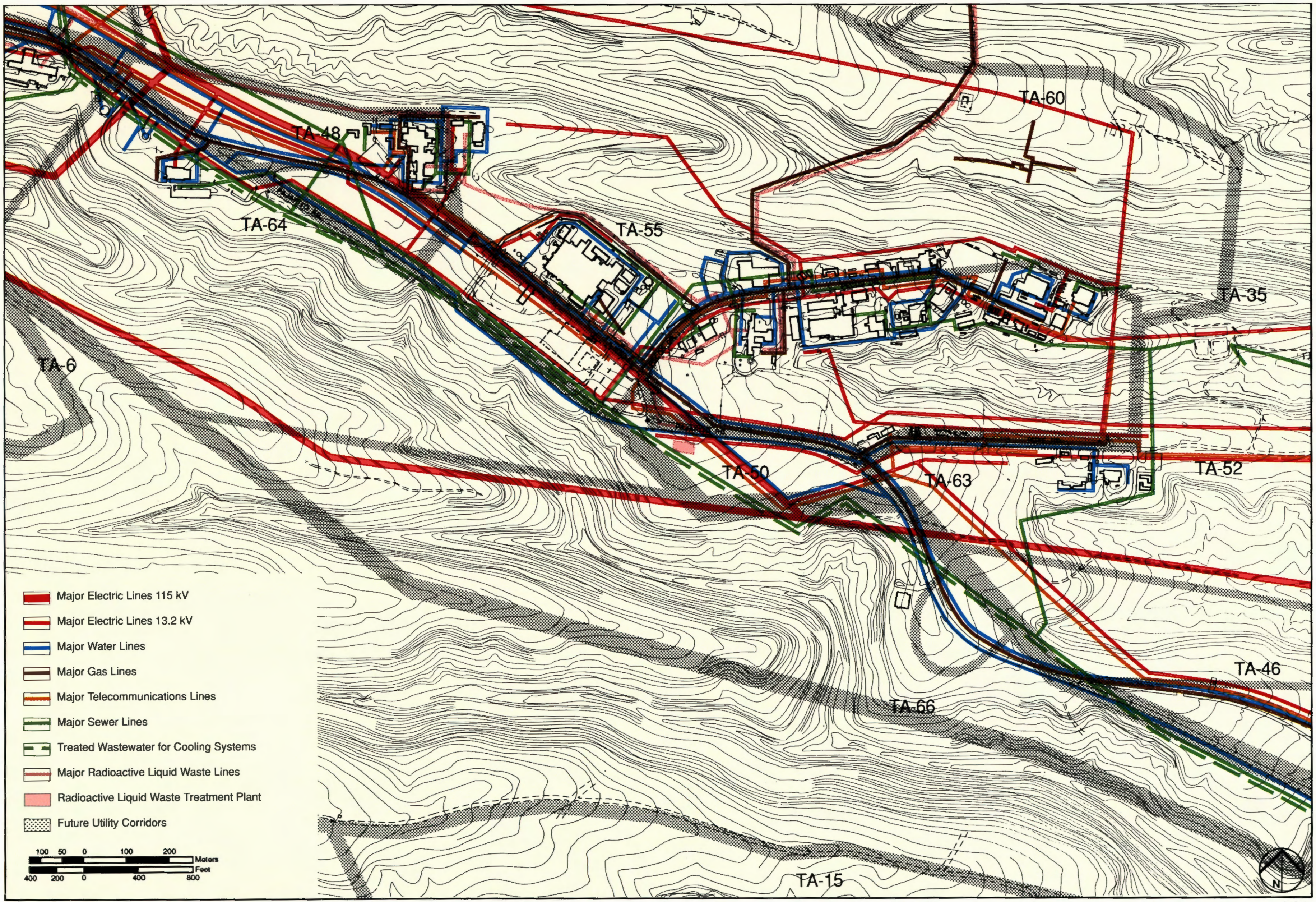
TA-55 is the Laboratory's largest user of the radioactive liquid waste system. Therefore, the radioactive liquid waste treatment plant is located close to TA-55. The other major user, the CMR building, will transfer SNM activities to the new SNM research and development laboratory in TA-55 that is now under design. Expansion of this system is extremely costly. The old radioactive liquid waste lines have been removed and replaced by double encased lines using D&D funds.

The 345-kV electric power line proposed by the Public Service Company of New Mexico will pass through the development area adjacent to TA-64 and TA-66. The line will generate a zone of high radio frequency interference.

The new Sanitary Wastewater Systems Consolidation line-item project, now in design, will service all of Pajarito Corridor West in compliance with applicable DOE and EPA regulations.

*Recommendations*

- Design sanitary hookups to septic systems in this development area for connection to the future waste water treatment plant at TA-46.
- Discourage the expansion of the radioactive liquid waste system beyond its existing service area. New users of the system should be located within the existing service area whenever possible.
- Site only functions that would not be adversely affected by potential high radio frequency interference within the area of impact unless adequate mitigation such as shielding is feasible.


TA-60
TA-48
TA-64
TA-55
TA-35
TA-6
TA-50
TA-63
TA-52
TA-46
TA-66
TA-15
Major Electric Lines 115 kV
Major Electric Lines 13.2 kV
Major Water Lines
Major Gas Lines
Major Telecommunications Lines
Major Sewer Lines
Treated Wastewater for Cooling Systems
Major Radioactive Liquid Waste Lines
Radioactive Liquid Waste Treatment Plant
Future Utility Corridors
Meters
Feet
N

**Environment, Safety, and Health**

Two faults traverse this development area in the vicinity of TAs 48 and 35. Planning and development considerations with respect to placement of facilities within fault zones focus primarily on the question of maintaining the integrity of containment systems. This question is of greatest importance regarding certain special nuclear materials and waste management facilities.

Surface rupture along the fault traces must be anticipated in the event of large earthquakes within the local fault systems. Thus, any building built within a fault zone could be seriously damaged or destroyed by surface rupture, depending on the magnitude of the rupture. This damage could result in the destruction of containment structures or the violation of containment integrity, thereby allowing the possible release of hazardous materials into the environment.

The siting of some kinds of facilities must be constrained by the location of major faults within the Laboratory. Faults and their associated fracture systems penetrate deeply into the shallow crust. Some faults in this region penetrate to a depth of at least 10 kilometers. Thus, unless completely sealed by secondary depositional processes, the faults and fault zones can provide pathways and access for widespread circulation of fluids.

There are several potentially contaminated areas in Pajarito Corridor West requiring possible remediation before they can be redeveloped. The largest one, a fenced waste-burial area south of TA-50, is proposed for redevelopment as a major parking lot to serve TAs 35, 50, and 55.

Several sources of radiation and associated radiation site evaluation circles are present within Pajarito Corridor West, which is the location of the Laboratory's SNM research and development functions. The sources are the result of programmatic research and will remain. Corresponding radiation site evaluation circles serve as protective buffer areas that surround radiation sources, and they too will remain. Detailed safety analysis may reduce the size of some circles.

The Laboratory's major wellness and emergency facilities are located in the Core Area. Pajarito Corridor is the second most populous area of the Laboratory, making it a logical location for satellite service functions. This would prevent the overuse of TA-3 facilities and would better serve employees located within the Pajarito Corridor.

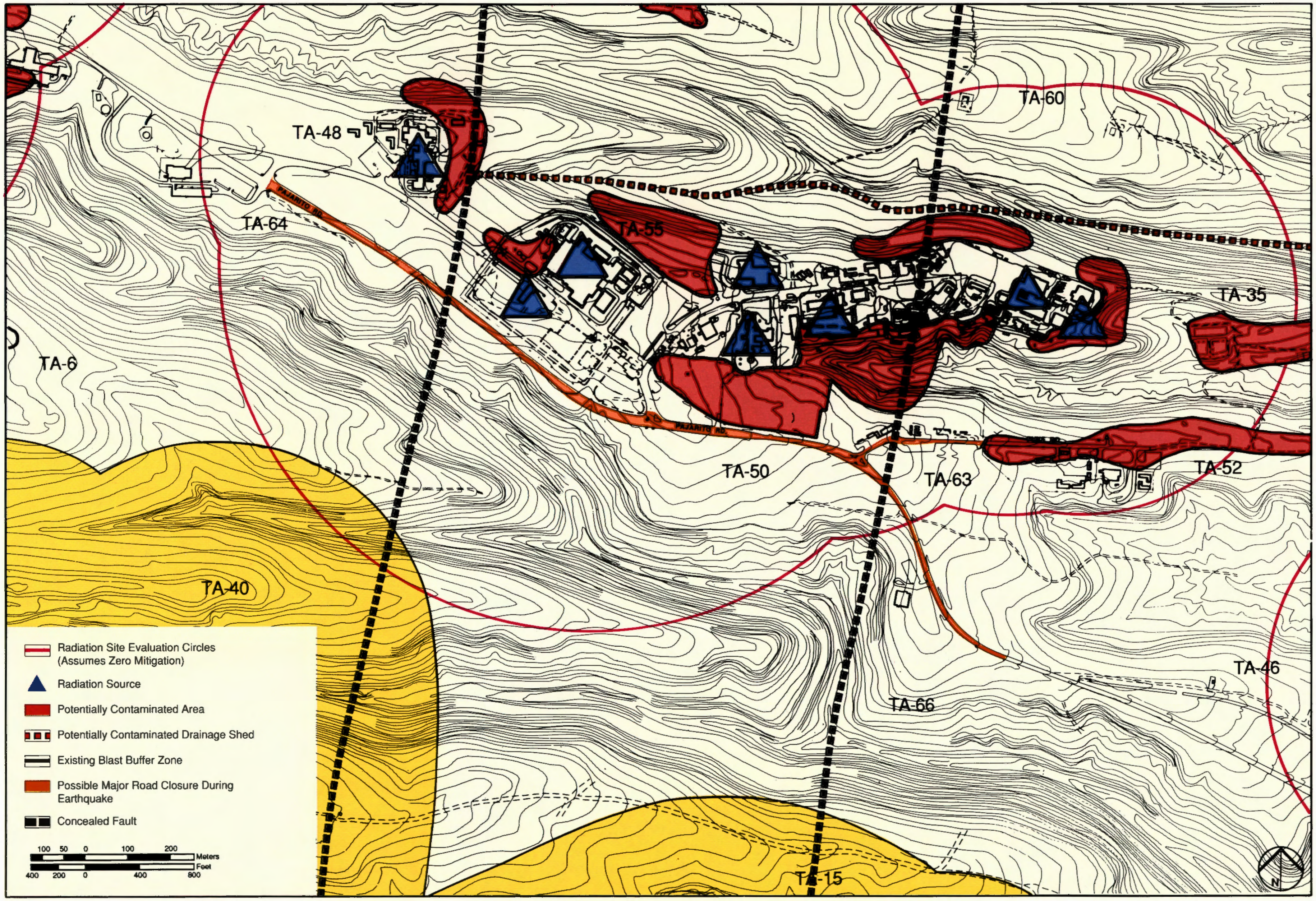
*Recommendations*

- Avoid siting SNM and waste management facilities and structures on faults that traverse the area.

- Develop TA-63 as a satellite services area. Incorporate wellness and health center facilities, a cafeteria, and perhaps administrative and technical services into the development.

- Study possible redevelopment of potentially contaminated lands.

- Reserve suitable sites for future facilities that are sources of radiation including those relocated from the Core Area. Emphasize the role of the Pajarito Corridor as the appropriate place for the Laboratory's SNM research and development and waste management efforts.


TA-48
TA-60
TA-64
TA-55
TA-35
TA-6
TA-50
TA-63
TA-52
TA-40
TA-46
TA-66
TA-15
PAJARITO RD.
Radiation Site Evaluation Circles (Assumes Zero Mitigation)
Radiation Source
Potentially Contaminated Area
Potentially Contaminated Drainage Shed
Existing Blast Buffer Zone
Possible Major Road Closure During Earthquake
Concealed Fault
100 50 0 100 200 Meters
400 200 0 400 800 Feet
N

# Pajarito Corridor Central
# (TAs 18, 46, 51, 65)

The Pajarito Corridor Central Development Area includes the following four technical areas

TA-18: Special nuclear materials criticality research;

TA-46: Laser fusion research and development;

TA-51: Environmental research and development; and

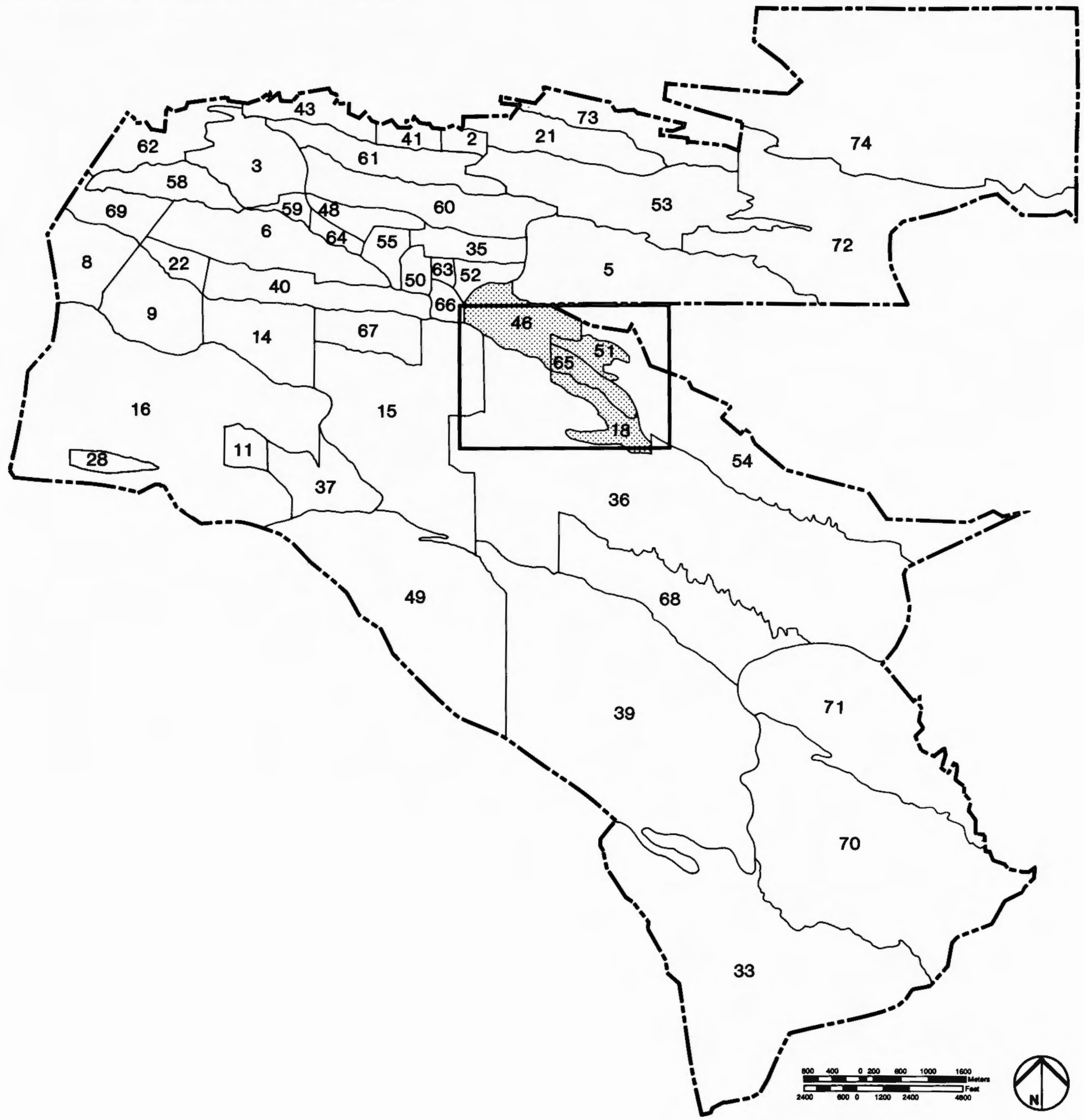
TA-65: An undeveloped technical area.

Note: TA-54 is partially shown within this development area but not discussed here in detail. It is used solely for waste management operations and is discussed in the Environment, Safety, and Health element plan.

To maintain a consistent scale of maps throughout all development areas (except for the Core Area and Two-Mile Mesa North, and Dynamic Testing Development Areas), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical areas that make up this development area and not the area defined by the development area map borders.

*Development Area Window for Pajarito Corridor Central*



## Existing Conditions

The Pajarito Corridor Central Development Area accounts for approximately 500 employees or 4% of the Laboratory's total on-site population; about 266,000 square feet, or 4% of total net Laboratory facility space, and 537 acres, or 2% of total Laboratory land area. The bar chart to the right illustrates the current acreage of each land use in this development area. This chart can be contrasted with a similar one included in the master plan section which shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

The major land use in this development area is experimental science. Waste management functions also occupy some areas on Mesita del Buey in TA-54. However, most of TA-54 is not included on the Pajarito Corridor Central maps and is not part of this development area. The western edge is included here to portray potential expansion areas for waste management functions and to depict the interrelationships for planning purposes.

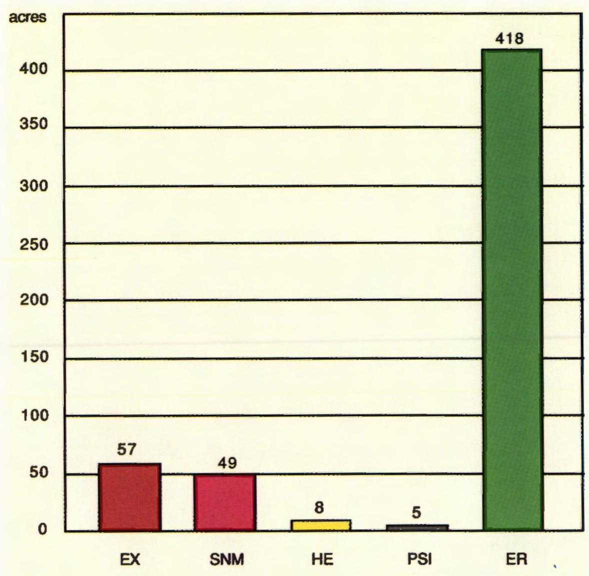
TA-18 is a materials access area that has nuclear criticality research capabilities unique within the DOE complex. These facilities use distance rather than shielding to buffer neutron emissions.

Chemistry laser science and applied engineering are the main focuses of investigation in TA-46.

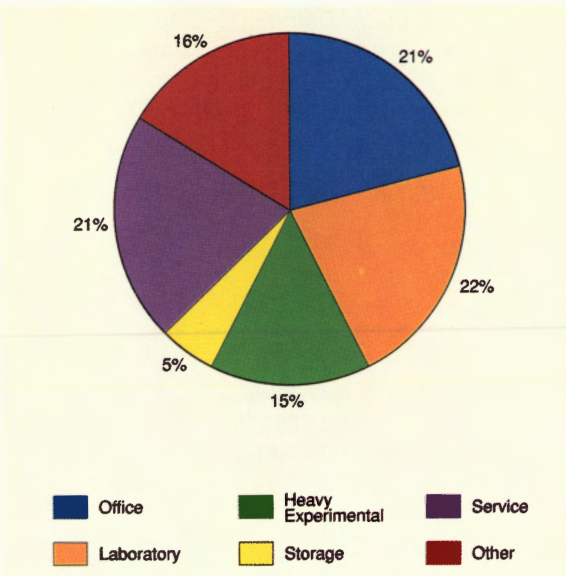
TA-51 is used for environmental research, exposure and field studies.

TA-54 is used for radioactive solid and hazardous chemical waste management. This technical area is discussed within the Environment, Safety, and Health element of this plan.

*Existing Land Use Analysis*




*Existing Space Categories*

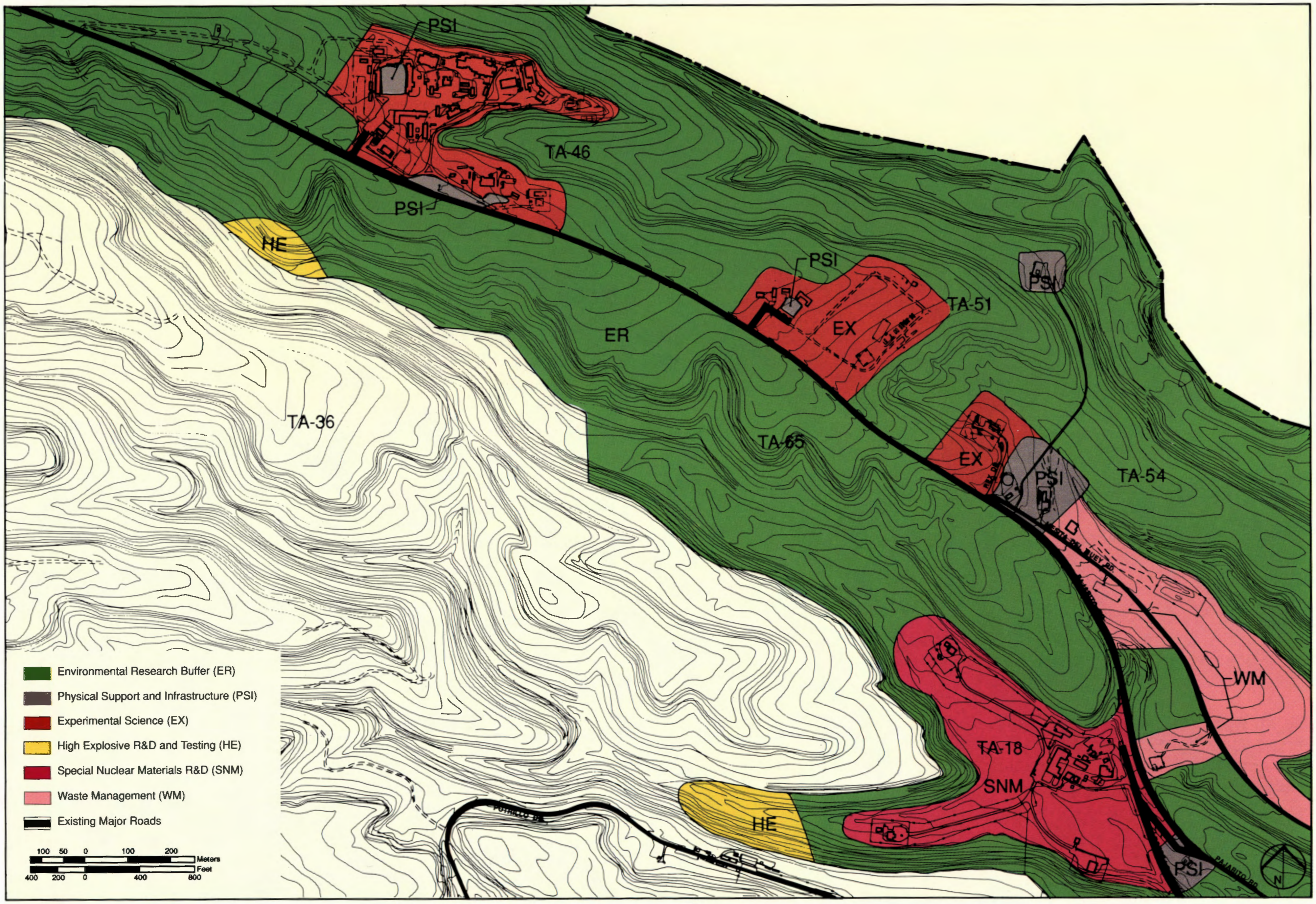



*Note: TA-54 is not included in this analysis, (see text).*

### Trends

Pajarito Corridor Central functions are land- and/or facilities-intensive and have relatively small populations. Cleared and uncleared facilities are expanding toward each other, thereby increasing potential security conflicts.

*Existing Land Uses*



## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints.

Developable sites within the Pajarito Corridor Central Development Area are available west of TA-46, north and west of TA-51. Potentially developable land is also available at TA-65, but it may be partially restricted by the TA-18 neutron emission zone as depicted by the radiation site evaluation circles shown on the potential hazards map on page 163.

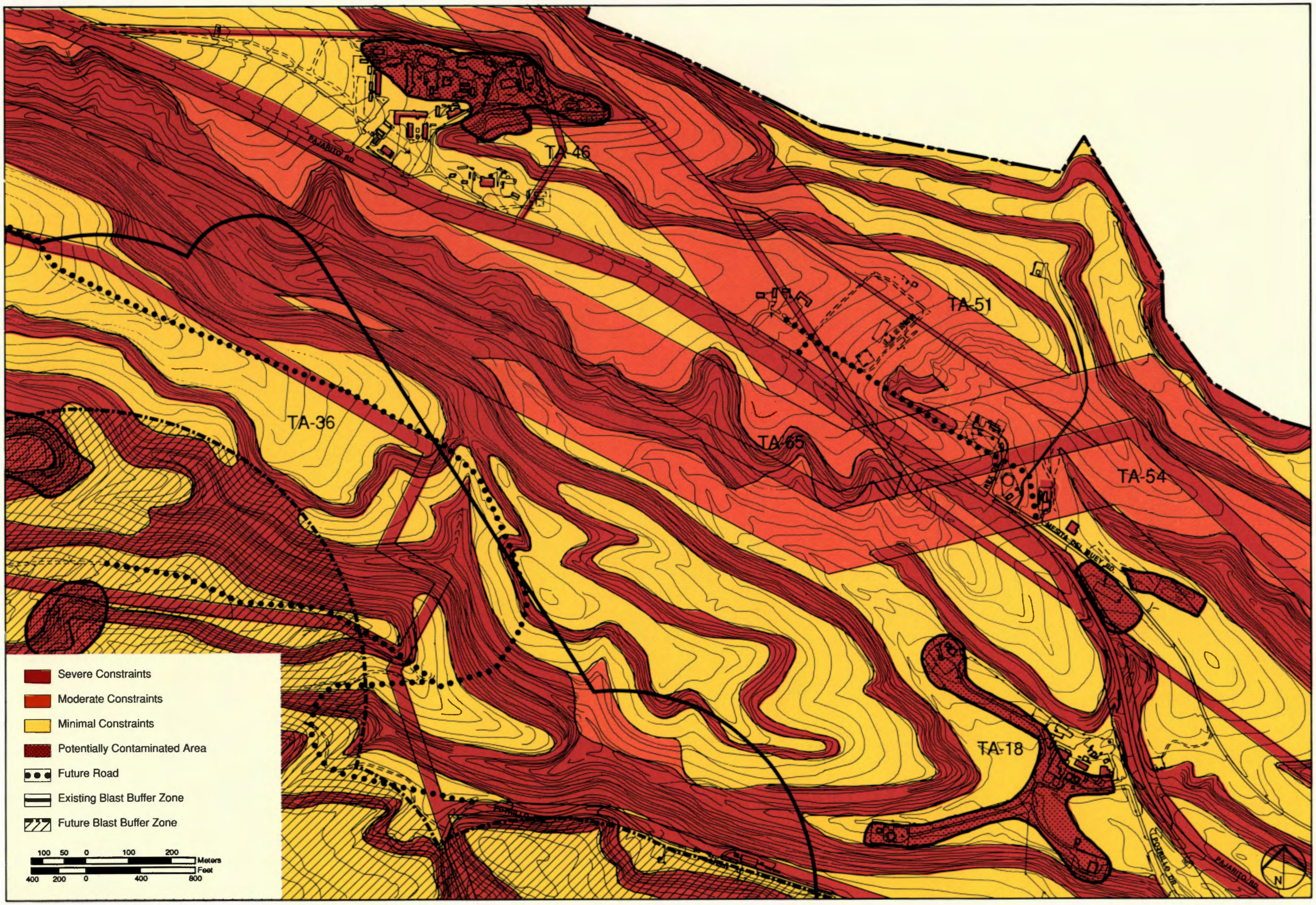
The 345-kV power line proposed by the Public Service Company of New Mexico will run through this development area. This will create a zone in which the use of instruments sensitive to high radio frequency interference would not be advisable without significant shielding.

Utility corridors also restrict expansion areas within Pajarito Corridor Central. An existing overhead power line cuts through some of the developable sites closest to the north and south sides of Pajarito Road.

Technical Area 18 is located within a flood plain. It is constrained by topography and buffer distances that must be maintained to operate the remote critical assembly areas (kivas) located here.

The whole southern boundary of Pajarito Corridor Central abuts high-explosives land uses and is close to the edge of current blast fragment hazard buffer zones.

*Opportunities and Constraints*



## Pajarito Corridor Central Master Plan

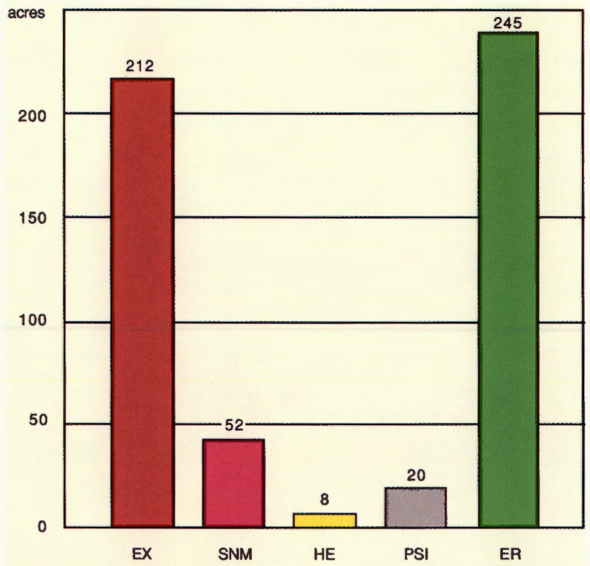
### Future Land Uses

Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses.

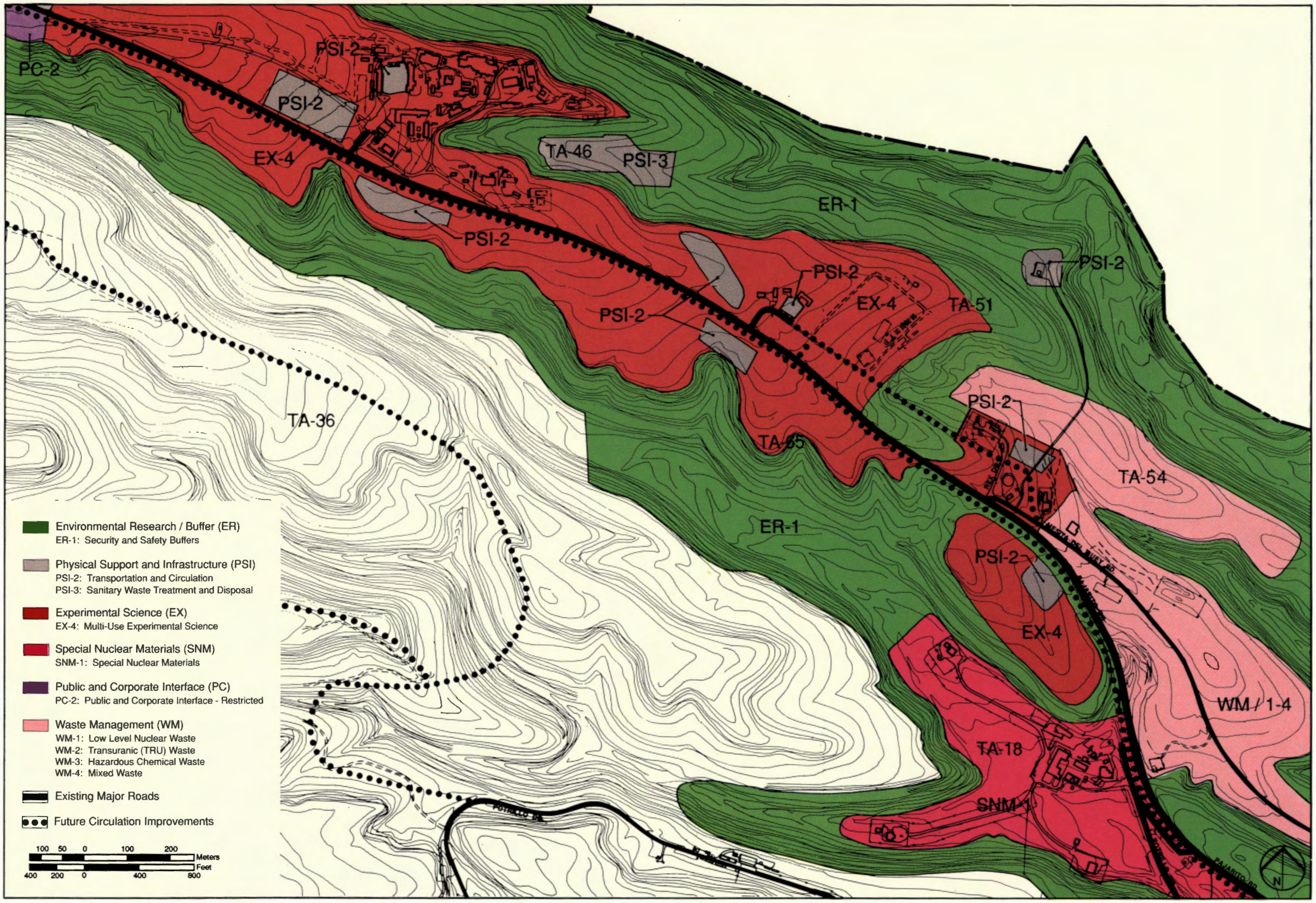
The Pajarito Corridor Central Development Area will continue to provide additional locations for the kinds of experimental science and waste management research functions and land uses currently there. Technical areas 18, 51, and 54 will remain, respectively, the focus of criticality research, environmental science, and waste management functions. The opportunity also exists to redevelop portions of TA-46 presently occupied by small, old, temporary, and substandard buildings.

Room for programmatic expansion exists throughout most of Pajarito Corridor Central. TA-46 can expand westward, and TA-51 can expand to the east and west. A string of undeveloped parcels exists along the south side of Pajarito Road which also provides room for future programmatic expansion. Use of the undeveloped lands northwest of TA-54 for expansion of waste management functions may also be possible. The developable sites in this area are characterized by moderate slopes.

*Future Land Uses Anaylsis*




*Note: TA-54 is not included in this analysis.*


PC-2
PSI-2
PSI-2
EX-4
TA-46
PSI-3
ER-1
PSI-2
PSI-2
PSI-2
EX-4
TA-51
PSI-2
TA-36
TA-55
PSI-2
TA-54
ER-1
PSI-2
EX-4
WM / 1-4
TA-18
SNM-1
PAJARITO RD
N
Environmental Research / Buffer (ER)
ER-1: Security and Safety Buffers
Physical Support and Infrastructure (PSI)
PSI-2: Transportation and Circulation
PSI-3: Sanitary Waste Treatment and Disposal
Experimental Science (EX)
EX-4: Multi-Use Experimental Science
Special Nuclear Materials (SNM)
SNM-1: Special Nuclear Materials
Public and Corporate Interface (PC)
PC-2: Public and Corporate Interface - Restricted
Waste Management (WM)
WM-1: Low Level Nuclear Waste
WM-2: Transuranic (TRU) Waste
WM-3: Hazardous Chemical Waste
WM-4: Mixed Waste
Existing Major Roads
Future Circulation Improvements
100 50 0 100 200 Meters
400 200 0 400 800 Feet

### Future Trends – Population and Facilities

The population in Pajarito Corridor Central is projected to grow at a faster rate than the Laboratory average; however, the absolute increase in population will be small.

Environmental research and waste management activities will increase as environmental regulations become more restrictive, thereby adding to the personnel and facilities required here. Consequently, associated office, laboratory, and storage space will experience moderate growth in Pajarito Corridor Central. One funded major project of Laboratory-wide significance will be constructed at TA-46: The Sanitary Wastewater Systems Consolidation project will be designed to prevent violations of waste water standards and to meet EPA requirements.

## Development Sites

The development sites map identifies sites in the Pajarito Corridor Central Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.

- "Future parking" sites are best suited for parking needs of future buildings.

- "Buildings to building" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.

- "Parking areas to buildings"means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

Relocating or redeveloping parking lots in this development area can create sites for programmatic expansion. For example, at TA-46, parking areas inside the security fence could be relocated outside, thereby releasing land for facilities expansion. TA-65 is wholly undeveloped and there are no programmatic plans for this area in the near term. A developable site exists between TA-54 and TA-51 that could be used for the expansion of TA-54 activities. This site has moderate slopes and an overhead power line running through a portion of the site.

*Recommendations*

- Retain the TA-18 criticality facilities site as an important research resource.

- Explore the feasibility of expanding the TA-54 waste treatment and disposal functions into the area northwest of Mesita del Buey.

- Expand TA-51 environmental science functions on available developable lands.

- Explore the safety and security implications of using the sites above and to the west of TA-18 for future programmatic expansion of Pajarito Corridor functions, including waste management functions.

- Develop the western part of TA-46 for multi-use experimental science.

- Relocate existing parking that is currently within the TA-46 security fence and redevelop remaining area with permanent, limited-security facilities.

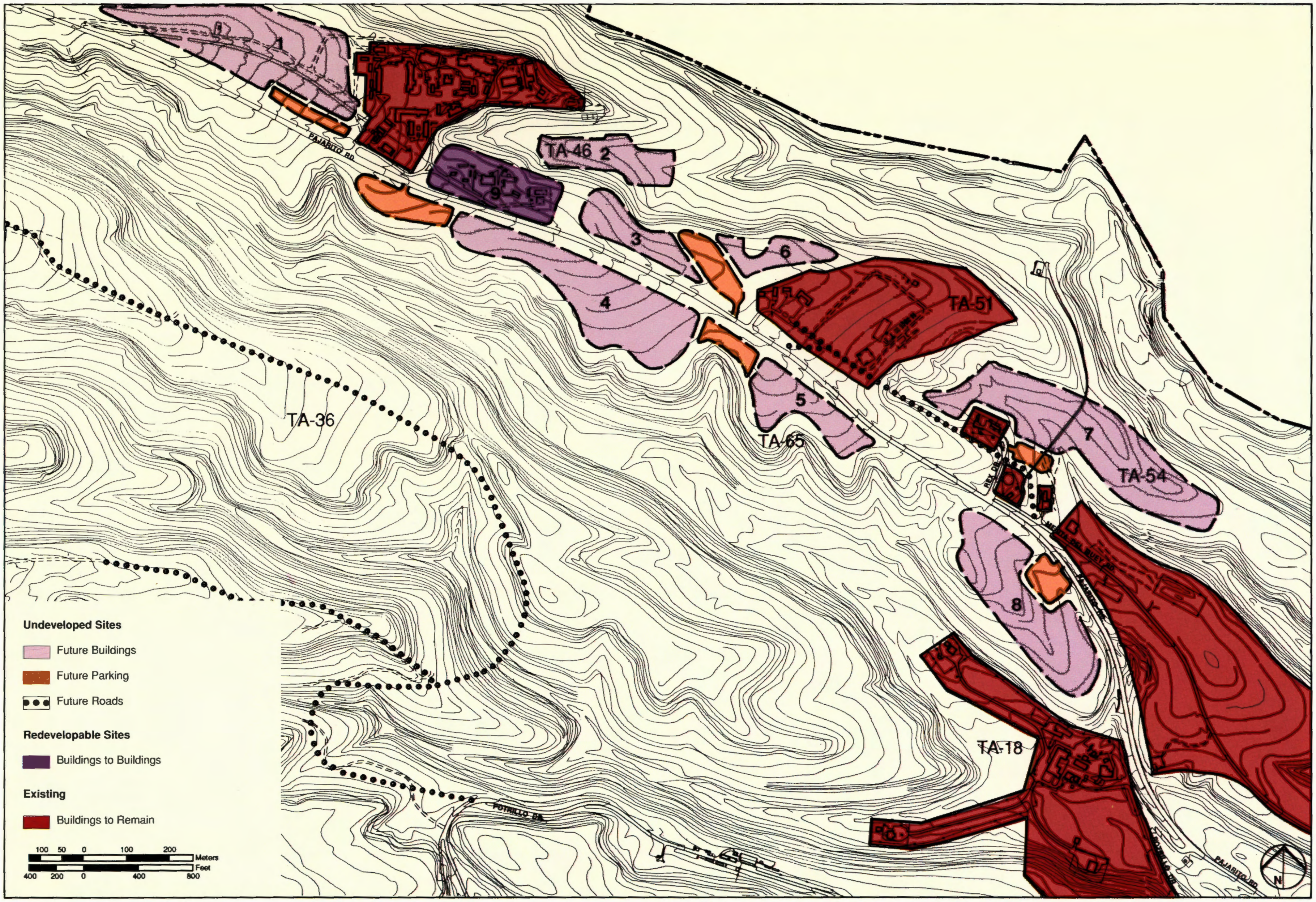
*Pajarito Corridor Central Development Sites Evaluation*

| Undeveloped Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 1 | 17 ac. | Controlled/ Limited | EX-4 | This is the only area for TA-46 expansion and the preliminary location of a technical support facility at TA-46. An existing utility corridor bisects the site and should be relocated along Pajarito Road. |
| 2 | 6 ac. | Controlled | PSI-3 | Funded Consolidated Sanitary Wastewater Treatment Plant site. |
| 3 | 5 ac. | Controlled | EX-4 | Future site for potential TA-51 environmental research expansion. |
| 4 | 16 ac. | Controlled/ Limited | EX-4 | Future site for permanent programmatic expansion related to Pajarito Corridor functions. Adjacent to utility corridor and high radio frequency interference area. |
| 5 | 6 ac. | Controlled Limited | EX-4 | Future site for permanent programmatic expansion related to Pajarito Corridor functions. Adjacent to utility corridor to the north and within high radio frequency interference area due to proposed 345-kV line to southeast. |
| 6 | 3 ac. | Controlled | EX-4 | TA-51 environmental research expansion area. |
| 7 | 19 ac. | Controlled | EX-4 & WM-1 | Possible expansion area for radioactive waste treatment and disposal functions now at TA-54. Bisected by the proposed 345-kV line and related high radio frequency interference area. |
| 8 | 14 ac. | Controlled/ Limited | EX-4 | Future EX-4 functions undetermined and may be limited by TA-18 neutron emission zone. Proposed 345-kV line and related high radio frequency interference area are adjacent on west side. |
| Total | 86 ac. | | | |

| Redevelopable Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 9 | 7 ac. | Controlled | EX-4 | Future site for permanent programmatic expansion related to Pajarito Corridor functions. |
| Total | 7 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.

*Development Sites*



**Transportation/Circulation**

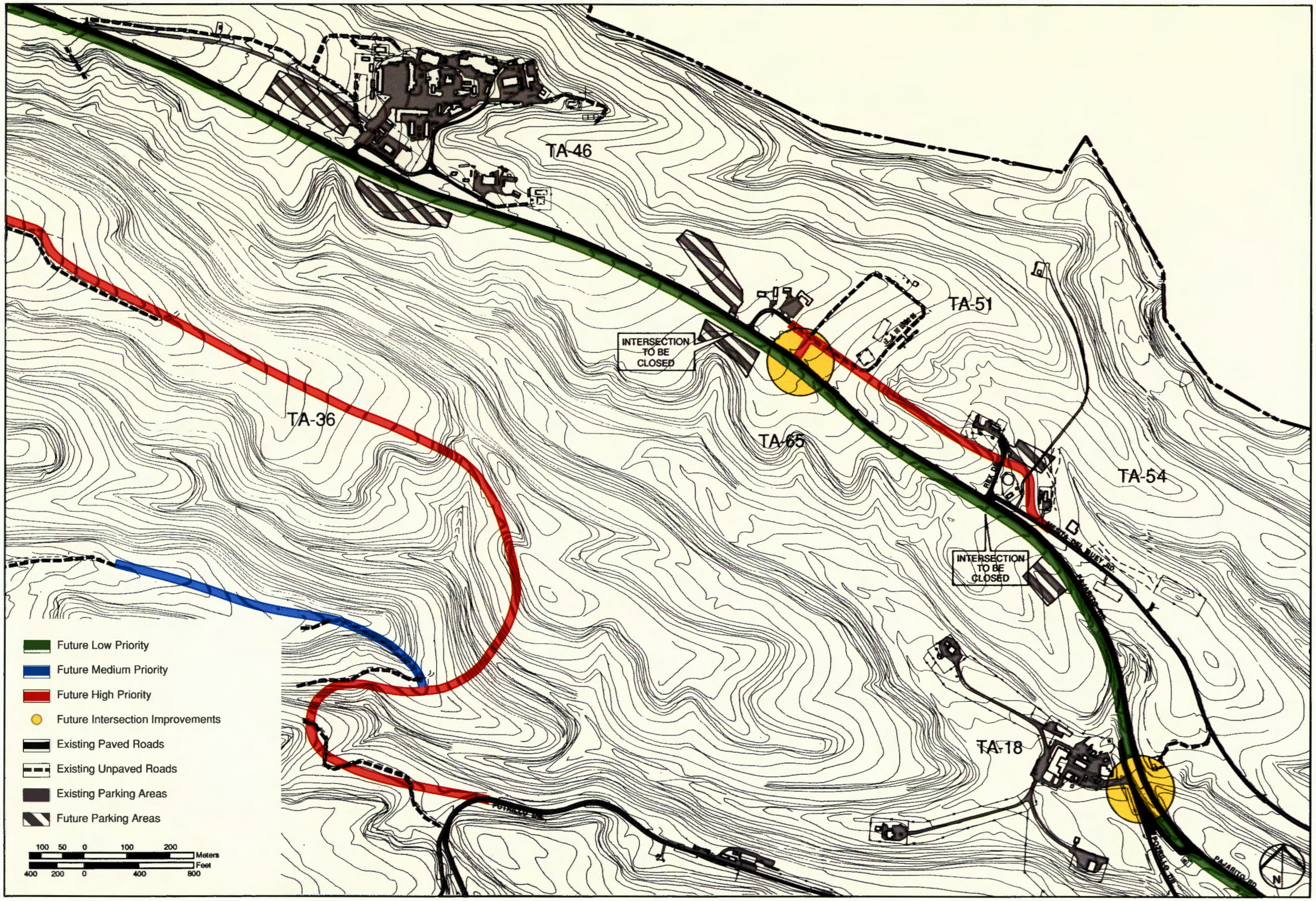
There are four basic transportation improvements proposed for the Pajarito Corridor Central Development Area. Existing intersections of Pajarito Road with the TA-51 and TA-54 access roads would be replaced with a newly designed four-way intersection at TA-51. This would provide better and safer access to these areas and TA-65. A new connector road will be built from this new intersection, through TA-51, to link up with Mesita del Buey Road. The current unsafe intersection of Mesita del Buey Road and Pajarito Road would thereby be eliminated. The other traffic safety improvements involve redesigning the Pajarito Road/Potrillo Road intersection, and widening Pajarito Road throughout its length.

*Recommendations*

- Identify a source of funding and proceed with planned intersection improvements at Pajarito/TA-51, at Pajarito Road/Potrillo Road, and the related internal roadway improvements.

- Widen Pajarito Road as planned to improve roadway capacity and traffic safety.

*Existing and Future Transportation/Circulation Improvements*



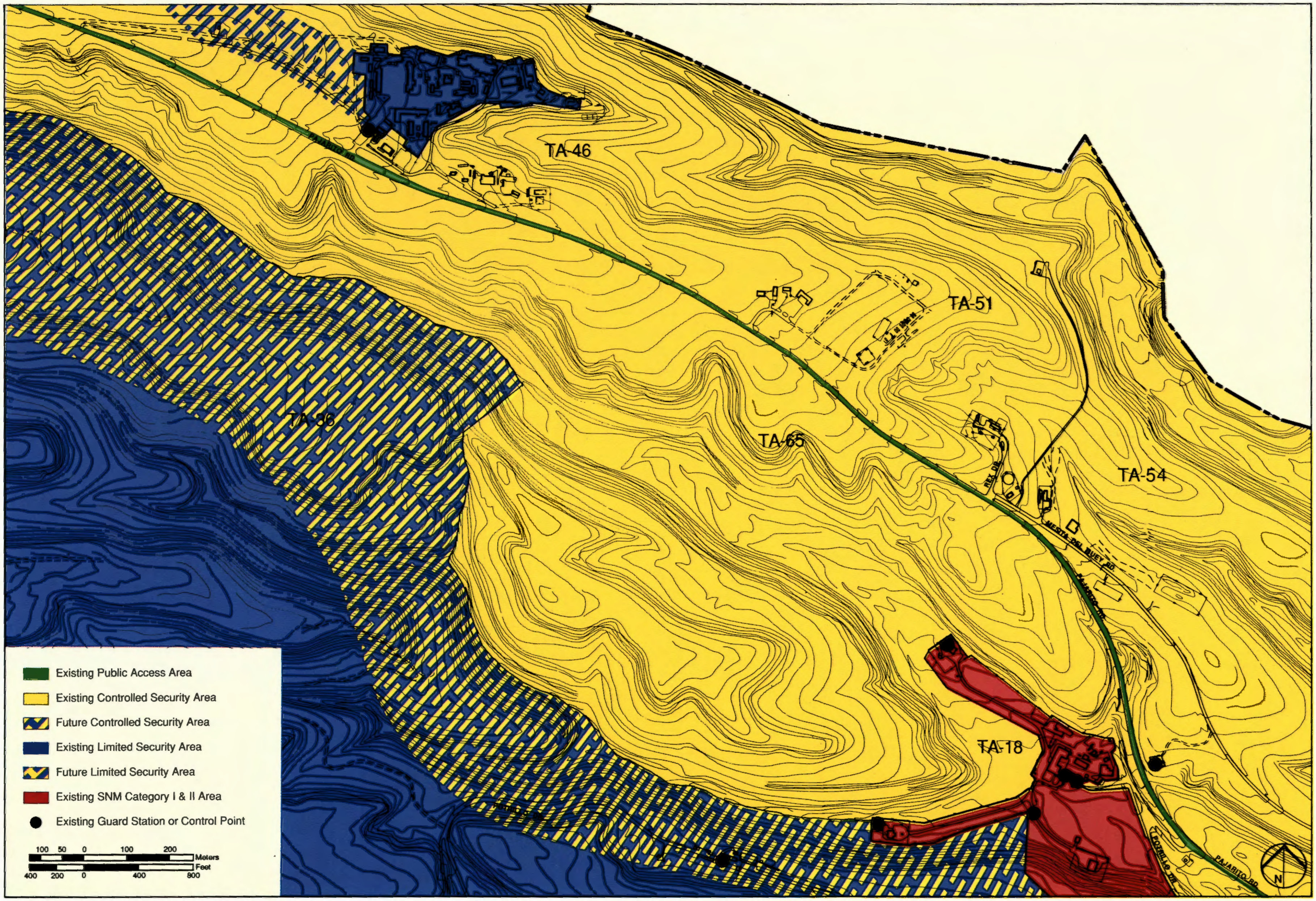
**Security**

Pajarito Corridor Central is used for basic research requiring limited security at TA-46, category I & II SNM security at TA-18, and environmental research requiring controlled security at TA-51. The remainder of the area is undeveloped.

*Recommendations:*

- Expand programs requiring materials access areas and category I & II SNM security only within or adjacent to the existing category I & II SNM security area in TA-18.
- Site any additional facilities requiring limited-security within or adjacent to the existing limited-security area to limit the number of security islands within the development area.
- Reserve the area directly west of the TA-46 fence for classified activities because there is no room for such expansion in the other three directions.
- Reserve the area along Pajarito Road and on the north edge of the TA-46 mesa for unclassified functions.

*Existing and Future Security*



### Utilities

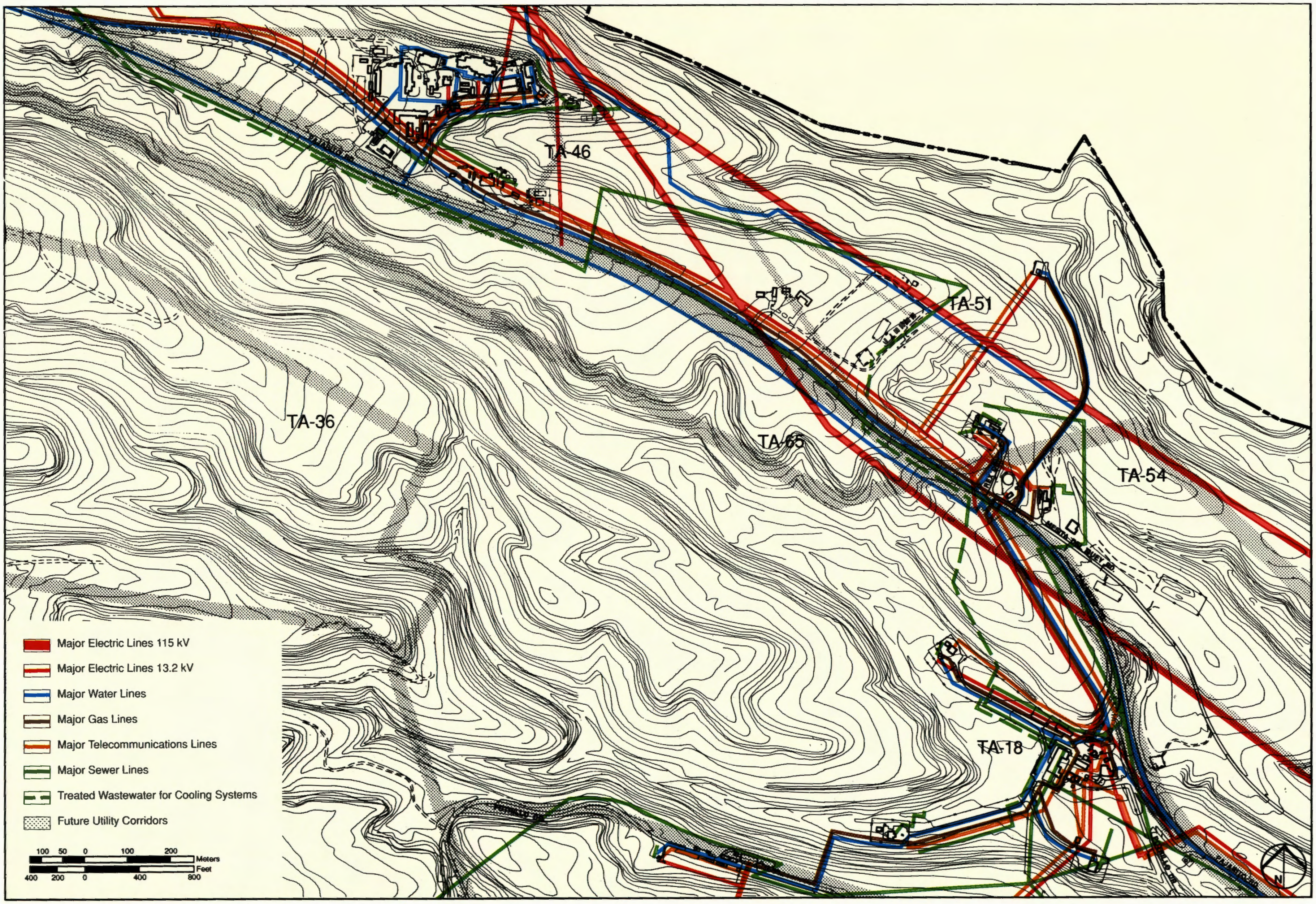
TA-18 has an inadequate water supply to meet fire protection needs. This system must be upgraded to satisfy this requirement.

The 345-kV electric power line proposed by the Public Service Company of New Mexico will pass through the Pajarito Corridor Central development area at TAs 51, 54, and 65. The line will emit high radio frequency interference.

The Laboratory is replacing its aging and dispersed sanitary waste water treatment facilities with one central facility. This will be located on a shelf south of TA-46 in Pajarito Corridor Central. This consolidation will be beneficial to the Laboratory because it will improve the efficiency and effectiveness of sanitary waste water treatment and bring the Laboratory into compliance with state regulations. The new facility will establish a gravity-fed sanitary sewer service area above the 7,000 foot elevation and will service TAs 18, 46, 51, and 54. The remainder of Pajarito Corridor Central (to the southeast) is located outside the proposed sanitary sewer service area.

*Recommendations*

- Upgrade water supply for fire protection at TA-18.
- Limit development below the 7000 foot elevation to minor facilities that can be served effectively by septic tanks, or costly pumping stations will have to be constructed.
- Site only functions that would not be adversely affected by potential high radio frequency interference within the area of impact unless adequate mitigation such as shielding is feasible.


TA-46
TA-51
TA-36
TA-65
TA-54
TA-18
Major Electric Lines 115 kV
Major Electric Lines 13.2 kV
Major Water Lines
Major Gas Lines
Major Telecommunications Lines
Major Sewer Lines
Treated Wastewater for Cooling Systems
Future Utility Corridors
100 50 0 100 200 Meters
400 200 0 400 800 Feet
N

## Environment, Safety, and Health

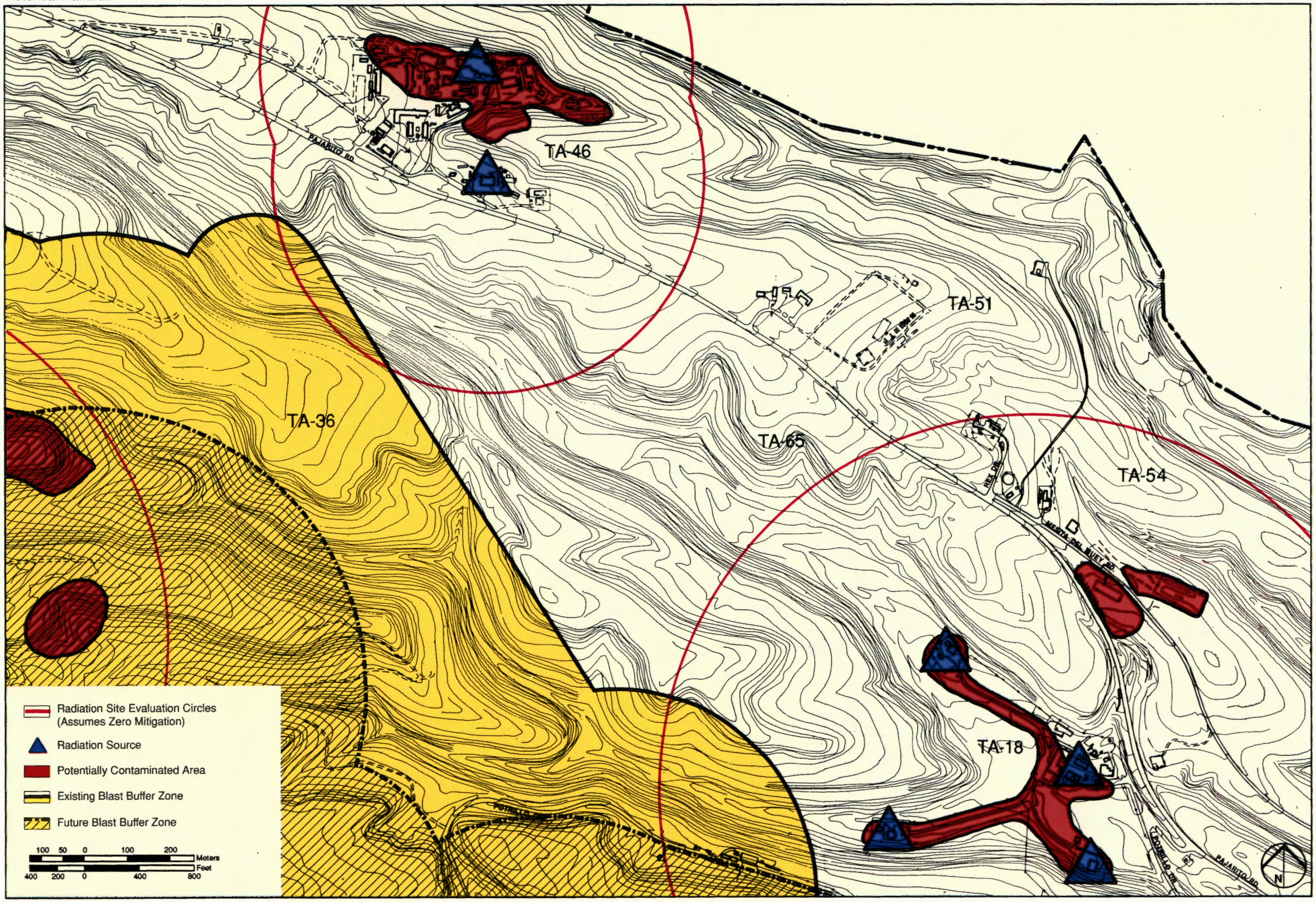
Potentially contaminated areas have been identified within Pajarito Corridor Central, including contamination in the vicinity of TA-46 and TA-18. Research functions at these technical areas are still active, so the potentially affected areas will not be redeveloped in the near future.

Sources of radiation and related radiation site evaluation circles exist within and around TA-46 and TA-18. The sources are used by programmatic research conducted in both technical areas. The circles are protective buffer zones that surround radiation sources. Both the radiation sources and circles will remain.

The blast fragment hazard buffer zone in this development area is the result of high-explosives programmatic needs and will remain.

*Recommendations*

- Reserve suitable sites for future facilities that are sources of radiation including those relocated from the Core Area. Emphasize the role of the Pajarito Corridor as the appropriate place for the Laboratory's SNM research and development efforts.
- Remediate any contaminated areas in the Pajarito Corridor Central Development Area so that they can be redeveloped.
- Investigate the feasibility of using some of the undeveloped sites identified on the development sites map for expansion of waste management functions.


TA-46
PAJARITO RD
TA-51
TA-36
TA-65
TA-54
MESITA DEL BUEY RD
TA-18
PAJARITO RD
N
Radiation Site Evaluation Circles (Assumes Zero Mitigation)
Radiation Source
Potentially Contaminated Area
Existing Blast Buffer Zone
Future Blast Buffer Zone
100 50 0 100 200 Meters
400 200 0 400 800 Feet

# East Jemez Corridor and Sigma Mesa (TAs 2, 41, 60, 61)

The East Jemez Corridor and Sigma Mesa Development Area includes the following four technical areas:

TA- 2: Experimental science, Omega West Reactor;

TA-41: SNM, engineering design/development of nuclear components;

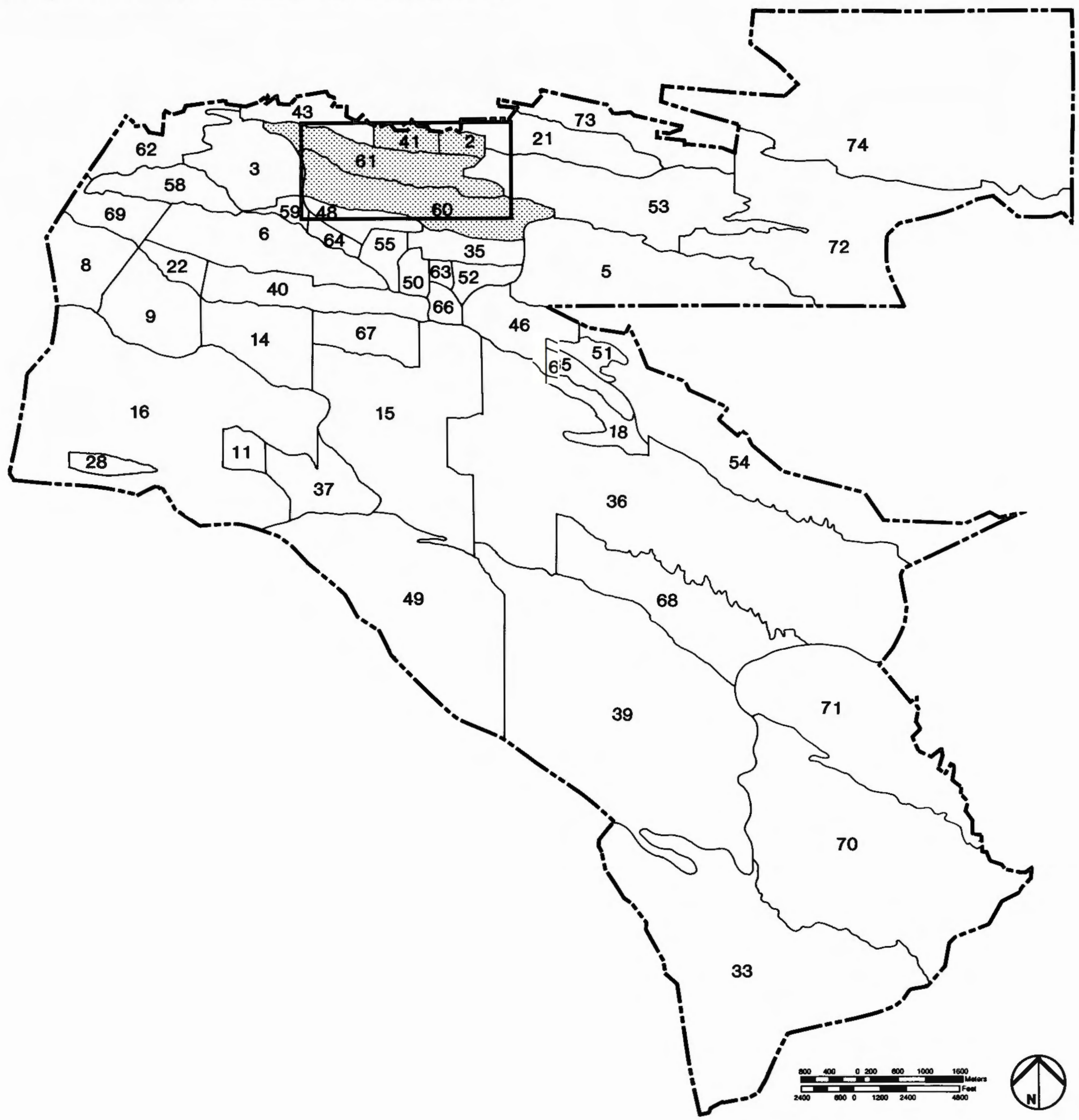
TA-60: Sigma Mesa, physical support and infrastructure, some support services, subcontractor physical support, and the Test Fabrication Facility; and

TA-61: East Jemez Road physical support and infrastructure, including the sanitary landfill and sand, gravel, and concrete operations.

To maintain a consistent scale of maps throughout all development areas (except for the Core Area and Two-Mile Mesa North, and Dynamic Testing Development Areas), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical areas that make up this development area and not the area defined by the development area map borders.

*Development Area Window for East Jemez Corridor and Sigma Mesa*



## Existing Conditions

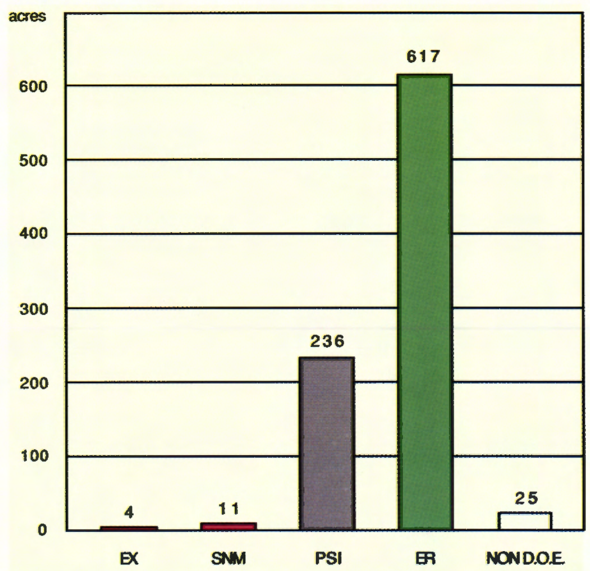
This development area houses 165 employees, or less than 1% of the total Laboratory on-site population; contains about 209,000 square feet, or 3% of the total net Laboratory facility space; and encompasses 893 acres or 3% of the total Laboratory land. The bar chart to the right illustrates the current acreage of each land use in this development area. This chart can be contrasted with a similar one included in the master plan section which shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

The major land use in this development area is physical support and infrastructure with smaller sites for experimental science and special nuclear materials.

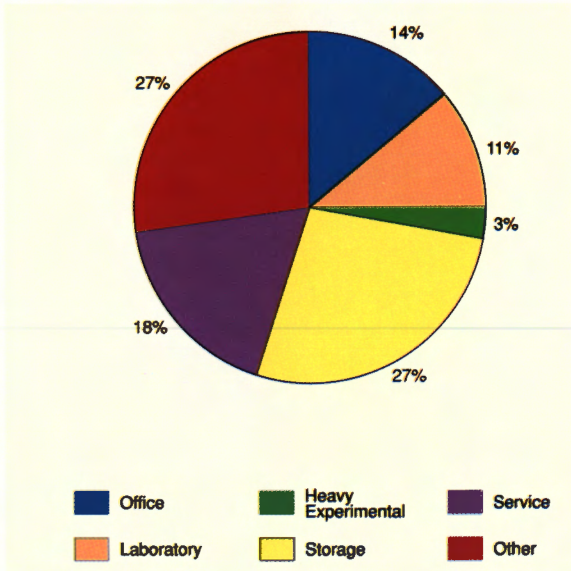
### Trends

Much of the developable land along East Jemez Road is now within the boundaries of the Laboratory/county sanitary landfill. Some of Sigma Mesa is used for the storage of large one-of-a-kind items. A temporary outside storage area has been designated here in compliance with applicable Laboratory environment, safety, and health guidelines. These areas possess land that could be put to higher and better uses when circumstances warrant.

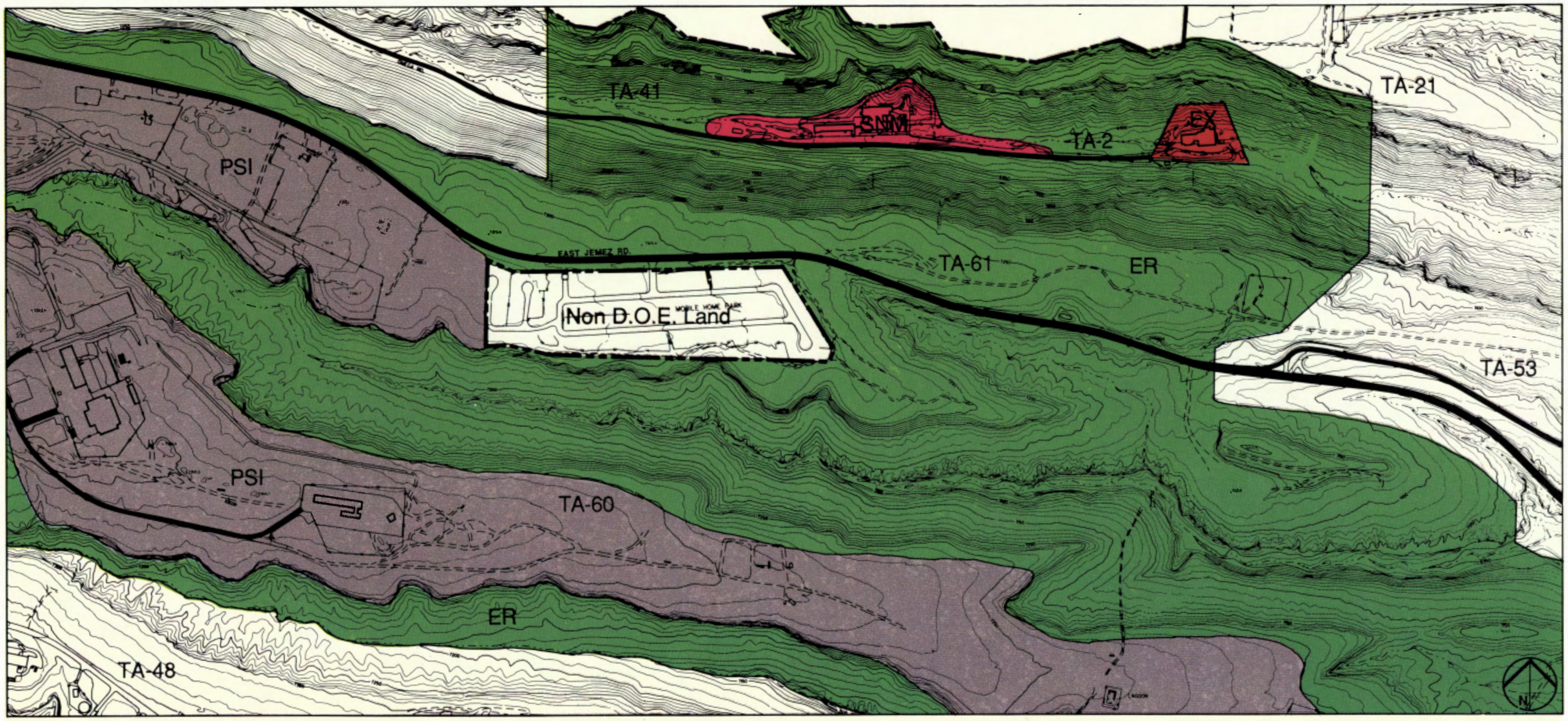
*Existing Land Use Analysis*




*Existing Space Categories*



*Existing Land Uses*




Environmental Research / Buffer (ER)
Physical Support and Infrastructure (PSI)
Experimental Science (EX)
Special Nuclear Materials R&D (SNM)
Existing Major Roads

## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints.

Major development opportunities exist in the East Jemez Corridor and Sigma Mesa Development Area. These sites are located along East Jemez Road, Eniwetok Drive, and along the Sigma Mesa access road.

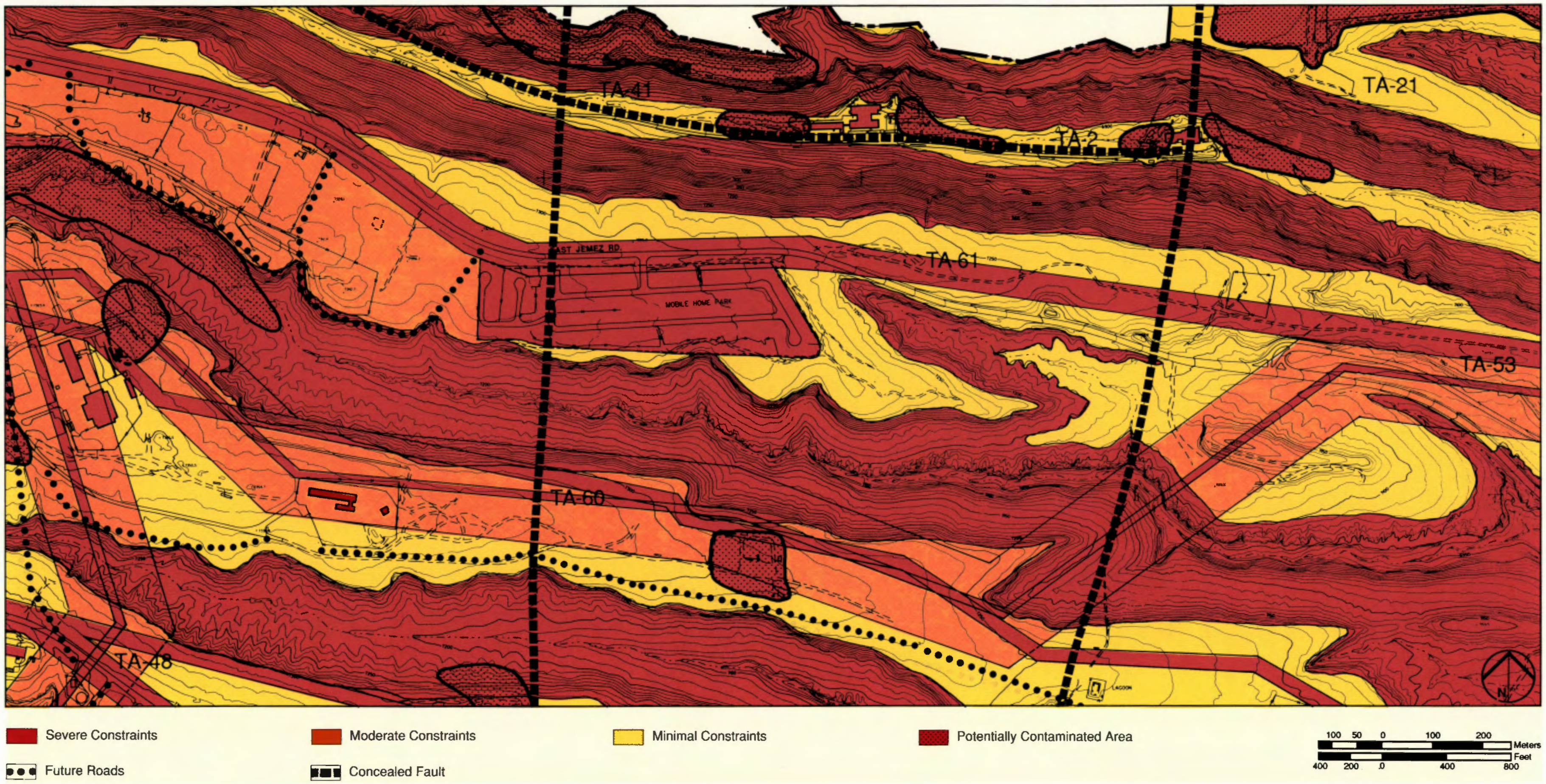
East Jemez Corridor (TA-61) is mostly undeveloped except for a privately owned mobile home park. While it may be advantageous for the Laboratory to acquire the trailer park, this option is not being pursued because of cost considerations.

The sanitary landfill area in TA-61 could be redeveloped but is constrained by poor soil compaction, settlement due to refuse material decomposition, and landfill-generated gases such as methane. These conditions will limit future reuse options. The contractor's yards in the area can be relocated, making available more developable parcels or landfill space. However, a new landfill site should be permitted expeditiously in accordance with the Sanitary Landfill Site Locations Study so that this site is preserved for higher and better uses.

Sigma Mesa (TA-60) offers sizable tracts of land, centrally located, for the relocation and consolidation of physical support functions.

Technical Areas 2 and 41 are small, linear parcels of land in Los Alamos Canyon that are located immediately below and south of the Los Alamos townsite. These two technical areas have no expansion space, and their future functions are constrained by their poor access, relative isolation, and proximity to privately owned land on the mesa top in Los Alamos townsite to the immediate north.

*Opportunities and Constraints*



## East Jemez Corridor and Sigma Mesa Master Plan

### Future Land Uses

Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses.

It is recommended that physical support and technical service activities expand into TA-60 and TA-61. Sigma Mesa and East Jemez Road are appropriate locations for these activities because they are both close to the Core Area and are well served by existing roads. East Jemez Road is the Laboratory's designated truck route. Placing shipping and receiving functions here eliminates unnecessary truck traffic through TA-3, thereby enhancing safety and security there, while also freeing up the existing facilities in TA-3 for uses that are more appropriate.

Relocating the support services subcontractor and similar functions to Sigma Mesa would still leave them accessible to the main Laboratory areas while providing room for support services expansion. These industrial functions are more appropriate in areas less densely populated than the Core and their relocation would provide space for more experimental and theoretical/computational science functions in the Core Area.

The private mobile home park in TA-61 could be relocated and the land acquired for Laboratory use.

The joint Los Alamos National Laboratory and Los Alamos County landfill should be relocated. This would free this valuable land for redevelopment.

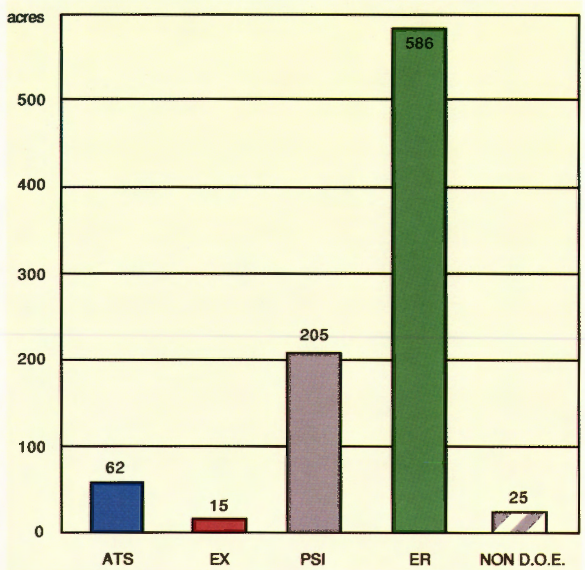
The TA-2 research reactor is nearing the end of its useful life and a replacement reactor has been proposed. The site is small, in a relatively narrow canyon bottom, and is directly below the townsite. Decommissioning costs would be included in a replacement proposal. The reactor facility would likely be decommissioned except for its existing office space. Reuse of the TA-2 office facilities for light duty experimental science is a possibility.

TA-41 can be redeveloped at reasonable cost for EX-4 functions that are nonhazardous and require isolation but not a high level of security.

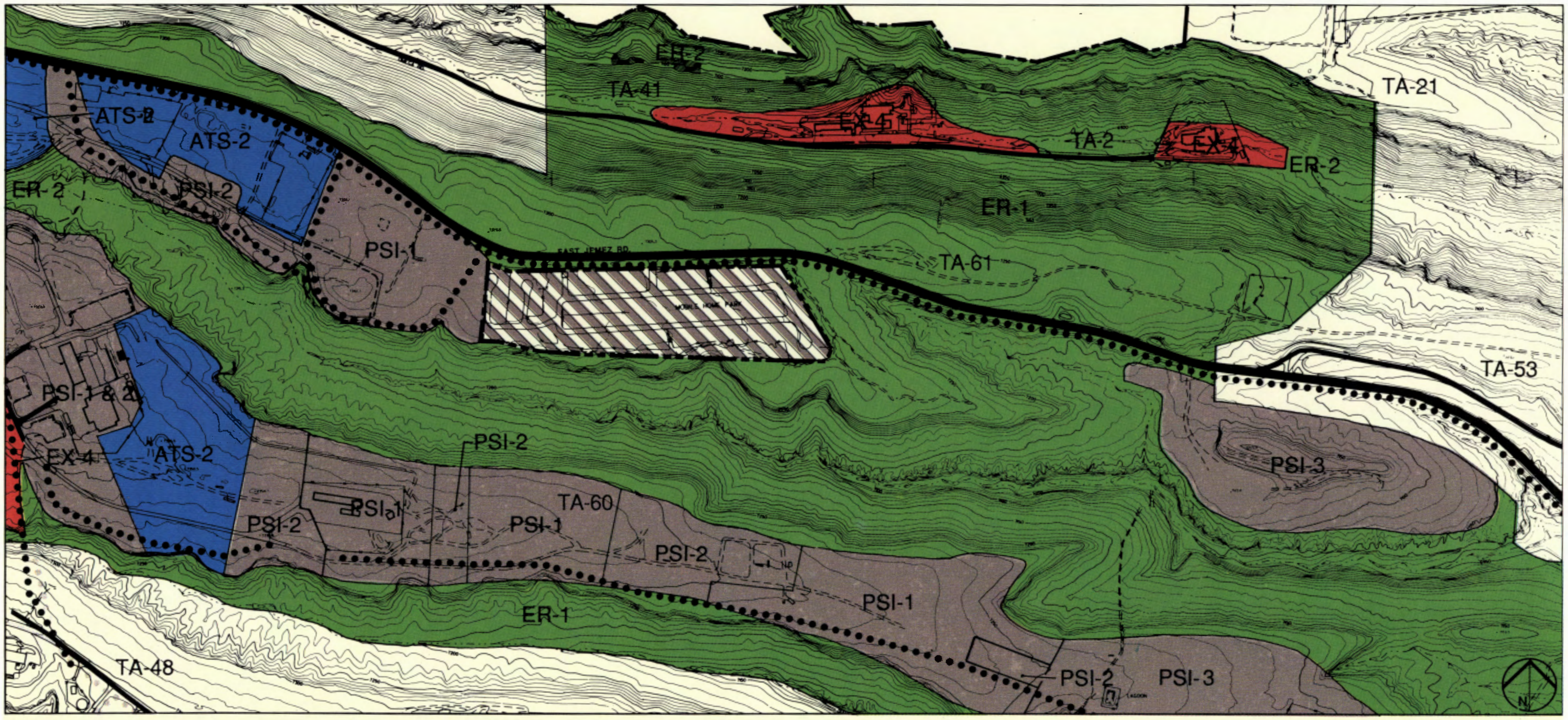
TA-60 has few constraints, but utilities need to be upgraded and access improved. This area is ideal for consolidating physical support and other technical service and support functions that need a central location but do not require public access. The Facilities Engineering Division, the support services subcontractor, and parts of the Health, Safety and Environment Division are likely candidates for relocation to this area.

TA-61 is adjacent to the major access route for the Laboratory (East Jemez Road) and can intercept most public heavy traffic now entering the Core Area. This technical area is ideal for support functions requiring public access, such as warehousing, shipping, and receiving. All utilities are available.

*Future Land Use Analysis*



*Future Land Uses*




Environmental Research / Buffer (ER)
ER-1: Security and Safety Buffers
ER-2: Environmental Restoration Areas

Physical Support and Infrastructure (PSI)
PSI-1: Physical Plant
PSI-2: Transportation and Circulation
PSI-3: Sanitary Waste Treatment and Disposal

Non-DOE Land : Potentially PSI

Experimental Science (EX)
EX-4: Multi-Use Experimental Science

100 50 0 100 200 Meters
400 200 0 400 800 Feet

Administration and Technical Services (ATS)
ATS-2: Technical Services

Existing Major Roads

Future Circulation Improvements

## Future Trends – Population and Facilities

In the long-term, population is expected to increase dramatically due to the relocation of physical support functions from TA-3 to Sigma Mesa. There will ultimately be a significant increase in office and storage space in this development area.

A variety of changes regarding facilities will occur in the East Jemez Corridor and Sigma Mesa Development Area.

TA-2, site of the Omega West research reactor, has been proposed for decontamination and decommissioning.

TA-41 will be redeveloped for nonhazardous experimental science (EX-4) functions because of its proximity to the townsite, isolation, and lack of expansion area, which precludes significant increases in development.

TA-60 will be the future site of support services subcontractor activities and other Laboratory technical support functions, including a possible consolidated HSE and ENG technical support complex. Ultimately this area could house 1,500 to 2,000 people.

TA-61 will be the site of Laboratory physical support functions and ultimately could house 400 to 800 people.

## Development Sites

The development sites map identifies the sites in the East Jemez Corridor and Sigma Mesa Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.
- "Future parking" sites are best suited for the parking needs of future buildings.
- "Buildings to buildings" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.
- "Parking areas to buildings"means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects, and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

*Recommendations*

- Relocate appropriate administration and technical services functions from TA-3 to TA-61.
- Relocate appropriate physical support functions from TA-3 to TA-60.
- Decontaminate and decommission TA-2 and TA-41 and reuse for nonhazardous experimental science functions.
- Permit and locate a new site for a sanitary landfill at TAs 60 and 61 as recommended in the Sanitary Landfill Site Locations Study, (reference Sites 8 and 9 shown on the East Jemez Corridor and Sigma Mesa development sites map).
- Consider acquisition of the 25-acre mobile home park to consolidate Laboratory holdings and enhance Laboratory security.

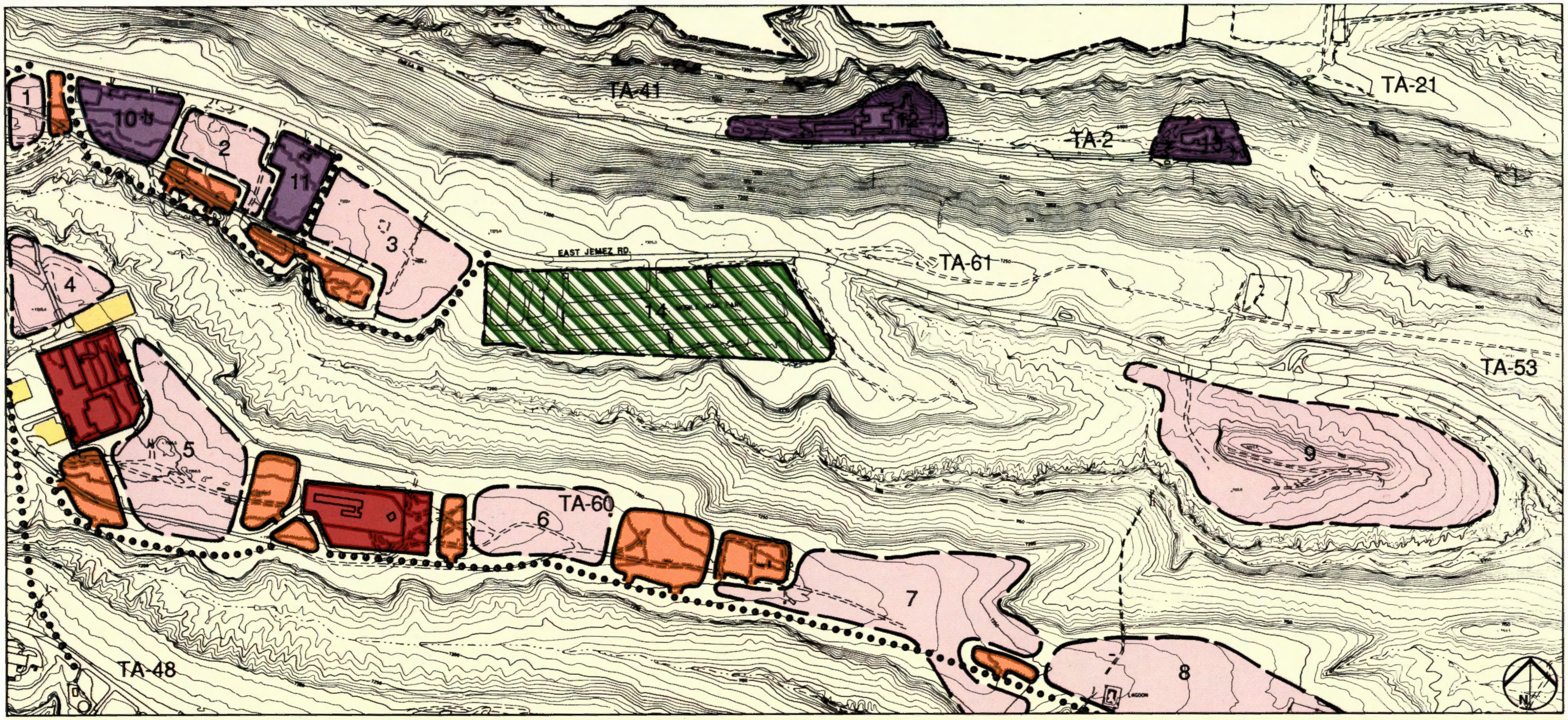
*East Jemez Corridor and Sigma Mesa Development Sites Evaluation*

| Undeveloped Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 1 | 2 ac. | Controlled | ATS-2 | Future site for undetermined technical service functions that could be relocated from the Core Area at TA-3. Adjacent to a utility corridor to the north. Within surveyed sanitary landfill boundary. |
| 2 | 4 ac. | Controlled | ATS-2 | Future site for undetermined technical service functions that could be relocated from the Core Area at TA-3. Adjacent to a utility corridor to the north. Within surveyed sanitary landfill boundary. |
| 3 | 11 ac. | Controlled | PSI-1 | Future proposed location of shipping, receiving and procurement functions relocated from TA-3. Adjacent to a utility corridor to the north. A fault line bisects site. Within surveyed landfill boundary. |
| 4 | 6 ac. | Controlled | PSI-2 | Future site for major support services subcontractor's vehicle maintenance, warehouse, or storage yard expansion. Within high radio frequency interference area. Near a potentially contaminated area that may pose constraints to development. |
| 5 | 15 ac. | Controlled | ATS-2 | Future site for a consolidated technical support complex, including Facilities Engineering Division, relocated from TA-3. Within high radio frequency interference area. Improved utilities and access required. |
| 6 | 8 ac. | Controlled | PSI-1 | Future site for major support subcontractor's administration and crafts facilities relocated from TA-3 and Health, Safety and Environment Division relocated from TA-59. Partially within a high radio frequency interference area. |
| 7 | 31 ac. | Controlled | PSI-1 | Future site for major support services subcontractor's roads and grounds operations relocated from TA-3, utility storage, and gas plant and tanks. Partially within a utility corridor and high radio frequency interference area. Improved utilities and access required. |
| 8 | 29 ac. | Controlled | PSI-3 | Future site for new county/Laboratory sanitary landfill. Utility corridor bisects site. There is an high radio frequency interference area on western edge of site. Improved utilities and access required. Fault line on eastern edge of site. |
| 9 | 32 ac. | Controlled | PSI-3 | Future site for a new county/Laboratory sanitary landfill. Partially in a utility corridor and within a high radio frequency interference area. Fault line on western edge of site. Presently used as a quarry site. Moderate topographic constraints. |
| Total | 138 ac. | | | |

| Redevelopable Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 10 | 5 ac. | Controlled | ATS-2 | Redevelop existing contractor operations as a future site for undetermined technical support functions that could be relocated from the Core Area at TA-3. Adjacent to a utility corridor to the north. Within surveyed sanitary landfill boundary. |
| 11 | 4 ac. | Controlled | ATS-2 | Redevelop existing contractor operations as a future site for East Jemez Corridor-related physical support and infrastructure and technical services functions. Adjacent to a utility corridor to the north. Within surveyed sanitary landfill boundary. |
| 12 | 6 ac. | Limited | EX-4 | Redevelop TA-41 for multi-use experimental science offices and laboratory functions requiring isolation and nonhazardous activities only. Close to townsite on clifftop above site. In potential rockfall area. Potential contamination may pose constraints to redevelopment. Existing facilities will need to be decontaminated and decommissioned prior to removal or reuse. |
| 13 | 3 ac. | Controlled/ Limited | EX-4 | Redevelop TA-2 for multi-use experimental science functions requiring isolation. Close to townsite on clifftop above site. In potential rockfall area. Potential contamination may pose constraints to redevelopment. Existing facilities will need to be decontaminated and decommissioned prior to removal or reuse. Fault line on western edge of site. |
| 14 | 25 ac. | Controlled | PSI-1 | Large redevelopable tract for possible East Jemez Corridor-related functions. Existing use is a privately owned mobile home park. |
| Total | 43 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.

*Development Sites*




**Undeveloped Sites**

- Future Buildings
- Future Parking
- Future Roads

**Redevelopable Sites**

- Buildings to Buildings
- Trailer Park (Potentially Redevelopable)

**Existing**

- Buildings to Remain
- Parking to Remain

### Transportation/Circulation

East Jemez Road, the major entry to the Laboratory, requires upgrading to four lanes.

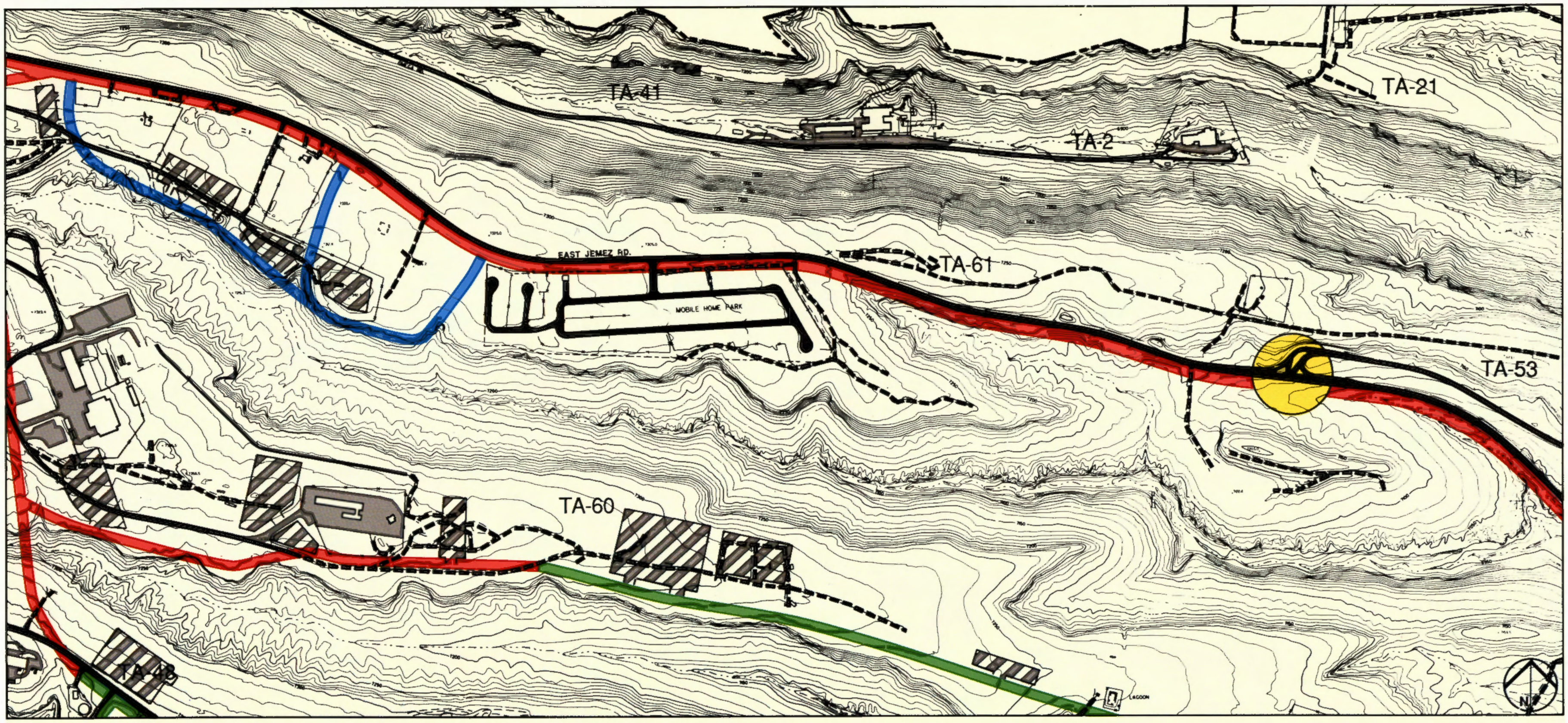
Technical Areas 2 and 41 can accommodate existing and planned development without any transportation improvements but will remain remote.

TA-60 will experience heavy traffic volumes in the future, including trucks and heavy machinery. The current Diamond Drive/Eniwetok Drive intersection will be unable to adequately accommodate this increase. The TA-3 eastern bypass road will ease congestion at the western ends of both TA-60 and TA-61 and will provide better access to Sigma Mesa. In the long-term, TA-60 will need an alternate road to connect it to East Jemez and Pajarito Roads.

*Recommendations*

- Improve Diamond Drive/Eniwetok Drive intersection.
- Upgrade main entry road to TA-60 to four lanes.
- Develop an alternate road from TA-60 to East Jemez Road and Pajarito Road in the long-term.
- Consider a frontage road and/or service road network at TA-61, south of East Jemez Road, to safely permit ingress, egress, and internal circulation as development occurs.
- Improve La Mesita/East Jemez Road intersection for safer ingress/egress at TA-53.

*Existing and Future Transportation/Circulation Improvements*




Future Low Priority
Existing Paved Roads
Future Medium Priority
Existing Unpaved Roads
Future High Priority
Existing Parking Areas
Future Intersection Improvements
Future Parking Areas

100 50 0 100 200 Meters
400 200 0 400 800 Feet

### Security

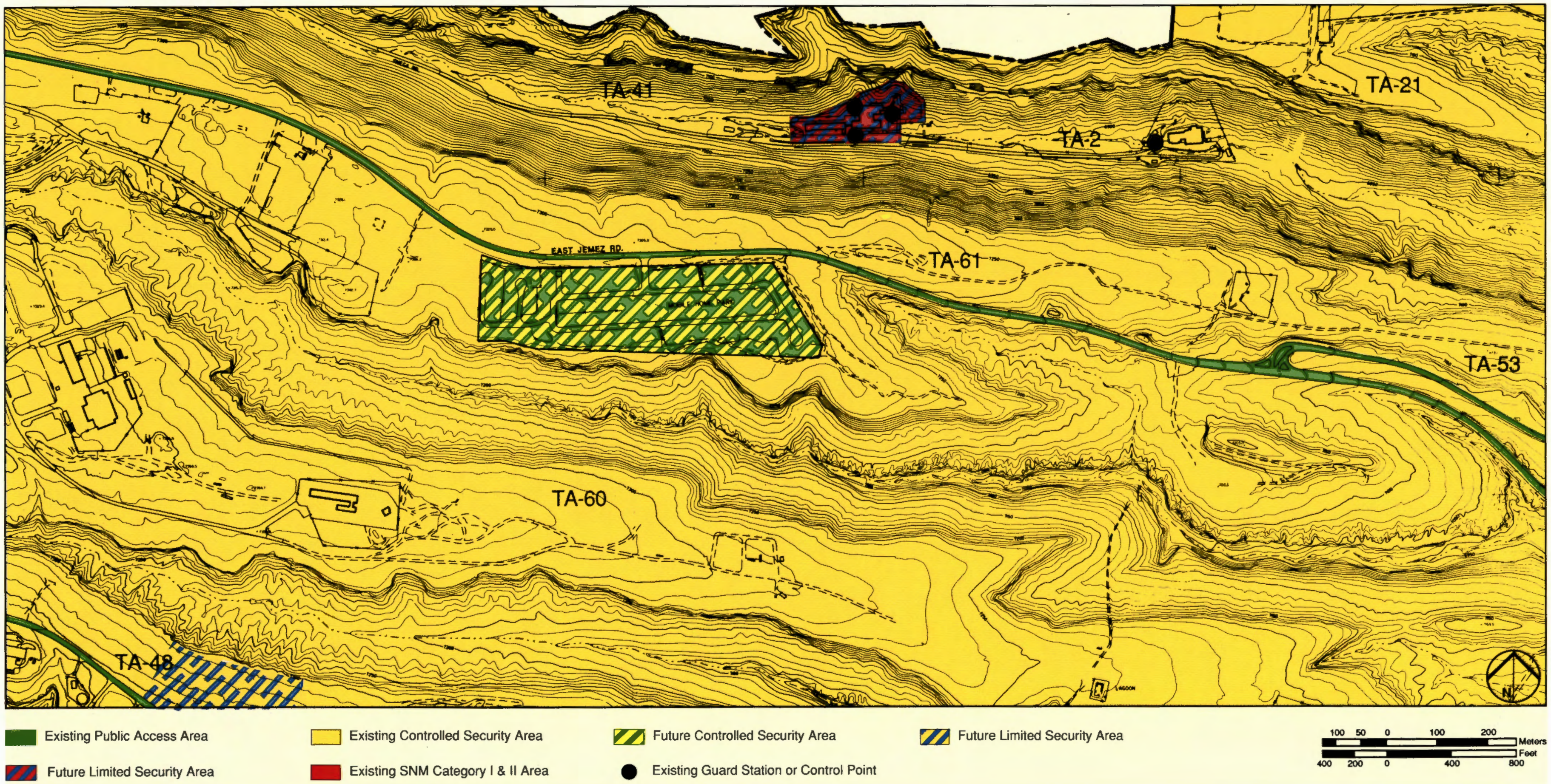
The majority of this development area is a controlled area. Technical Area 41 is an SNM category I & II area but will become a limited-security area. The levels of security to be maintained at TA-2 will depend upon the eventual reuse of the site.

An important security issue is the presence of a 25-acre privately owned and publically accessible residential area just east of TA-61 on East Jemez Road. It would be advantageous for security and safety reasons to relocate this residential area.

*Recommendations*

- Maintain TA-60 as a controlled-security area.
- Maintain TA-61 open to public access because of the existing and proposed publicly oriented functions located or planned there.

*Existing and Future Security*



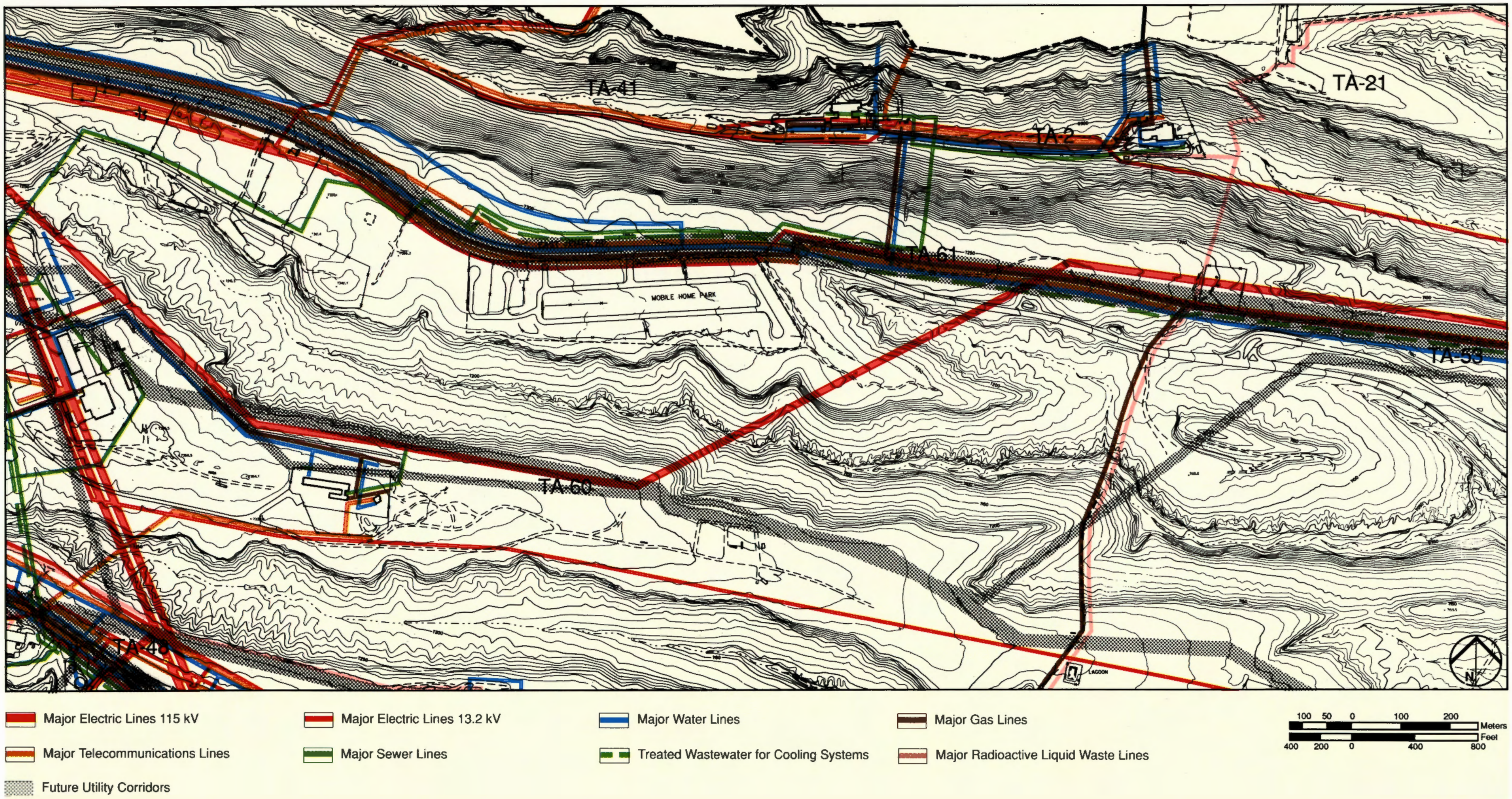
### Utilities

Existing utilities are adequate at TAs 2, 41, and 61. Existing utilities are not adequate for the long-term development planned at TA-60.

*Recommendation*

- Expand capacity of all major TA-60 utility systems and extend them to the east to accommodate planned development.

*Utilities and Utility Corridor Master Plan*



**Environment, Safety, and Health**

The major environmental issue in this development area is the existing sanitary landfill. The current landfill site is adjacent to Sandia Canyon along East Jemez Road and is the only sanitary landfill for both the Laboratory and Los Alamos County. A new site will be required within the next five years to ensure the proper functioning of the Laboratory and to maintain the health, safety, and welfare of both Laboratory employees and county residents. Two new sites have now been identified for permitting as the result of the Sanitary Landfill Site Locations Study. These sites are situated at a quarry along East Jemez Road at TA-61 opposite the entrance to TA-53 and at the far east end of Sigma Mesa at TA-60. Together they comprise about 70 acres.

There are a few potentially contaminated sites and facilities in this development area that may require clean up.

Sources of radiation at TA-2 and TA-41 will be removed when these technical areas are decommissioned. No new sources should be located in these areas given their proximity to the townsite.

With the increased emphasis on environmental safety, and health there will be growth in HSE functions at the Laboratory. It is planned that ENG and HSE functions will be relocated from TA-3 and TA-59 and consolidated into a centralized technical support complex at Sigma Mesa. This complex of offices, laboratories, and associated support structures will house the HSE and ENG Divisions, thus freeing up presently occupied facilities for programmatic activities requiring access and proximity to the core of TA-3.

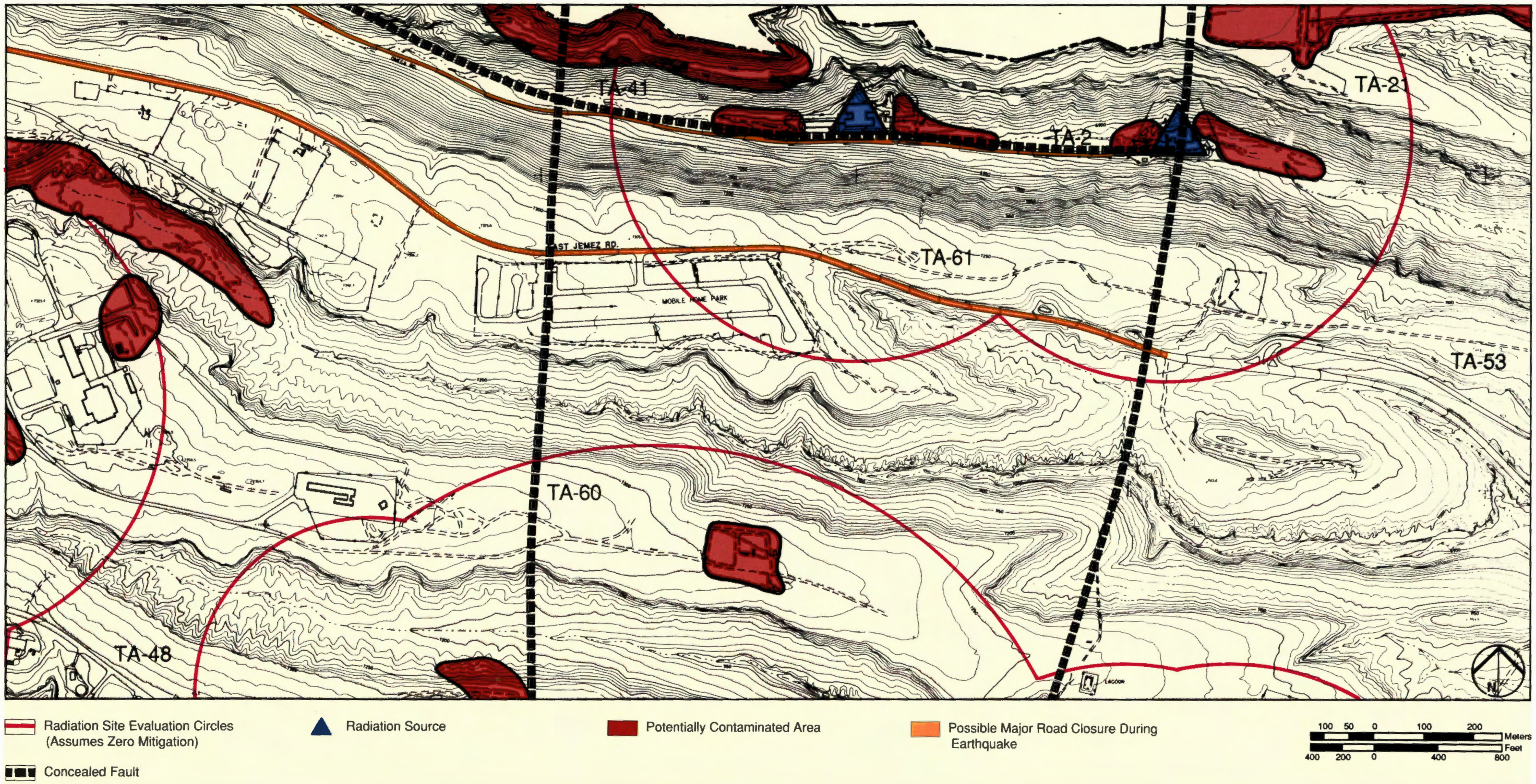
*Recommendations*

- Relocate the existing landfill as soon as the new sites identified by the Sanitary Landfill Site Locations Study have been permitted to free the area for appropriate redevelopment for physical support and technical service functions.

- Decontaminate and decommission contaminated facilities.

- Seek funding for the design and construction of a consolidated HSE/ENG technical support complex at Sigma Mesa.

*Potential Hazards*



# Weapons Engineering (TA-16)

The main technical area within the Weapons Engineering Development Area is

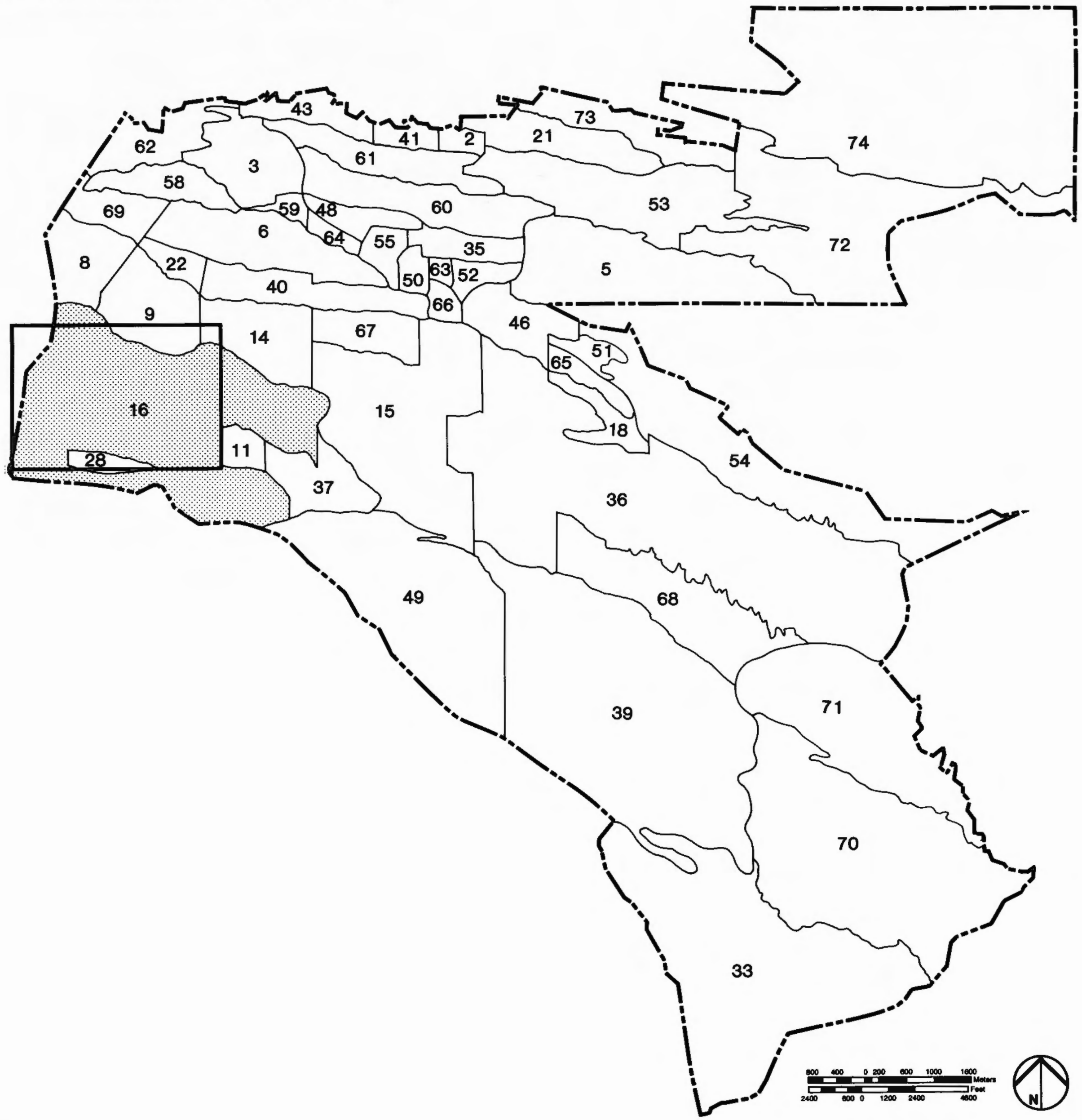
TA-16: Nuclear weapons warhead research (including design, development, prototype manufacturing, environmental testing, and stockpiling), and conventional weapons/ chemical explosives research and processing. The area is also the principal disposal site for explosives and explosives-contaminated waste.

TA-11, 28, and 37 are remote parts of this area and are discussed in the general site description section of this plan.

To maintain a consistent scale of maps throughout all development areas (except for the Core Area and Two-Mile Mesa North, and Dynamic Testing Development Areas), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical area that constitutes this development area and not the area defined by the development area map borders.

*Development Area Window for Weapons Engineering*



## Existing Conditions

The Weapons Engineering Development Area accounts for about 500 employees, or 4% of the Laboratory's total on-site population; roughly 532,000 square feet, or 8% of the total net facility space; and 2,015 acres, or 9% of the total Laboratory land area. The bar chart to the right illustrates the current acreage of each land use in this development area. The chart can be contrasted with a similar one included in the master plan section which shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

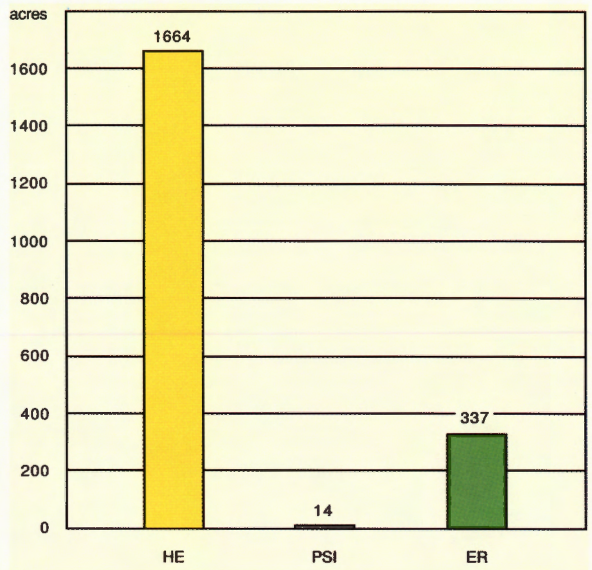
TA-16 is a high-explosives research and development area that requires controlled-security. It includes small areas for administrative, technical and physical support activities. Large blast fragment hazard buffer zones surround the high-explosives areas. Employees are concentrated at the western perimeter of TA-16.

For detailed information the Design Engineering Division Long-Range Plan should be referenced.

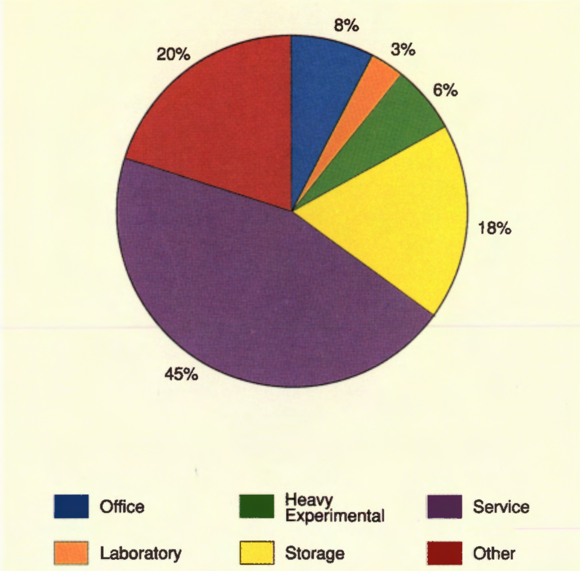
### Trends

Much of the Laboratory's scientific work centers around the research and development of more effective, and safer nuclear and conventional high-explosives. Much of this work is carried out at TA-16. However, many facilities and infrastructure systems in this development area require modernization to function optimally.

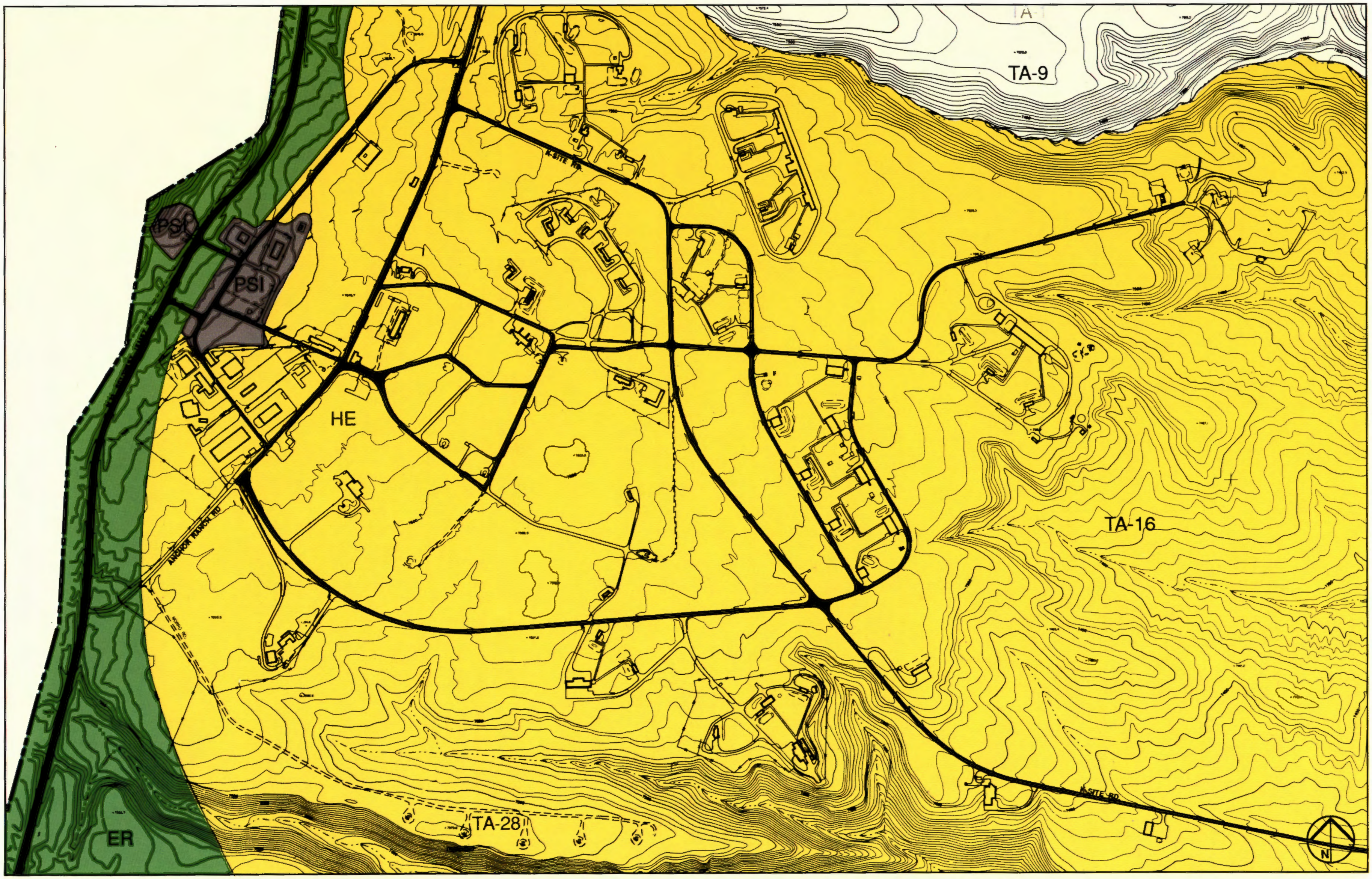
*Existing Land Use Analysis*




*Existing Space Categories*



*Existing Land Uses*




Environmental Research / Buffer (ER) | Physical Support and Infrastructure (PSI) | High Explosives R&D and Testing (HE) | Existing Major Roads

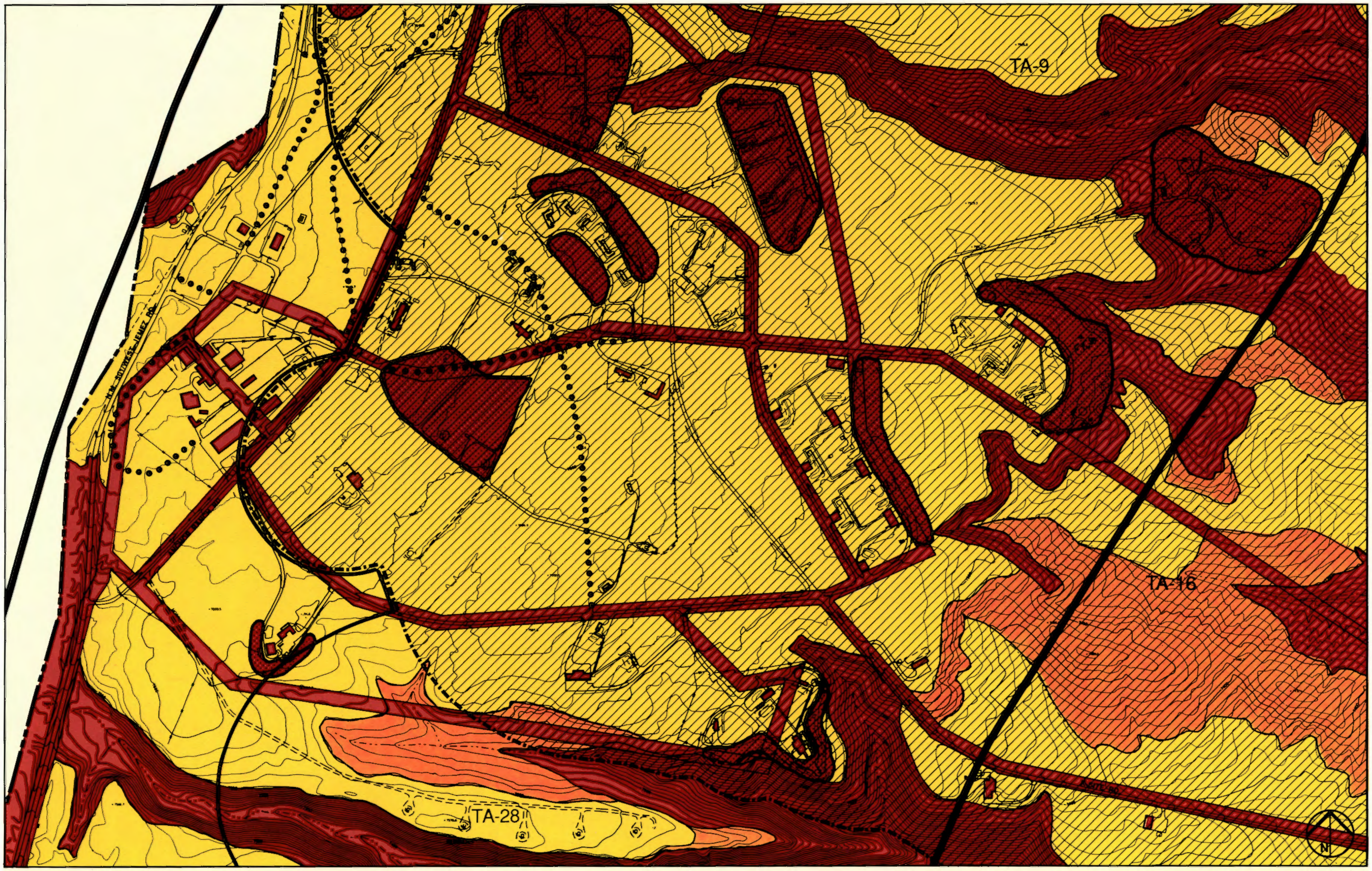
100 50 0 100 200 Meters
400 200 0 400 800 Feet

## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints.

Many land parcels in the Weapons Engineering Development Area are used as safety buffers necessary for the high-explosives research and development conducted here. These areas cannot be developed for other uses.

The large, central portion of TA-16 is composed of several unused, obsolete structures located on relatively flat land. There are large, paved areas between buildings that are appropriate sites for new facilities. Most physical support and infrastructure is in place, but expansion or upgrading may be required.




| | | | |
|---|---|---|---|
| Severe Constraints | Moderate Constraints | Minimal Constraints | Potentially Contaminated Area |
| Future Road | Existing Blast Buffer Zone | Future Blast Buffer Zone | Fault |

## Weapons Engineering Master Plan

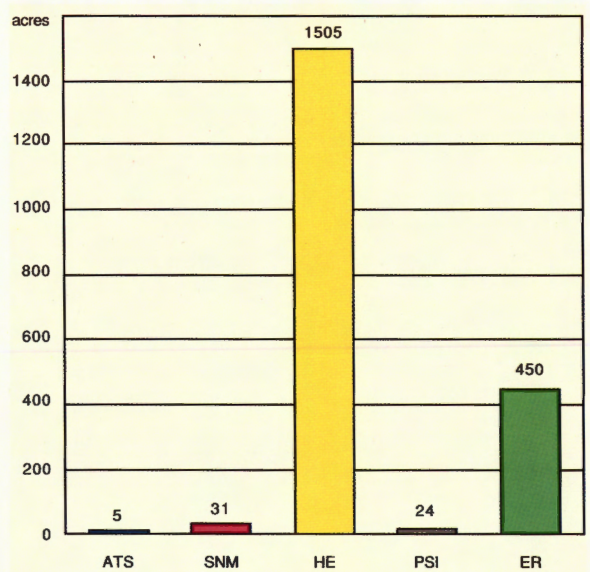
### Future Land Uses

Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses.

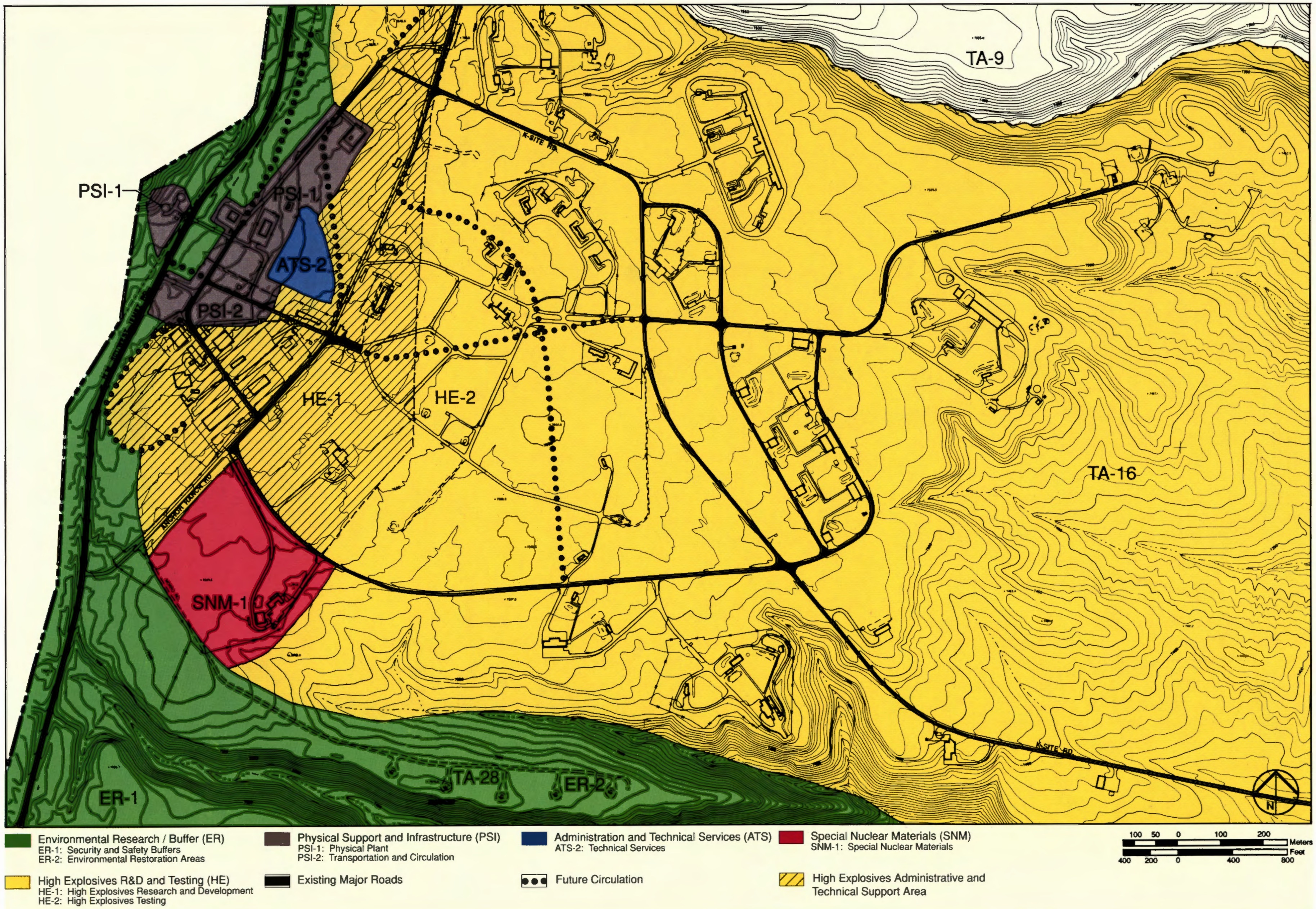
Work in this area will continue to focus primarily on high-explosives research and development. A new, internal, special nuclear materials area and expanded physical support functions will also be located here. Emphasis will also be placed on clearly separating explosives testing from nonexplosives (research and development) activities such that the latter are located in the western-most part of TA-16.

Consolidation of the support functions located in this development area would increase their functional efficiency and would encourage the redevelopment of the substandard and temporary facilities these functions now occupy, thereby freeing up redevelopable parcels. Physical support facilities and functions should also be consolidated and upgraded to enable more efficient use of the land available in this development area. The Design Engineering Division Long-Range Plan contains detailed recommendations regarding alterations to land use and the renovation or construction of facilities for the Weapons Engineering Development Area.

*Future Land Use Analysis*



*Future Land Uses*



## Future Trends – Population and Facilities

Population may increase in this development area because of the relocation of activities from TA-41.

Most of the facilities in the Weapons Engineering Development Area were built in the 1940s and 1950s and are approaching the end of their useful service. Groups and functions within TA-16 are widely scattered, causing communication and travel problems.

Many facilities require modernization, are less than ideally located, and in some cases do not meet current standards of safety and security. Much of the capital plant in this development area will have to be replaced or refurbished in the next 20 years. Many of the buildings at TA-16 are of heavy-duty construction, and most of the high-explosives operating buildings have heavy blast-resistant walls and roofs. Some of these buildings will be reconfigured, refurbished, and assigned to different functions.

The Design Engineering Division Long-Range Plan presents a framework for addressing the problems of optimal land use, technological upgrading, and improved operational safety, security, and efficiency. Near-term facility requirements are described below.

To consolidate WX Division at TA-16, new offices, laboratories, and computing facilities will have to be built. These facilities will house approximately 300 persons and will enable the relocation of groups now located at TA-8 and TA-41 to TA-16. These buildings will be clustered and will include existing buildings such as 16-200, 16-218, and 16-204. Personnel housed in these facilities will manage and staff research and development activities in the nonexplosives area, including the nuclear materials area, and the fabrication, assembly, and testing activities in the explosives area. These facilities are important in achieving several objectives:

- Consolidation of all WX Division personnel at TA-16 to improve communications and staff interactions;
- Relocation of Group J-6 and J-8 to permanent facilities elsewhere;
- Removal of nonexplosives operations from the TA-16 explosives area; and
- Removal of office and support activities from explosives and nuclear facilities.

These facilities will be built as soon as funds become available. In some cases they will be part of other construction projects.

A new facility is also required to replace the Icehouse nuclear materials and tritium facilities at TA-41. This facility should be located in the SNM area in TA-16 designated on the weapons engineering future land use map.

Available space will increase with new construction projects, even though some substandard space will require decontamination and decommissioning. The mix of space types will remain about the same with modest increases in offices and laboratories.

## Development Sites

The development sites map identifies sites in the Weapons Engineering Development Area suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.
- "Future parking" sites are best suited for the parking needs of future buildings.
- "Building to buildings" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.
- "Parking areas to buildings"means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects, and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

A nonexplosives area has been designated within TA-16 west of Anchor Ranch Road and separated from the existing explosives area by a buffer zone. This area will incorporate the present administrative area and two new special purpose areas – the nondestructive evaluation area and the nuclear materials areas. It will also contain new engineering laboratories and operations buildings for nonexplosives activities that are in the explosives area.

The nuclear materials area will incorporate the new Weapons Engineering Tritium Facility and will contain new buildings for special nuclear material (SNM) operations and storage and for canned subassembly (CSA) operations. This area will be a category I & II SNM security area. Tritium, SNM, and CSA operations now conducted at other sites, such as TA-41, will be moved here, thereby improving safety, security, and operational efficiency.

The planned nondestructive evaluation (NDE) area will provide NDE services to the entire Laboratory as well as to WX Division. Nondestructive activities now being conducted at TA-8 will be moved to this new area.

*Recommendations*

- Incorporate the nondestructive evaluation area and nuclear materials area into a new nonexplosives area at TA-16 per the Design Engineering Division Long-Range Plan.
- Relocate tritium, SNM, and canned subassembly operations to TA-16.
- Move nondestructive evaluation activities from TA-8 to TA-16.

| Undeveloped Sites<br>Site | Area | Future Security[1] | Future Land Use | Comments |
|---|---|---|---|---|
| 1 | 5 ac. | Limited | HE | Future site for expansion of Design Engineering Division (WX) administrative/experimental complex. A utility corridor is adjacent on the west. |
| 2 | 5 ac. | Controlled | ATS-2 | Future development site for nonexplosives operations, including a possible satellite technical services center. |
| 3 | 2 ac. | Limited | HE | Future site for high-explosives physical support functions. Utility corridor is adjacent to the south. Potential contamination may pose constraints to develop ment. |
| 4 | 38 ac. | Limited | HE | Future site for expansion of high-explosives testing operations within explosives area. |
| 5 | 15 ac. | Limited | HE | Future site for expansion of high-explosives testing operations within explosives area. Potential contamination may pose constraints to development. |
| 6 | 6 ac. | Limited | HE | Future site for expansion of high-explosives testing operations within explosives area. |
| 7 | 22 ac. | SNM | SNM-1 | Future site for facility to replace the SNM and tritium facilities now at TA-41 and TA-33. Utility corridor adjacent to the south. Potential contamination may pose constraints to development. |
| Total | 93 ac. | | | |

| Redevelopable Sites<br>Site | Area | Future Security[1] | Future Land Use | Comments |
|---|---|---|---|---|
| 8 | 6 ac. | Limited | HE | Redevelop for high-explosives-related administrative and experimental operations. Substandard buildings need to be decontaminated and decommissioned and then demolished. Utility corridor bisects the site. |
| 9 | 8 ac. | Limited | HE | Redevelop site for high-explosives-related administrative and experimental operations. Substandard buildings will need to be decontaminated and decommissioned and then demolished. A utility corridor is adjacent to west. |
| Total | 14 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.

*Development Sites*


**Undeveloped Sites**

Future Buildings

Future Parking

Future Roads

**Redevelopable Sites**

Buildings to Buildings

**Existing**

Buildings to Remain

Parking to Remain

### Transportation/Circulation

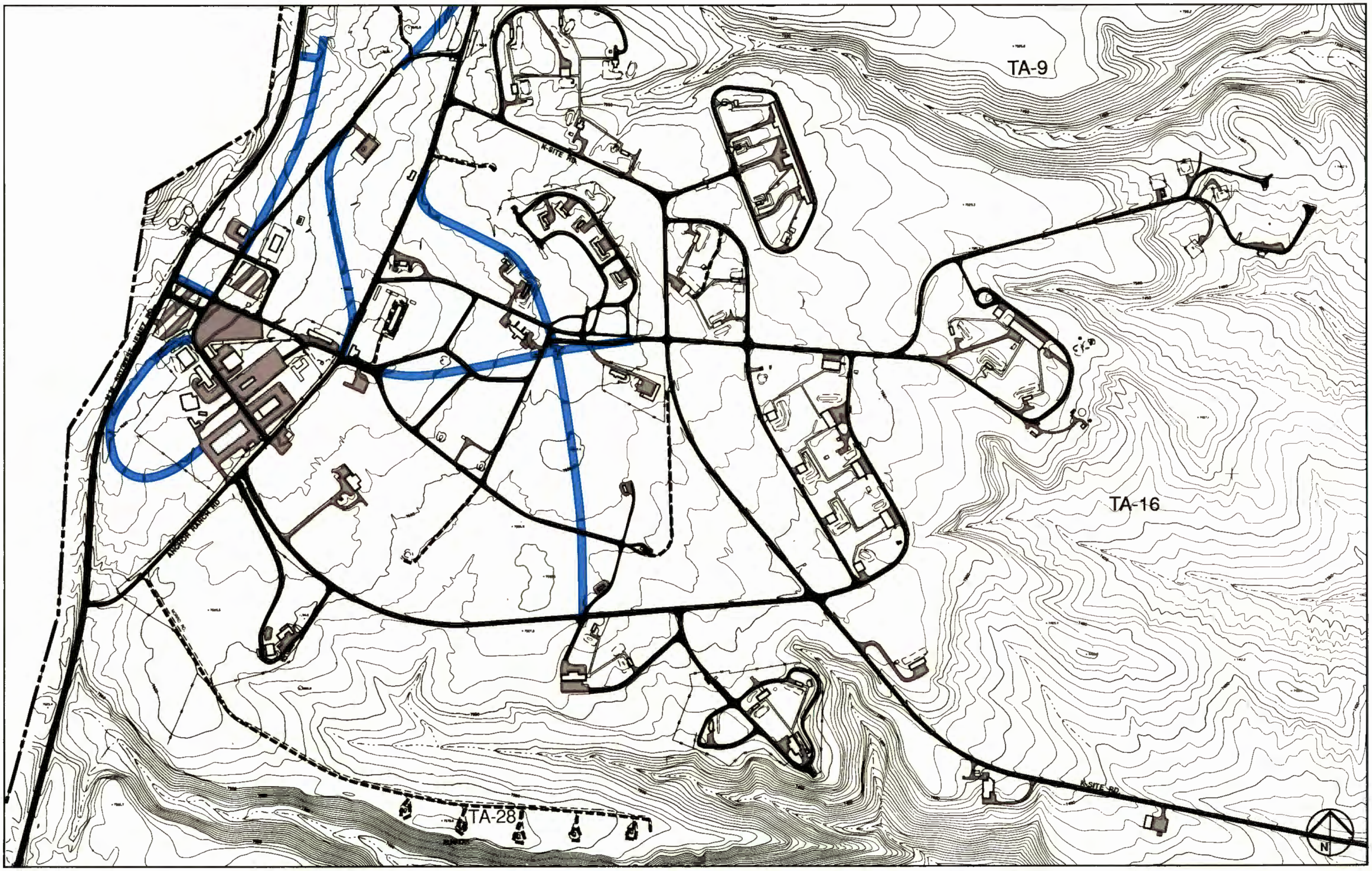
Roads in the Weapons Engineering Development Area were constructed incrementally to provide access to dispersed high-explosives research, development, and testing facilities. This uncoordinated expansion has left TA-16 with a confusing collection of multidirectional roads.

The Design Engineering Division Long-Range Plan includes a transportation element that outlines proposed improvements and prioritizes them. The recommended improvements are diagrammed on the existing and future transportation/circulation improvements map. All parking areas are located outside of the limited and SNM security areas.

*Recommendations*

- Expand parking areas concurrent with new major facilities construction.
- Construct all new parking outside limited and SNM security areas.
- Construct new internal road linkages for more efficient operations and close existing roads that serve no useful purpose in accordance with the Design Engineering Division Long-Range Plan.
- Construct recommended transportation improvements as prioritized in the Design Engineering Division Long-Range Plan.

*Existing and Future Transportation/Circulation Improvements*




Future Medium Priority

Existing Paved Roads

Existing Unpaved Roads

Existing Parking Areas

Future Parking Areas

100 50 0 100 200 Meters

400 200 0 400 800 Feet

### Security

The majority of the Weapons Engineering Development Area is used for high-explosives-related research requiring limited-security. Weapons engineering facilities house activities and operations that include high-explosives, special nuclear materials, radioactive gases, radiographic machines and sources, and heavy industrial machinery. Therefore, safety, security, and operational considerations are especially important when planning this area.

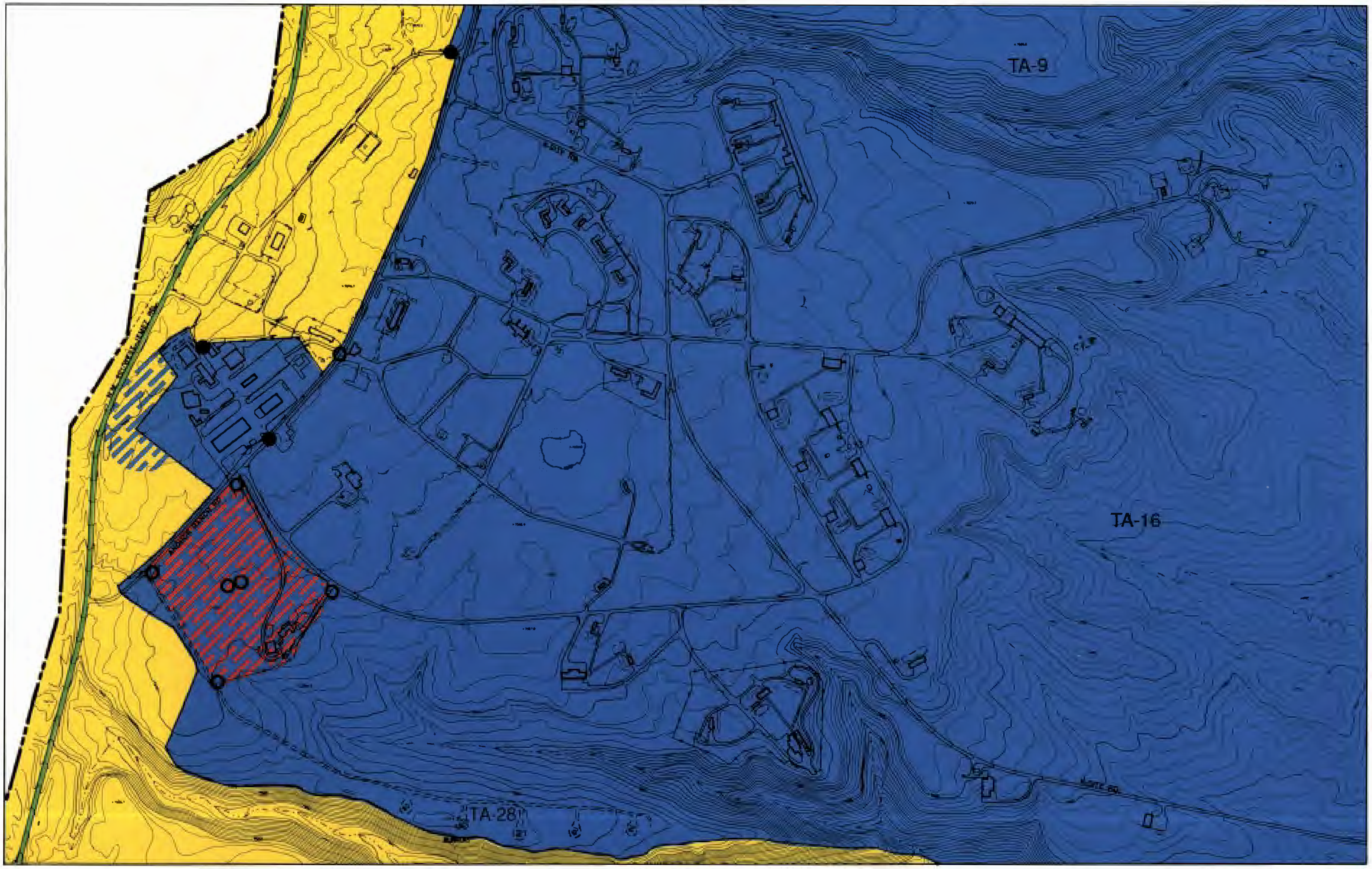
Nuclear materials functions at TA-41 in Los Alamos Canyon will be relocated to a more remote and secure location at TA-16. The new nuclear materials area at TA-16 will contain a weapons subsystem laboratory, a new tritium facility, and a canned subassembly facility. The TA-16 SNM area will be designed to meet or exceed the latest security requirements.

Consolidation of WX Division operations at TA-16 will essentially eliminate transportation of related hazardous explosives materials on public roads.

*Recommendations*

- Site any additional programs requiring limited-security within or adjacent to the existing limited-security area at TA-16.
- Site any additional programs requiring category I & II SNM security within or adjacent to the existing category I & II SNM security area at TA-16.

*Existing and Future Security*




Existing Public Access Area
Existing Controlled Security Area
Existing Limited Security Area
Future Limited Security Area
Future SNM Category I & II Area
Existing Guard Station or Control Point
Future Guard Station of Control Point

100 50 0 100 200 Meters
400 200 0 400 800 Feet

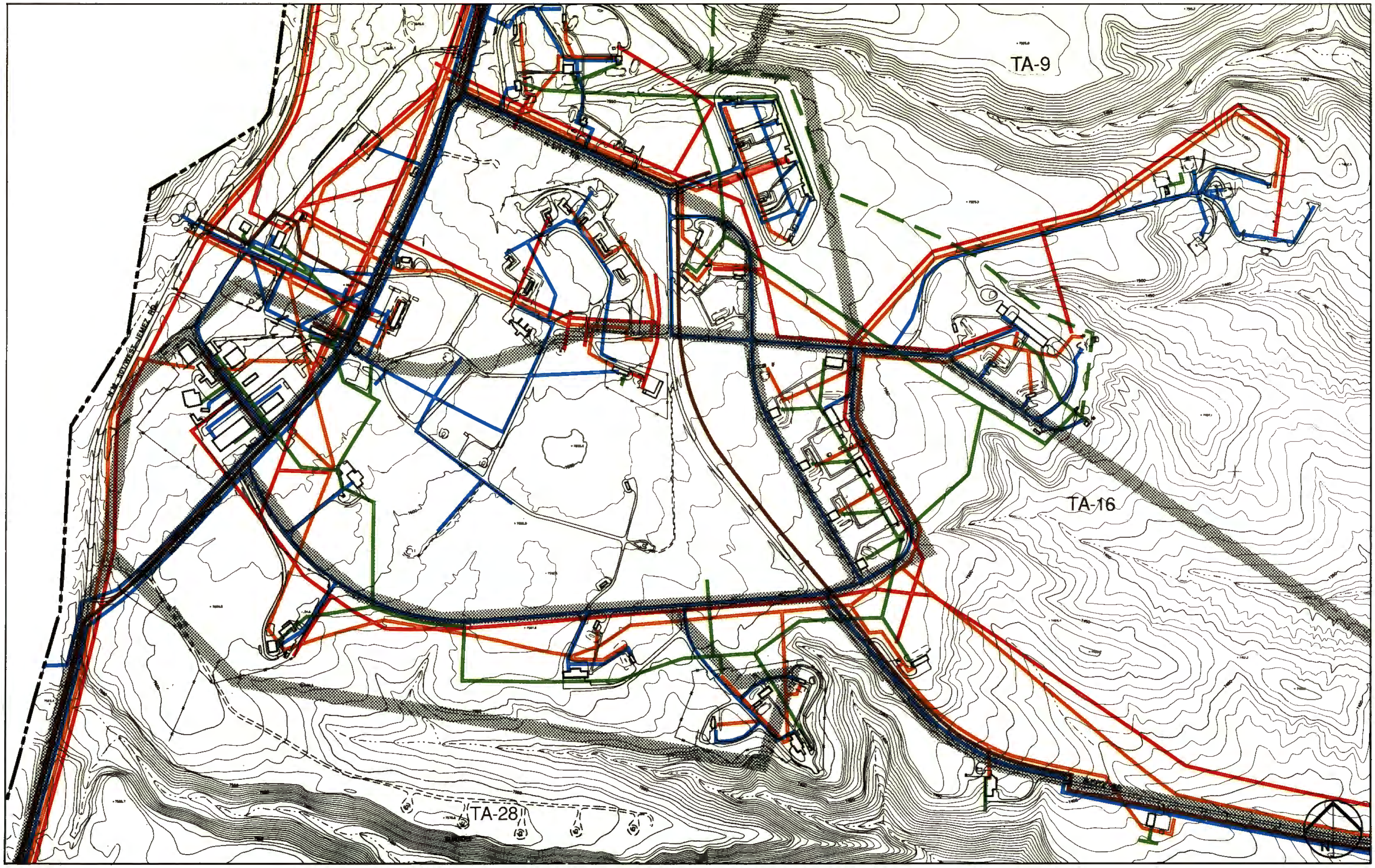
### Utilities

Many of the utilities in the Weapons Engineering Development Area are 30 to 40 years old and are generally in need of overall modernization. Problems include inadequate electric power supply, old substations, an inefficient and outdated steam plant, and heating, ventilating, and air conditioning systems that require continual, costly, and time consuming maintenance. Comprehensive upgrading of the utilities is planned over the next five to ten years.

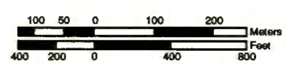
*Recommendation*

- Upgrade TA-16 utilities as necessary to serve changing programmatic needs. Specifically, provide adequate electrical power, and upgrade heating, ventillating, and air conditioning systems as necessary when cost-effective.

*Utilities and Utility Corridor Master Plan*




Major Electric Lines 13.2 kV
Major Water Lines
Major Gas Lines
Major Telecommunications Lines
Major Sewer Lines
Treated Wastewater for Cooling Systems
Future Utility Corridors



## Environment, Safety, and Health

Environment, safety, and health issues in the Weapons Engineering Development Area focus on potentially contaminated areas and the treatment and disposal of operational wastes.

The explosives processing facilities are currently in full compliance with federal and state laws and environmental regulations. The permanent processing facilities were designed and built several decades ago to permit clean operations based on explosives safety concerns. However, the control and disposal of processing waste presents special environmental problems. As environmental regulations become more restrictive, it will be increasingly important to maintain environmental compliance at the explosives processing and waste disposal facilities as these facilities are an essential resource for accomplishing the Laboratory's missions. Although it is not possible to predict what will happen in the way of future environmental regulations, it is likely that new advances in the field of process waste control and disposal will have to be used to stay in compliance.

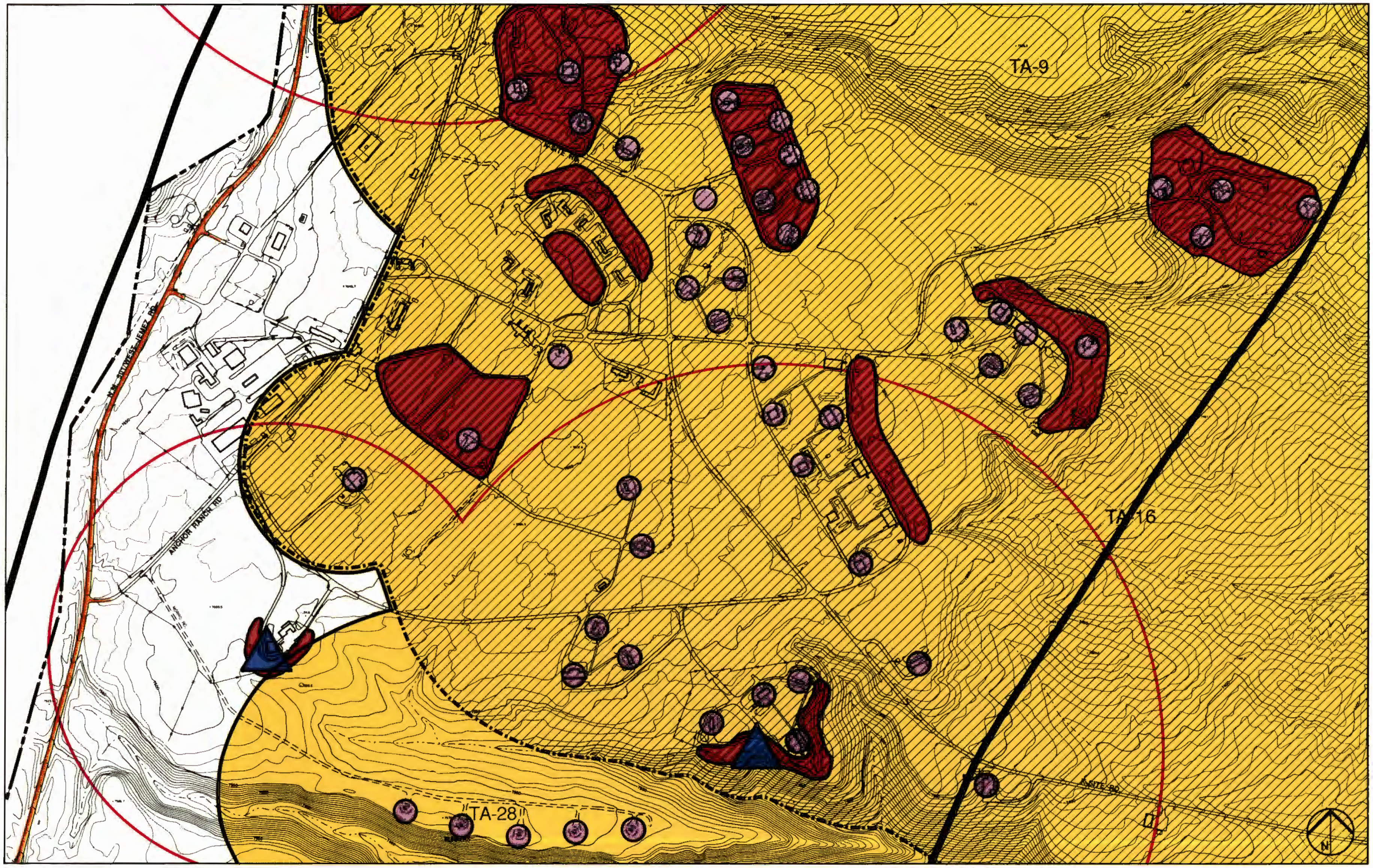
A separate industrial sewage and waste treatment system for TA-16 processing and laboratory facilities will likely be required in the future. An additional concern is the stabilization or clean up of areas or facilities that do not meet current standards.

The Design Engineering Division Long-Range Plan also calls for removal of all nonexplosives activities at TA-16 to a site adjacent but outside of the explosives area. Currently, a number of plastics, metal forming, and physical testing operations are performed within the explosives area because of the lack of alternative facilities elsewhere.

*Recommendations*

- Segregate nonexplosives activities from explosives activities at TA-16 in accordance with the Design Engineering Division Long-Range Plan.
- Construct a centralized high-explosives waste treatment facility for TA-16.
- Clean up potentially contaminated sites to comply with current state and federal regulations.

*Potential Hazards*




Radiation Site Evaluation Circles (Assumes Zero Mitigation)
Radiation Source
Potentially Contaminated Area
Possible Major Road Closure During Earthquake
Existing Blast Buffer Zone
Future Blast Buffer Zone
Fault
High Explosive Facility

# Dynamic Testing
# (TAs 8, 9, 14, 15, 22, 36, 39, 40, 67, 68)

The Dynamic Testing Development Area includes the following ten technical areas

TA-8: Nondestructive testing and M Division offices;

TA-9: Fabrication feasibility studies and research on the physical properties of explosives;

TA-14: Weapons systems and functions analysis;

TA-15: Detonator development for high-explosives and hydrodynamic testing;

TA-22: Detonator development for high-explosives;

TA-36: Explosive phenomena investigations;

TA-39: Non-nuclear weapons behavior and shock wave phenomena investigations;

TA-40: Explosives testing and characterization;

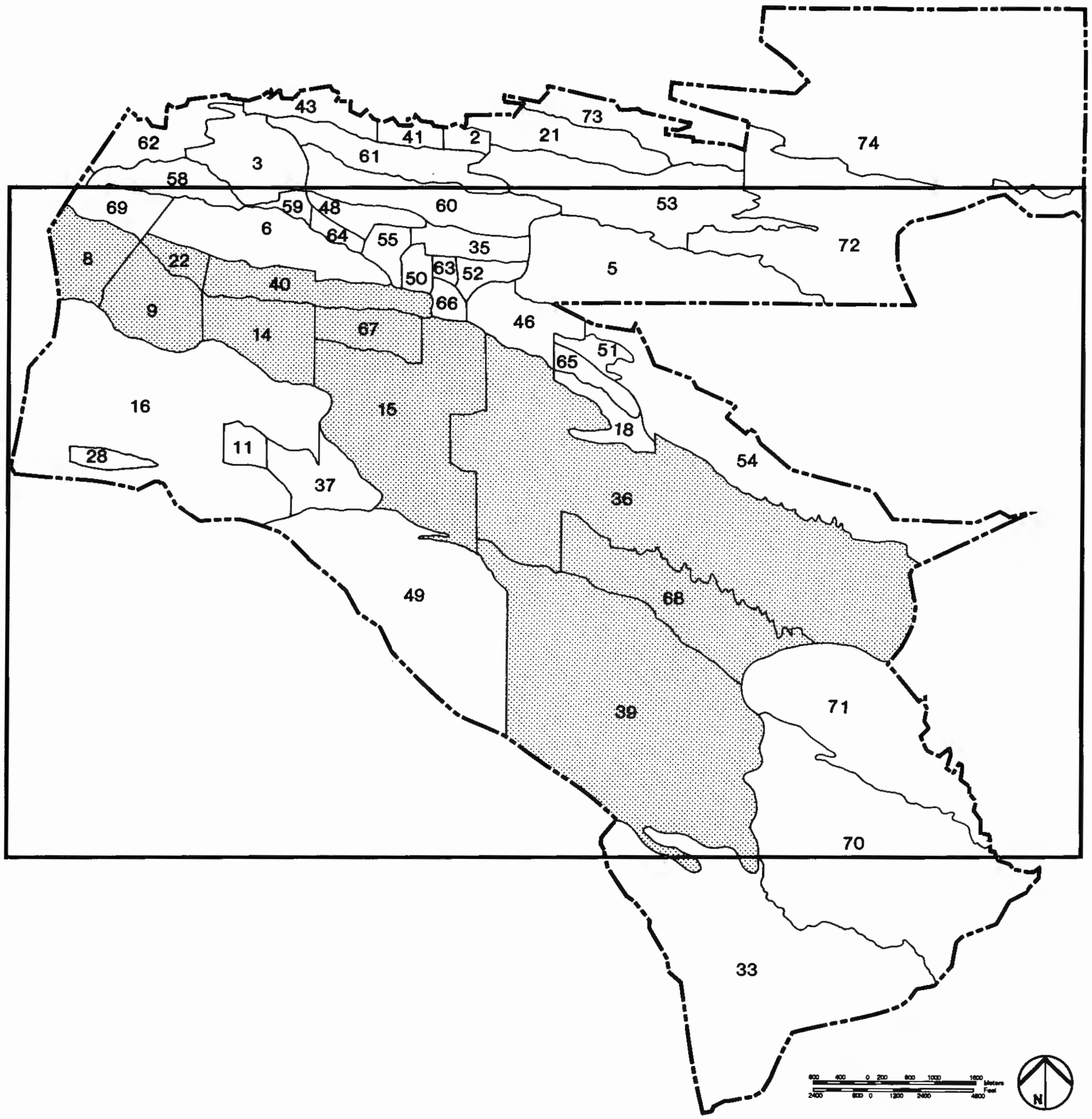
TA-67: M Division central complex (future TA); and

TA-68: An undeveloped technical area (future TA).

In the future, TAs 8, 22 and 40 will not be included in this development area. They will be considered part of the Two-Mile Mesa South Development Area.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical areas that make up this development area and not the area defined by the development area map borders.

*Development Area Window for Dynamic Testing*



## Existing Conditions

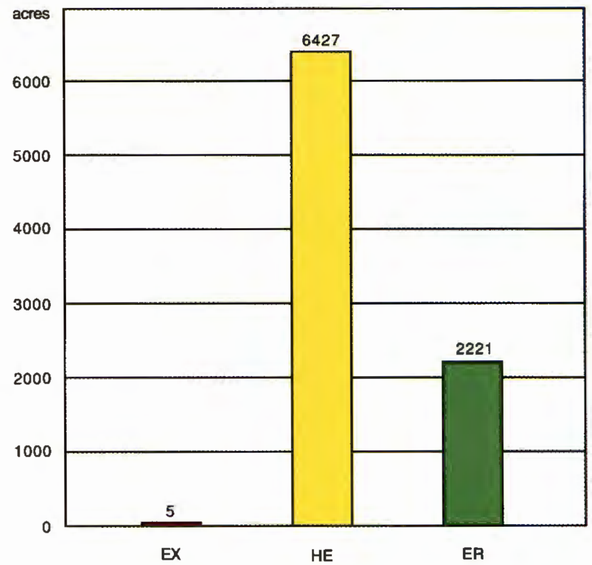
The Dynamic Testing Development Area accounts for approximately 500 employees, or 4% of the total Laboratory population on-site; approximately 356,000 square feet, or 5% of the total net Laboratory facility space; and currently covers 8,653 acres, or 31% of the total Laboratory land area. Together the Dynamic Testing and Weapons Engineering Development Areas occupy about half of the Laboratory acreage. The bar chart to the right illustrates the current acreage of each land use in this development area. This chart can be contrasted with a similar one included in the master plan section which shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

The main land use in the Dynamic Testing Development Area is high-explosives research, development, and testing. It is dominated by the requirements of testing high-explosives materials and devices. Large buffer zones are required to protect personnel and facilities from explosive fragments.

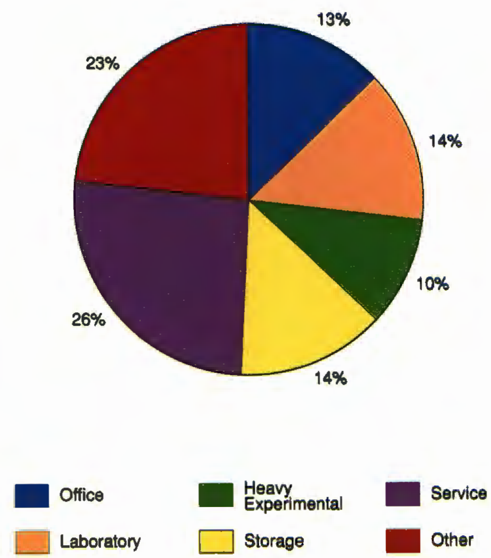
### Trends

Existing dynamic testing facilities are inadequate and outdated for current technological needs. Many operations are dispersed more than is necessary, and consolidation of some functions is desirable.

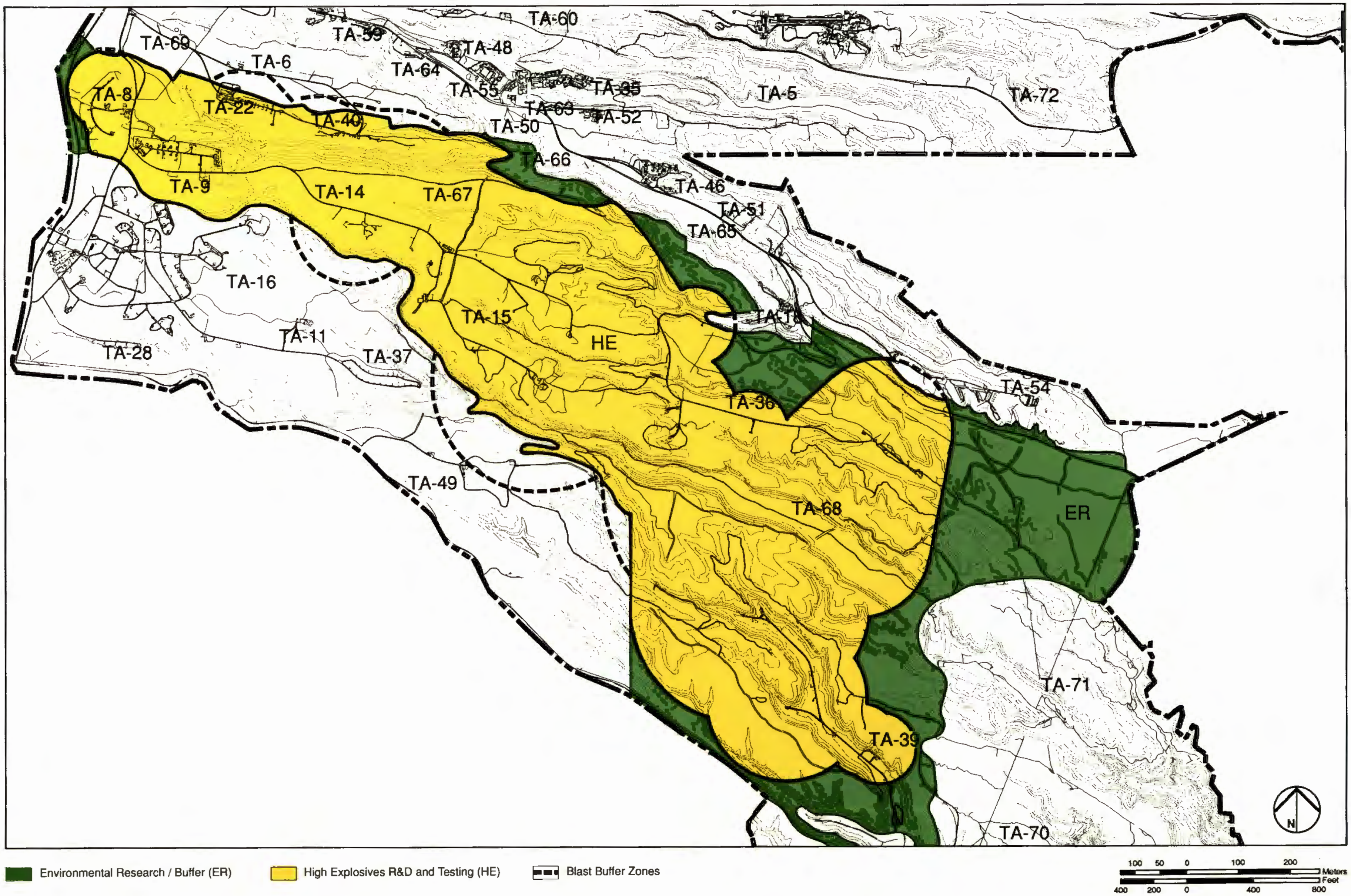
*Existing Land Use Analysis*




*Existing Space Categories*



*Existing Land Uses*



## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints.

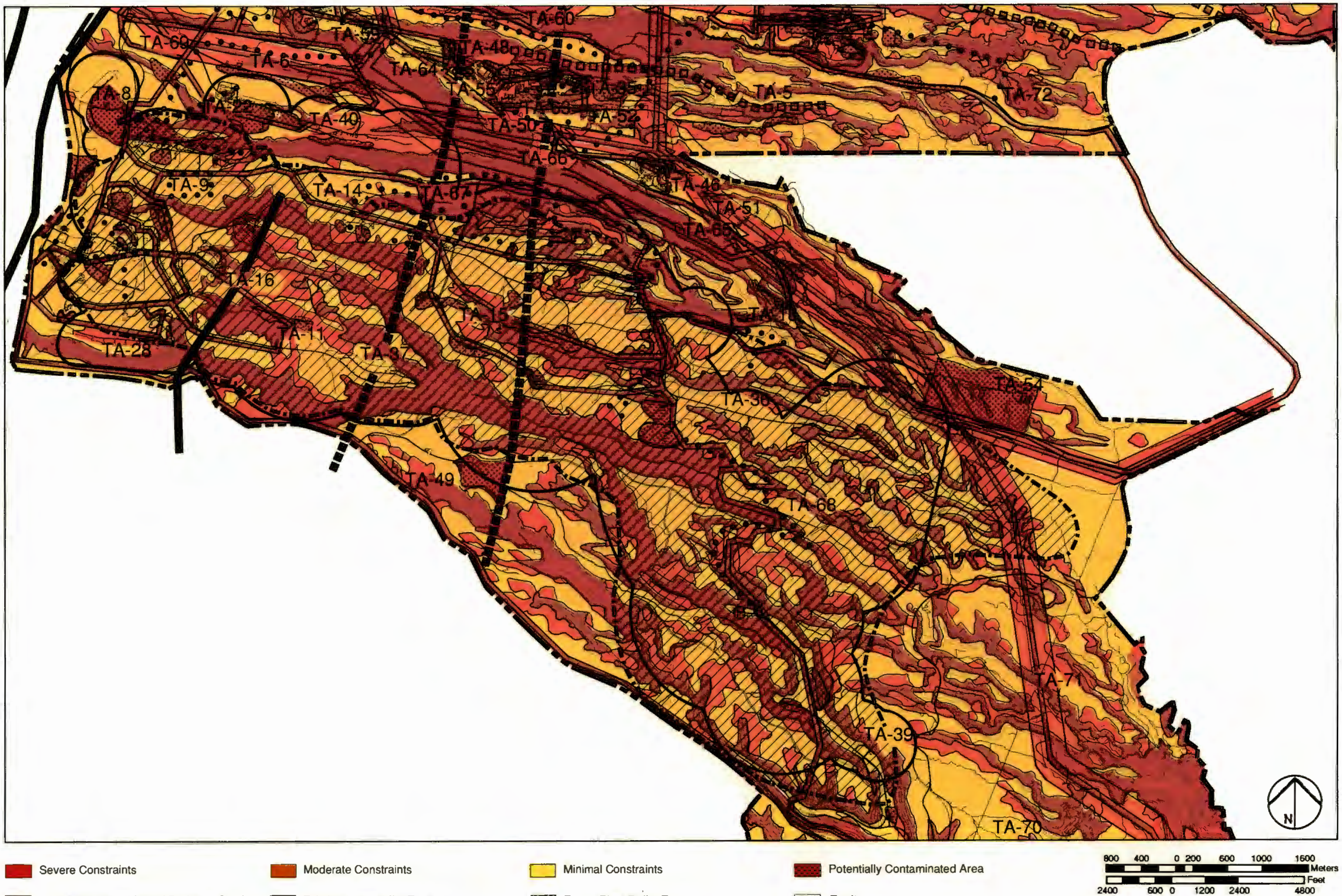
Significant parcels of developable land exist within the Dynamic Testing Development Area. These parcels are useable but only for high-explosives functions.

Because of the blast fragment hazard buffer zones nonhigh-explosives personnel cannot be permanently located within the zones. The Dynamic Testing Division is consolidating many of its support and other functions in a new central complex in TA-67 that will not encroach upon the hazard zones.

Geographic separation of the activities in this development area is necessary for safety and buffering reasons. Improved road linkages are desirable for operational efficiency and the internal transportation of hazardous materials. However, the construction of new roads is constrained by the severe topography.

Existing and planned high-voltage power lines traversing large portions of the development area create moderate constraints to development. This is because of the high radio frequency interference generated by these lines. Safety requirements may restrict the location of power transmission lines in the vicinity of explosives facilities and firing sites.

Archaeological sites and potentially contaminated areas present only moderate constraints as functions in this area are land consumptive but not facility intensive.


TA-60
TA-69
TA-59
TA-48
TA-6
TA-64
TA-8
TA-22
TA-40
TA-55
TA-5
TA-72
TA-50
TA-52
TA-66
TA-9
TA-14
TA-46
TA-51
TA-16
TA-11
TA-28
TA-37
TA-36
TA-54
TA-49
TA-68
TA-39
TA-70
N
Severe Constraints
Moderate Constraints
Minimal Constraints
Potentially Contaminated Area
Potentially Contaminated Drainage Shed
Existing Blast Buffer Zone
Future Blast Buffer Zone
Fault
Concealed Fault
Future Roads
800 400 0 200 600 1000 1600 Meters
2400 600 0 1200 2400 4800 Feet

## Dynamic Testing Master Plan

### Future Land Uses

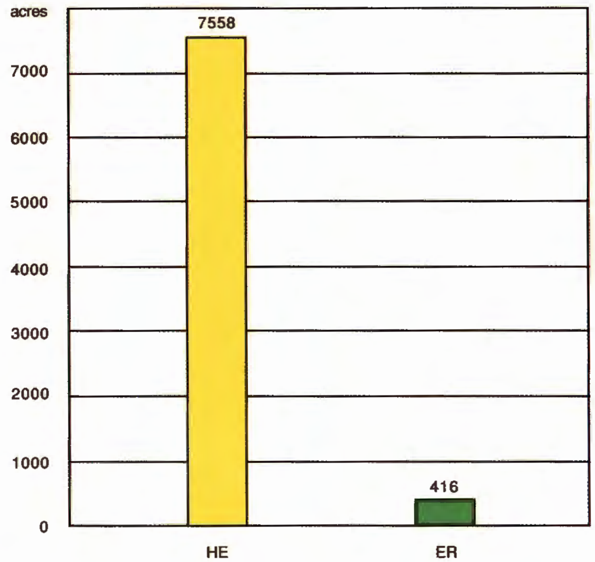
Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses.

The Laboratory will continue to maintain high-explosives testing areas as they are an essential component for carrying out the Laboratory's mission. The deep canyons and relative isolation of this site make it a unique facility within the DOE weapons complex.

Consolidation of high-explosives testing uses is planned for the long term. About 680 acres in TAs 8, 22, and 40 will be redeveloped for mixed-use experimental science as each of these areas is released by the consolidation. The future uses of these sites is discussed in the Two-Mile Mesa South Development Area master plan. Consolidation of the experimental, administrative, technical, and physical support functions into the central complex at TA-67 would increase functional efficiency.

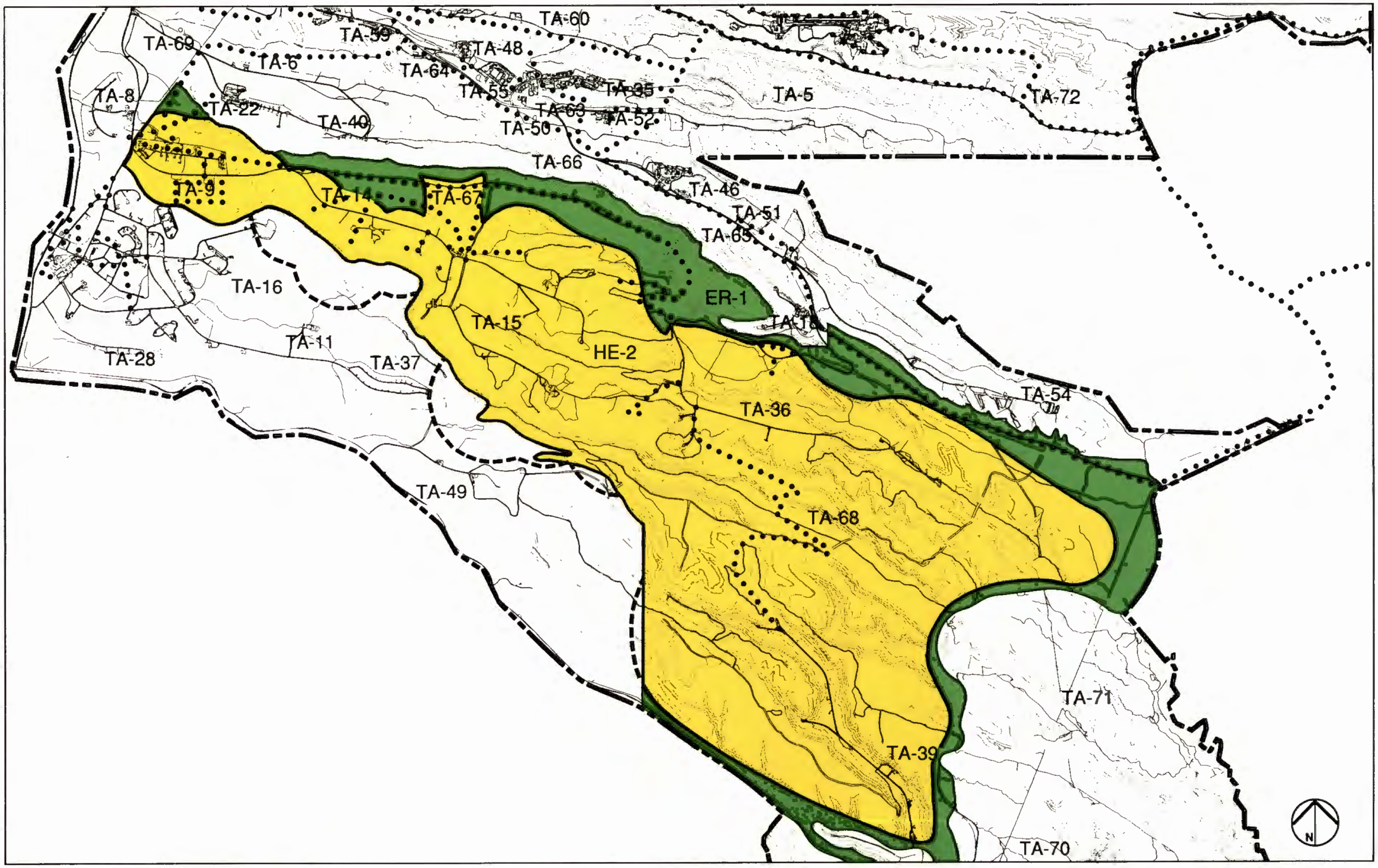
It may be desirable to maintain a zone of minimum Laboratory activity adjacent to areas in which high-explosives operations are conducted, specifically the area between NM 4 and the Rio Grande (TAs 70 and 71). Future uses in neighboring technical areas such as TA-33 and TA-49 should be carefully reviewed so as not to adversely affect Dynamic Testing operations. In the future, TA-49 may become available for use once the extended blast hazard circle that bisects the fenced compound is constricted. Moreover, HE testing activities will tend to increase in the western parts of the Dynamic Testing Development Area at TAs 36, 39 and 68.

*Future Land Use Analysis*




Several internal roads are planned to improve circulation for the safe transport of hazardous materials. These are discussed in the transportation/circulation section.

*Future Land Uses*




Environmental Research / Buffer (ER)
ER-1: Security and Safety Buffers

High Explosives R&D and Testing (HE)
HE-2: High Explosives Testing

Blast Buffer Zones

Future Circulation Improvements

100 50 0 100 200 Meters
400 200 0 400 800 Feet

### Future Trends – Population and Facilities

Population growth at the Dynamic Testing Development Area will likely not exceed the Laboratory-wide population growth projection rate. As new facilities are constructed, some existing space will be decontaminated and decommissioned, while other existing space will be made available for renovation for other functions. The mix of space categories will not change significantly.

Existing M Division facilities are widely dispersed by necessity throughout the Dynamic Testing Development Area. The present configuration causes inefficiency and duplication of functions. In addition, some facilities are outdated and inadequate for current and future technical requirements.

The Dual-Axis Radiographic Hydrotest Facility (DARHT) currently is a $53.4 million line-item project providing expanded diagnostic capability to accommodate the weapons design improvement effort. This project is programmatically required and will enhance the ability to prevent major program setbacks at an early stage. DARHT includes development of two accelerators to produce flash x-rays (for dual-axis radiography), installation of state-of-the-art hydrodiagnostic instrumentation at a new firing site, and the construction of a weatherproof radiographic systems support laboratory. The project is to be located in TA-15.

The Dynamic Testing Division Long-Range Plan recommends a centrally located complex to contain the main laboratory/office building and to house personnel who are presently dispersed over an area of about 20 square miles. By bringing together as many personnel as possible, increased technical interactions can be expected.

This complex would be serviced by two access roads: one from TA-9 and the other from TA-36. This arrangement will enhance safety by allowing technical personnel to continue their direct involvement in the activities of the experimental facilities without necessarily traversing high-explosives testing areas.

The proposed central complex will also contain chemistry and physics laboratories, facilities for explosives formulation and testing, facilities for contained firing and testing, and equipment for shock wave studies. Most of the support functions will also be contained in the central complex. Consolidation of these presently dispersed functions will improve both quality and effectiveness.

Implementation of the Dynamic Testing Division Long-Range Plan will require construction and development of a number of new firing sites. However, many of the existing facilities at TA-9, TA-14 (Q-Site), TA-15 (R-280 and PHERMEX) will be retained. The total number of firing sites will remain essentially the same, although their functions will change.

### Development Sites

The development sites map identifies sites in the Dynamic Testing Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.
- "Future parking" sites are best suited for parking needs of future buildings.
- "Buildings to buildings" sites are presently occupied by buildings that can either be renovated or demolished and the site reused for new buildings.
- "Parking areas to buildings"means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects, and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

Development sites in the Dynamic Testing Development Area consist primarily of consolidated development at the proposed TA-67 central complex, the expansion of functions at TA-9, and the redevelopment of TAs 6, 8, 22, 40 for multi-use experimental science functions. Firing sites and hazard zones are not developable for uses other than the expansion of those functions.

*Recommendations*

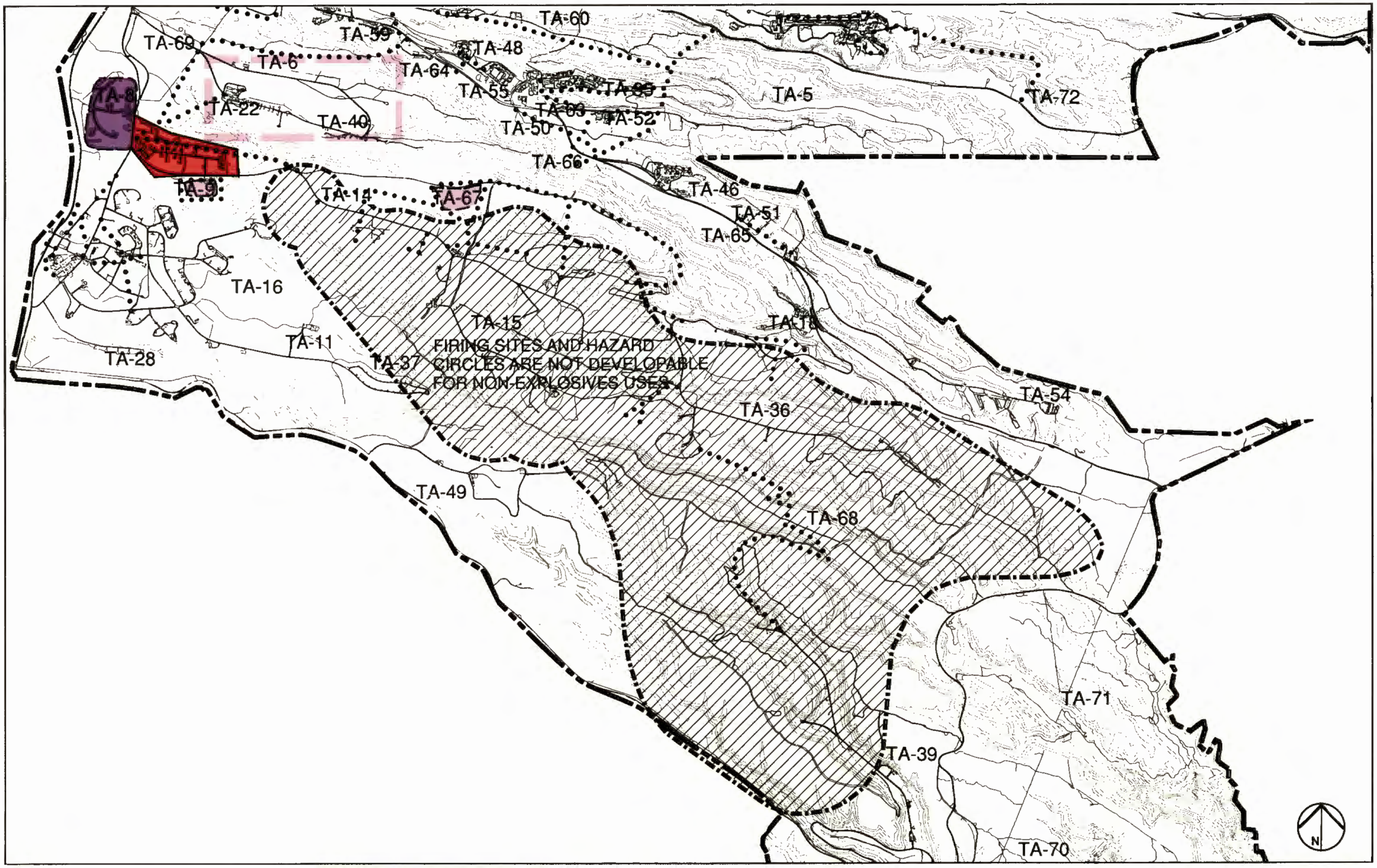
- Implement the M Division plans for a central complex in TA-67.
- Redevelop TAs 8, 22, and 40 for multi-use experimental science functions, and decontaminate and decommission substandard facilities.

*Dynamic Testing Development Sites Evaluation*

| Undeveloped Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 1 | 14 ac. | Limited | HE | Expansion for TA-9 HE processing functions. |
| 2 | 23 ac. | Limited | HE | TA-67 Dynamic Testing (M) Division central complex and related parking. Utility corridor adjacent to the north. |
| Total | 37 ac. | | | |

| Redevelopable Sites | | | | |
|---|---|---|---|---|
| Site | Area | Future Security[1] | Future Land Use | Comments |
| 3 | 93 ac. | Limited | EX-4 | Redevelop TA-8 for multi-use experimental science (nonHE) functions. Renovate existing office/laboratory buildings. Decontaminate and decommission, then demolish or upgrade substandard facilities. Potential contamination may pose constraints to redevelopment. |
| Total | 93 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.




**Undeveloped Sites**

Future Buildings

Future Roads

Refer to Two Mile Mesa South Developable Sites Map for Detailed Information About Future Development Opportunities for this Area

**Redevelopable Sites**

Buildings to Buildings

**Existing**

Buildings to Remain

Firing Sites and Hazard Circles

100 50 0 100 200 Meters
400 200 0 400 800 Feet

**Transportation/Circulation**

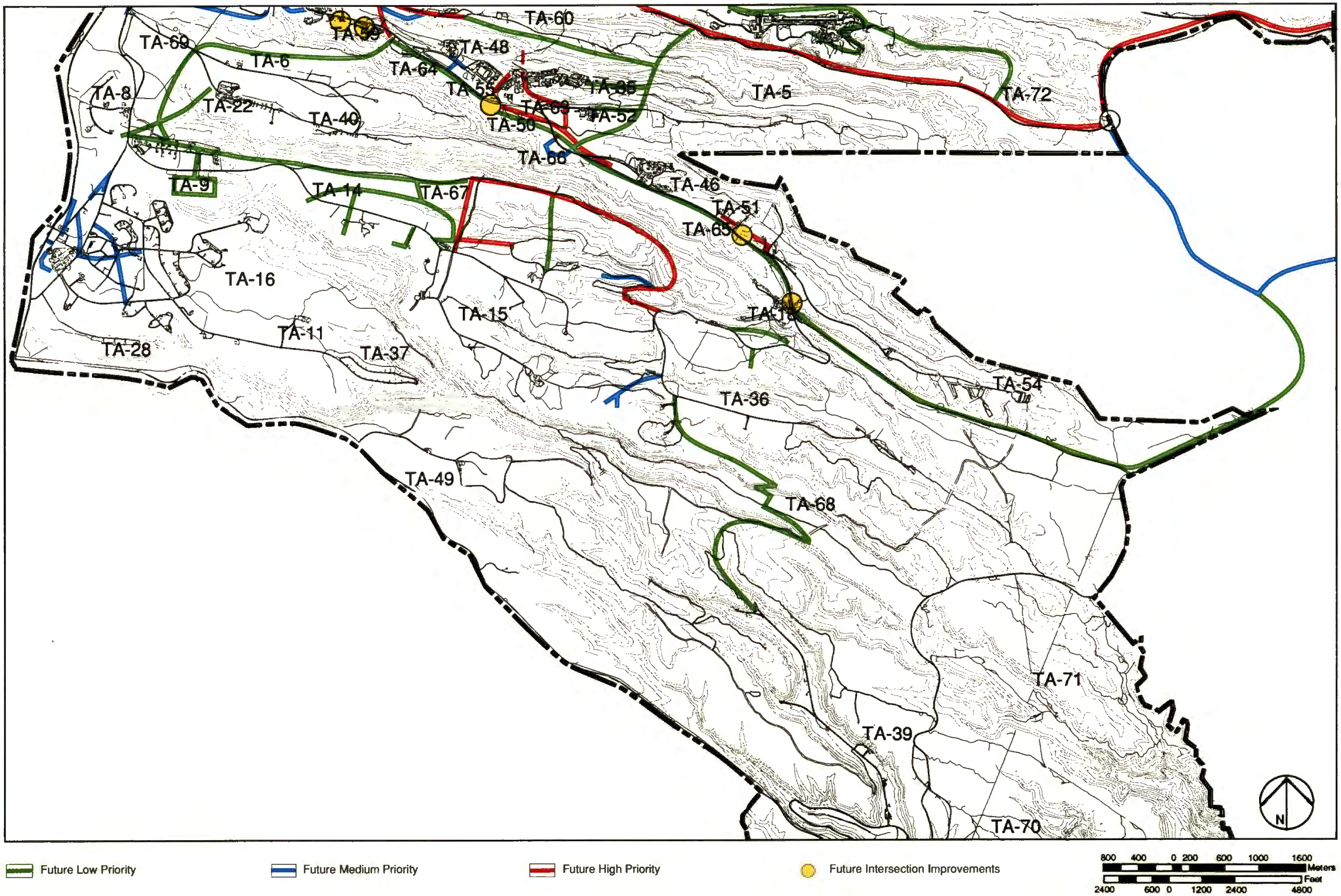
Internal road additions and improvements are proposed in and around TA-16. These will result in more efficient circulation and improved internal transportation of hazardous materials to the Dynamic Testing Development Area.

Roads and parking are also planned for the proposed TA-67 central complex. Access will be provided from TA-36 and TA-9. The TA-36 access will pass to the north outside of the limited-security boundary to allow controlled access by uncleared personnel.

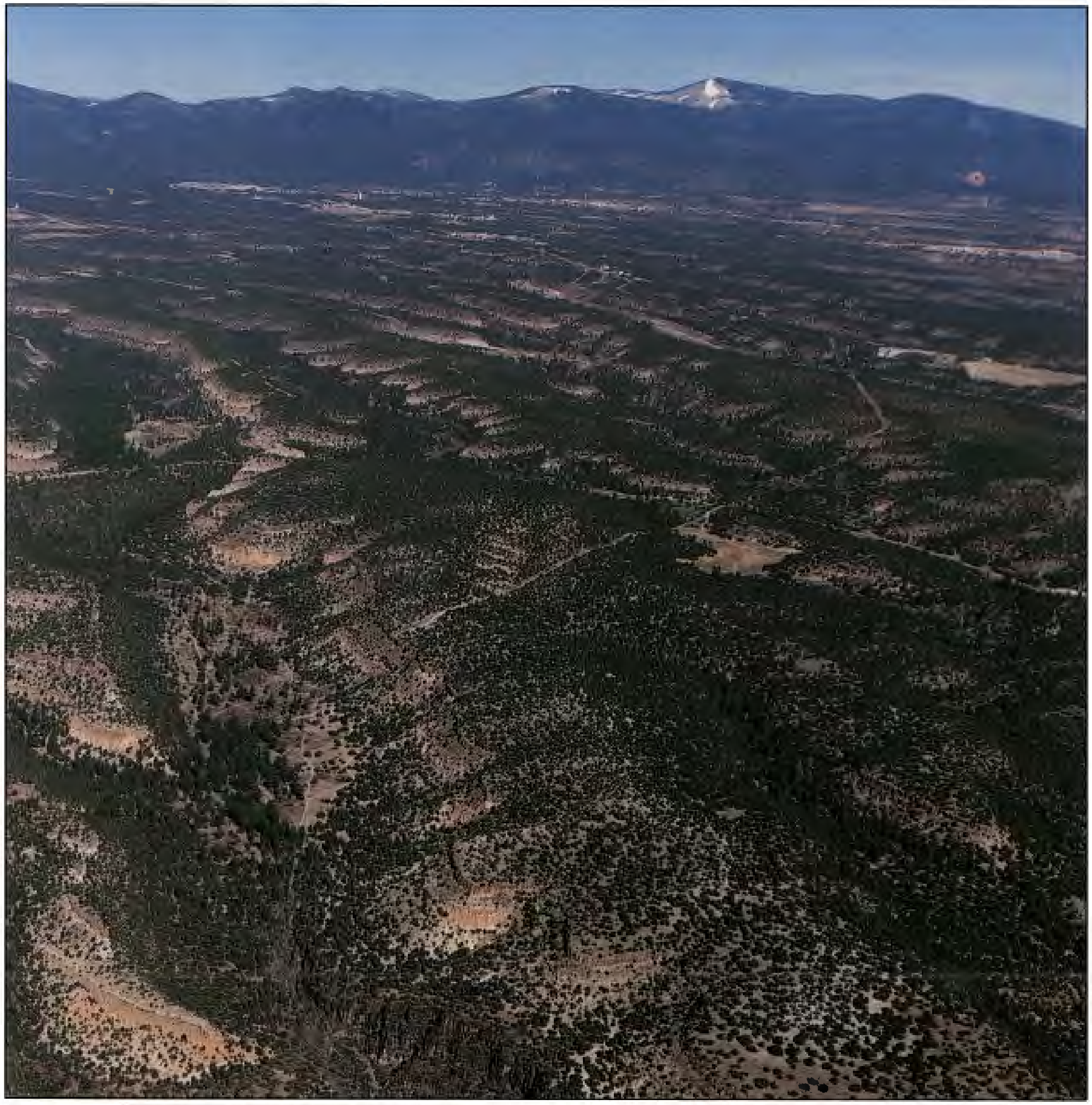
*Recommendations*

- Construct the roads necessary to provide access from the east and west, and provide parking as required for the TA-67 central complex.
- Construct roads necessary for internal connection of TAs 39 and 68 to other sites.

*Existing and Future Transportation/Circulation Improvements*



Aerial View of Dynamic Testing Areas Looking from the Southeast Toward the Jemez Mountains



## Security

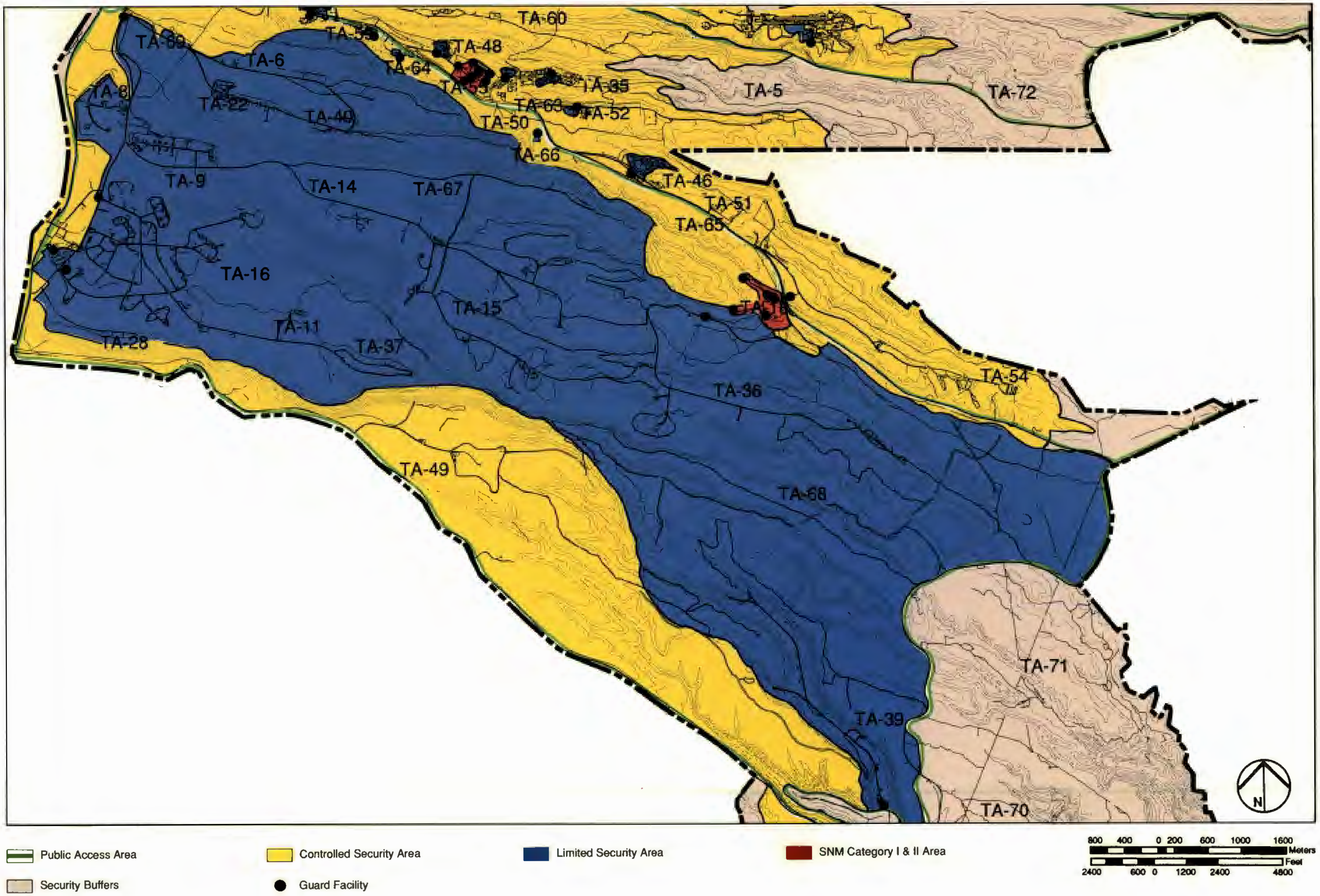
The majority of the Dynamic Testing Development Area requires limited-security. The security areas are bounded by steep, deep canyons that act as barriers to intrusion. Part of the facilities in the proposed central complex at TA-67 will be in a controlled access area outside the fenced security area. This arrangement will allow limited-cleared personnel to interact effectively with uncleared personnel from universities, other agencies, and industry, and to participate in joint projects with them.

Controlled and limited security is planned for the central complex at TA-67. Access will be provided from TA-9 and TA-36 on a new road to the north of the secure perimeter.

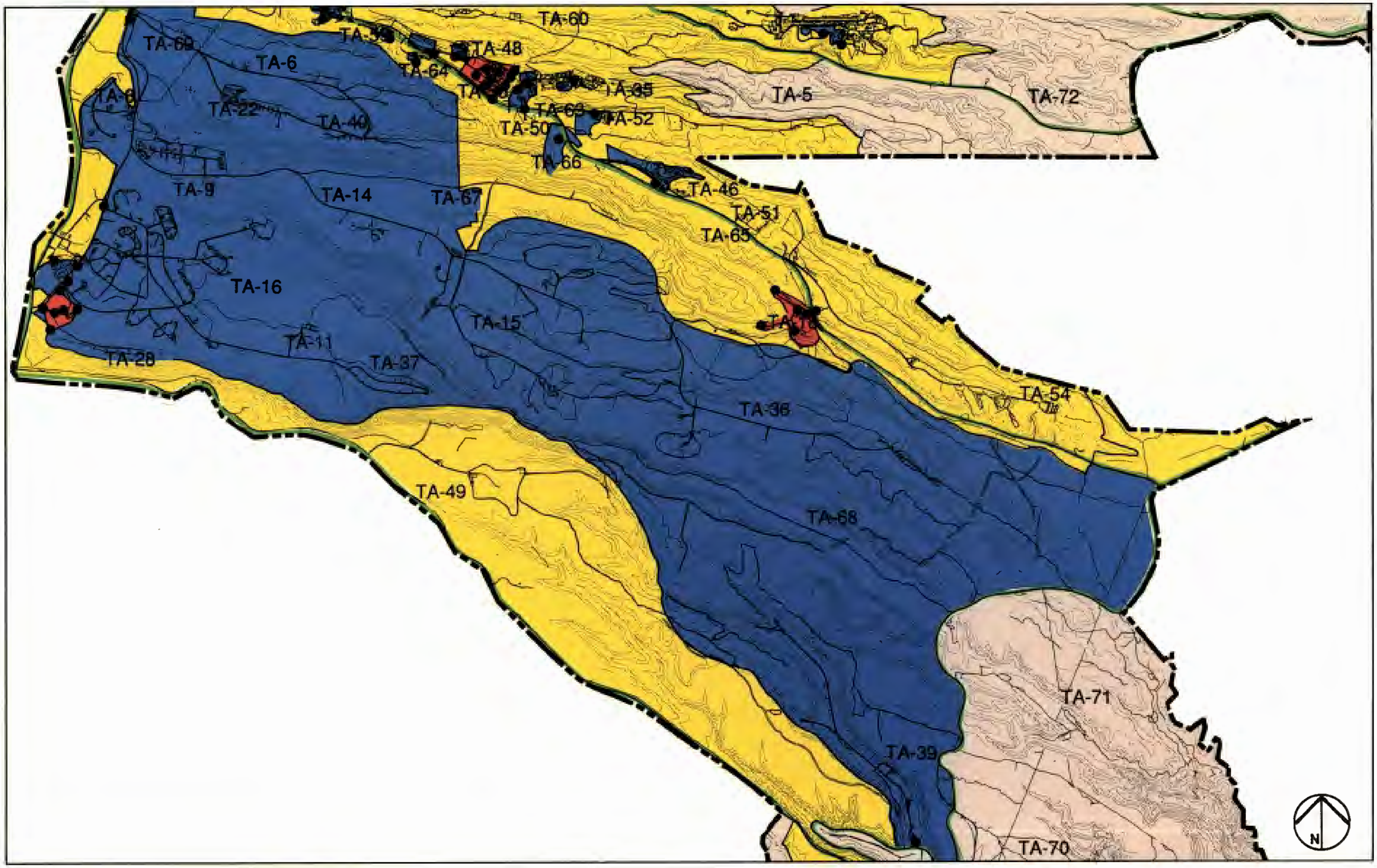
*Recommendations*

- Install security fencing as functions expand in the eastern part of the area to provide a limited level of security.
- Develop the central complex at TA-67 as two security areas: controlled and limited.

Existing Security



*Future Security*




Public Access Area
Controlled Security Area
Limited Security Area
SNM Category I & II Area
Security Buffers
Guard Facility

800 400 0 200 600 1000 1600 Meters
2400 600 0 1200 2400 4800 Feet

## Utilities

Individual utility lines in the Dynamic Testing Development Area are shown on the Laboratory-wide utility maps in the utilities element master plan.

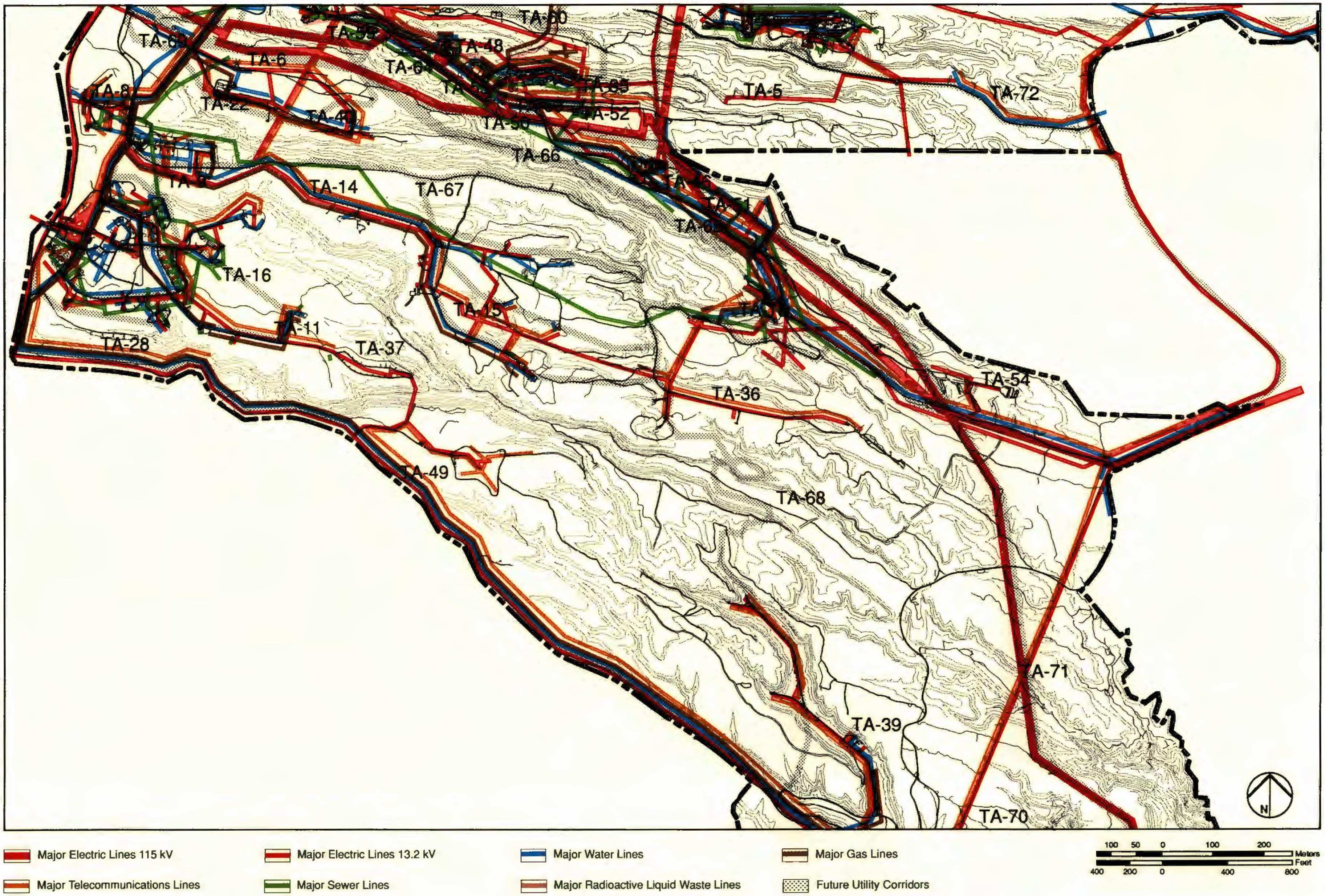
The majority of this development area is outside the recommended sanitary sewer service area. However, the TA-67 central complex should be connected to the sanitary waste water system to the north.

A 345-kV line is planned to pass through the northern and eastern testing areas. It will be located in canyons and other undevelopable land where feasible. This proposed line and existing high-voltage lines produce high radio frequency interference which may impact nearby activities.

No other major utility upgrades are planned given the low density of this development area.

*Recommendations*

- Limit construction in outlying sites to small facilities (under 2,000 square feet) which can be served effectively by septic systems
- Refrain from siting larger facilities outside of the sanitary sewer service area.


TA-60
TA-6
TA-8
TA-22
TA-40
TA-5
TA-72
TA-48
TA-52
TA-66
TA-14
TA-67
TA-9
TA-16
TA-15
TA-11
TA-28
TA-37
TA-36
TA-54
TA-49
TA-68
TA-71
TA-39
TA-70
N
Major Electric Lines 115 kV
Major Electric Lines 13.2 kV
Major Water Lines
Major Gas Lines
Major Telecommunications Lines
Major Sewer Lines
Major Radioactive Liquid Waste Lines
Future Utility Corridors
100 50 0 100 200 Meters
400 200 0 400 800 Feet

## Environment, Safety, and Health

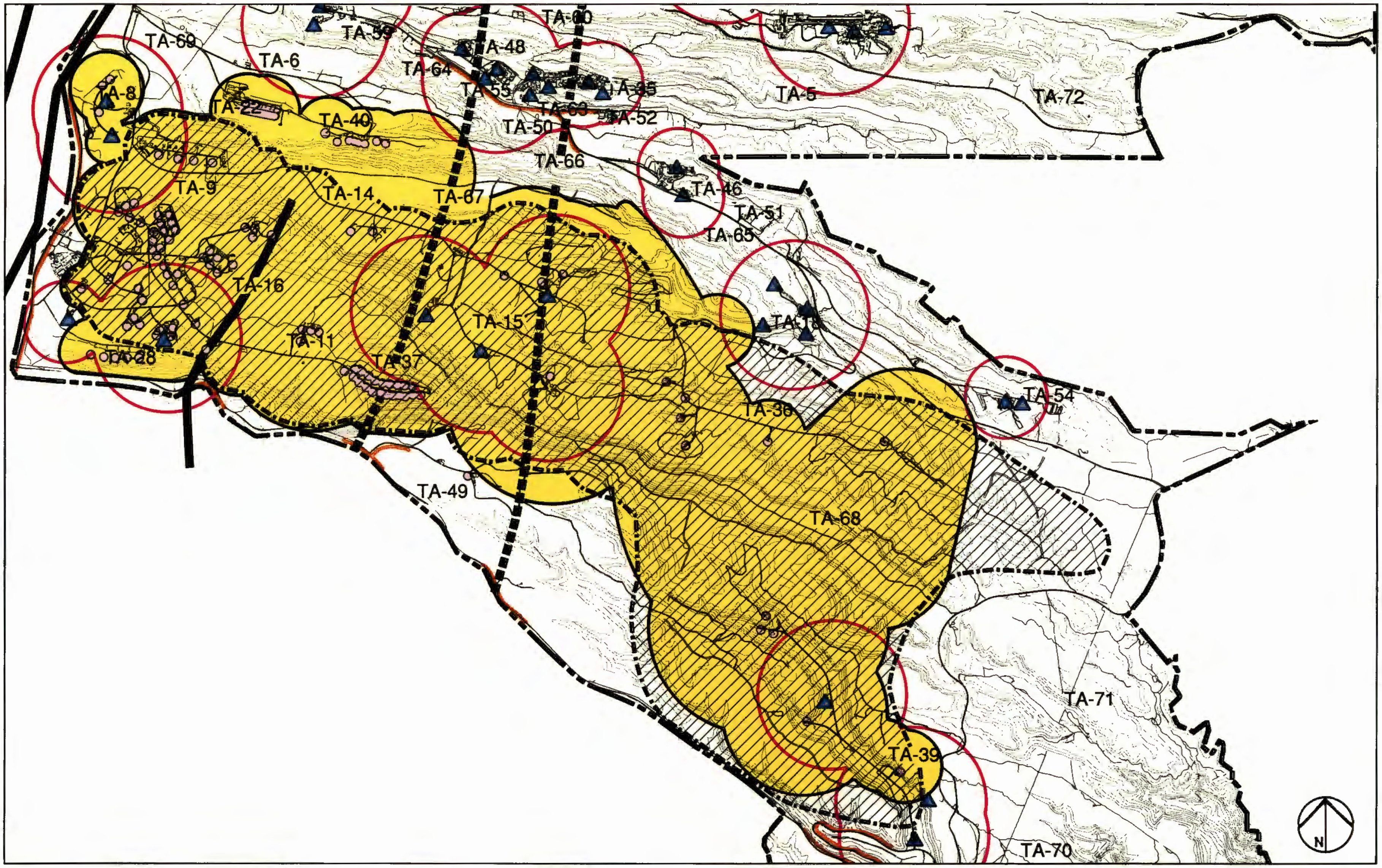
There are numerous environment, safety, and health concerns that will be important when considering facilities and site development planning matters in the Dynamic Testing Development Area. Potentially contaminated areas are scattered throughout the development area. High-explosives blast fragment hazard buffer zones are a permanent factor due to the nature of the work done in this area. High radio frequency interference zones associated with traversing electrical lines must be considered when siting detonator facilities. Radiation site evaluation circles related to services must be considered when siting facilities for personnel. Numerous archaeological sites must be protected or surveyed if they need to be disturbed. The safe storage, handling, and transportation of hazardous materials is essential within and around the Dynamic Testing Development Area. Ultimately, it makes sense to consider the development of a consolidated facilility for the treatment of explosives-contaminated wastes in the Dynamic Testing or the Weapons Engineering Development Areas.

TA-49 has been identified as possibly appropriate for a RCRA/mixed-waste disposal site. Further investigations and feasibility studies are pending.

*Recommendations*

- Preserve dynamic testing lands and facilities as essential Laboratory resources by remaining in compliance with new federal and state environmental laws and regulations.

- Consider the development of a consolidated facility for the treatment of explosives-contaminated wastes.




Radiation Site Evaluation Circles (Assumes Zero Mitigation)

Radiation Source

Possible Major Road Closure During Earthquake

Existing Blast Buffer Zone

800 400 0 200 600 1000 1600 Meters
2400 600 0 1200 2400 4800 Feet

Future Blast Buffer Zone

Fault

Concealed Fault

High Explosive Facility

# LAMPF
# (TA-53)

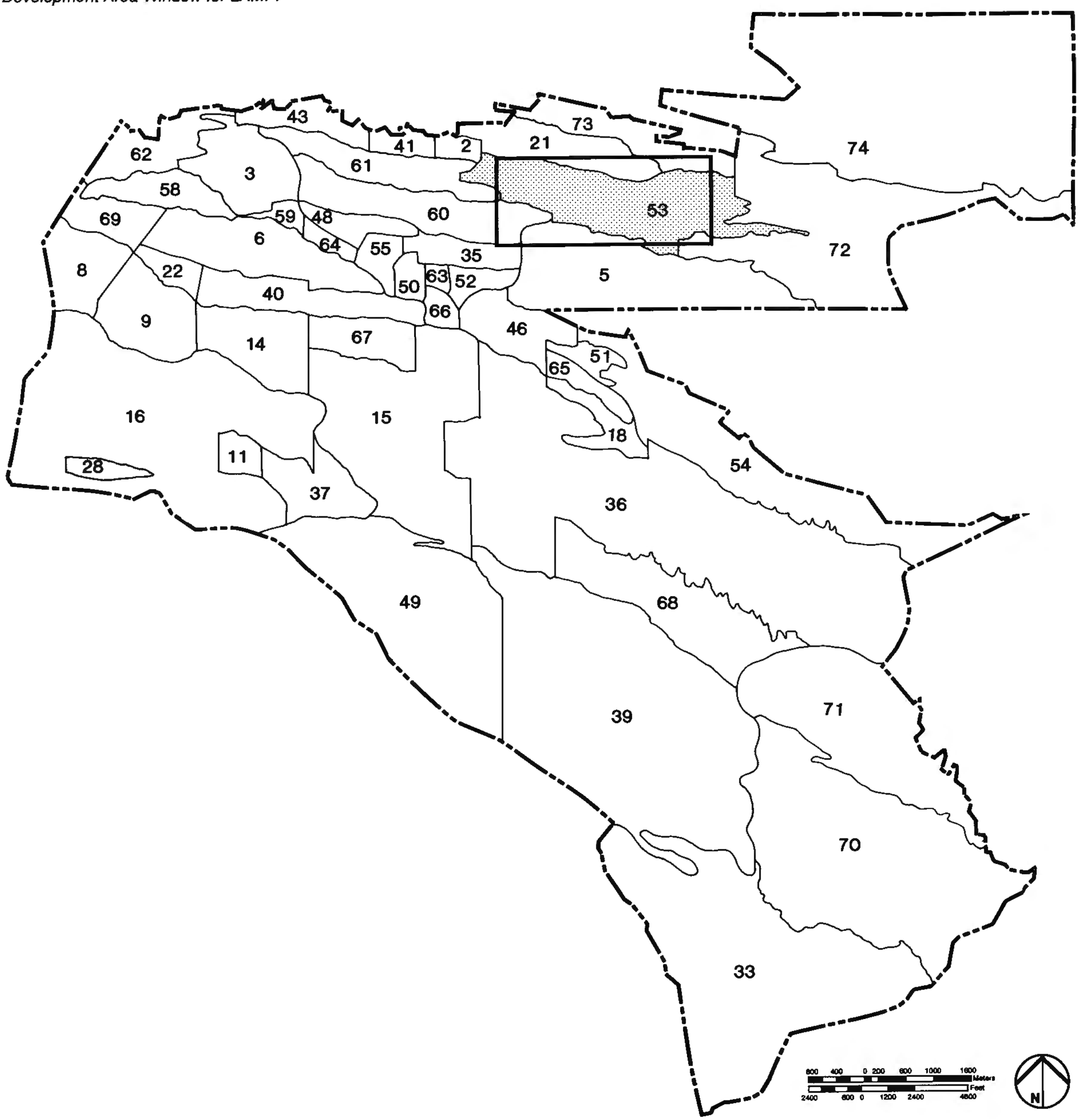
The Los Alamos Meson Physics Facility (LAMPF) Development Area consists of one technical area, TA-53 – the Laboratory's major accelerator-related experimental science area.

The Los Alamos Meson Physics Facility is a nationally important accelerator research and development complex. Built between 1968 and 1974 and continually modified, LAMPF is the world's foremost medium-energy physics installation.

To maintain a consistent scale of maps throughout all development areas (except for the Core Area and Two-Mile Mesa North, and the Dynamic Testing Development Areas), portions of some of the technical areas contained in this development area fall outside the boundaries of the development area map. The map, however, does include portions of the affected technical areas where existing development occurs and where significant development opportunities have been identified.

The acreage indicated in the existing and future land use analysis charts represents the total land area contained within the technical area that constitutes this development area and not the area defined by the development area map borders.

*Development Area Window for LAMPF*



## Existing Conditions

Technical Area 53 employs 1,125 people, or 9% of the Laboratory on-site total population; contains nearly 800,000 square feet, or 11% of the Laboratory's total net facility space; and encompasses 750 acres, or about 3% of the Laboratory's total land area. The bar chart to the right illustrates the current acreage of each land use in the development area. This chart can be contrasted with a similar one included in this master plan section which shows the future acreage. Much of the land is designated as environmental research/buffer, in part because there are large areas with severe development constraints. The pie chart to the right depicts the current composition of space within the development area.

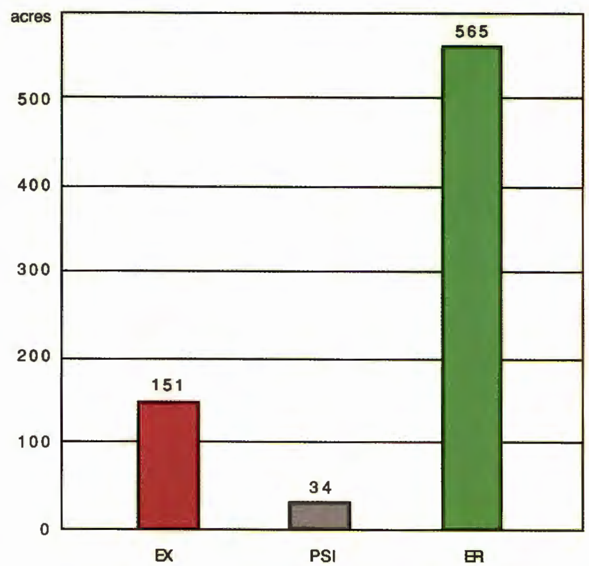
Most other facilities at TA-53 are also related to accelerator science and technology applications. These facilities include the Ground Test Accelerator (GTA) and the Manuel Lujan Jr. Los Alamos Neutron Scattering Experiment (LANSCE). The GTA forms the nexus of the Laboratory's work on the Strategic Defense Initiative.

### Trends

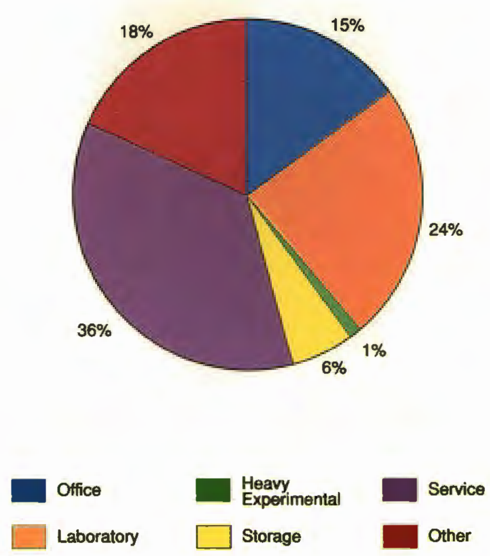
Most of the usable land in TA-53 has already been developed. Three major users compete for the limited land and space as their programs change and expand. LAMPF requires substantial amounts of electrical power and will need more soon if programs are to continue to grow.

A persistent shortage of permanent office, laboratory, and storage space has led to a proliferation of substandard temporary structures. These occupy valuable land and supplant much-needed parking areas.

*Existing Land Use Analysis*

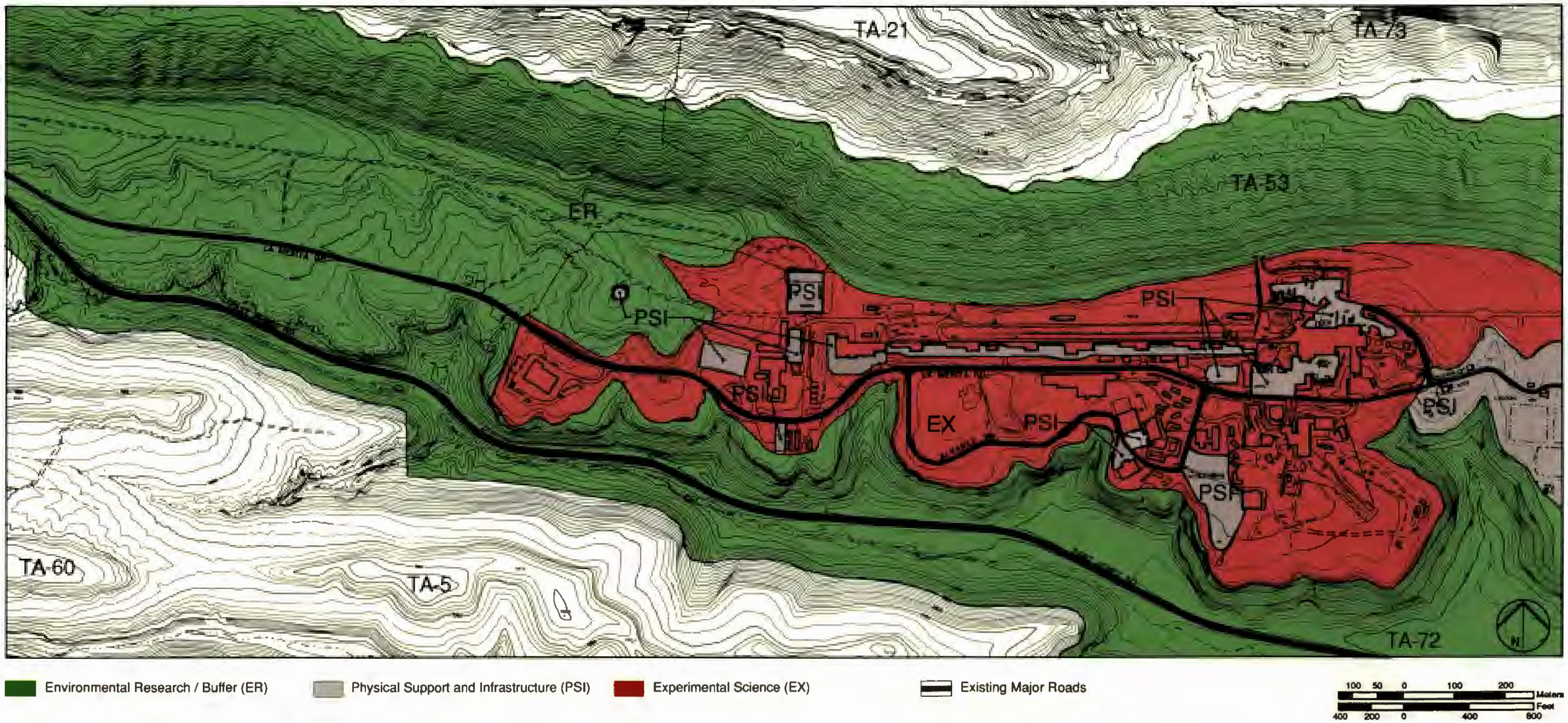



*Existing Space Categories*




The population at TA-53 fluctuates dramatically – growing considerably in the summer months when LAMPF is open to numerous visitors and collaborators and diminishing in the winter when the LAMPF accelerator is not in operation. The summer expansion puts pressure on facilities that may be adequate at other times of the year.

*Existing Land Uses*



## Opportunities and Constraints

Development opportunities and constraints for this development area are portrayed on the accompanying map. Reference page 22 for an explanation of the three levels of constraints.

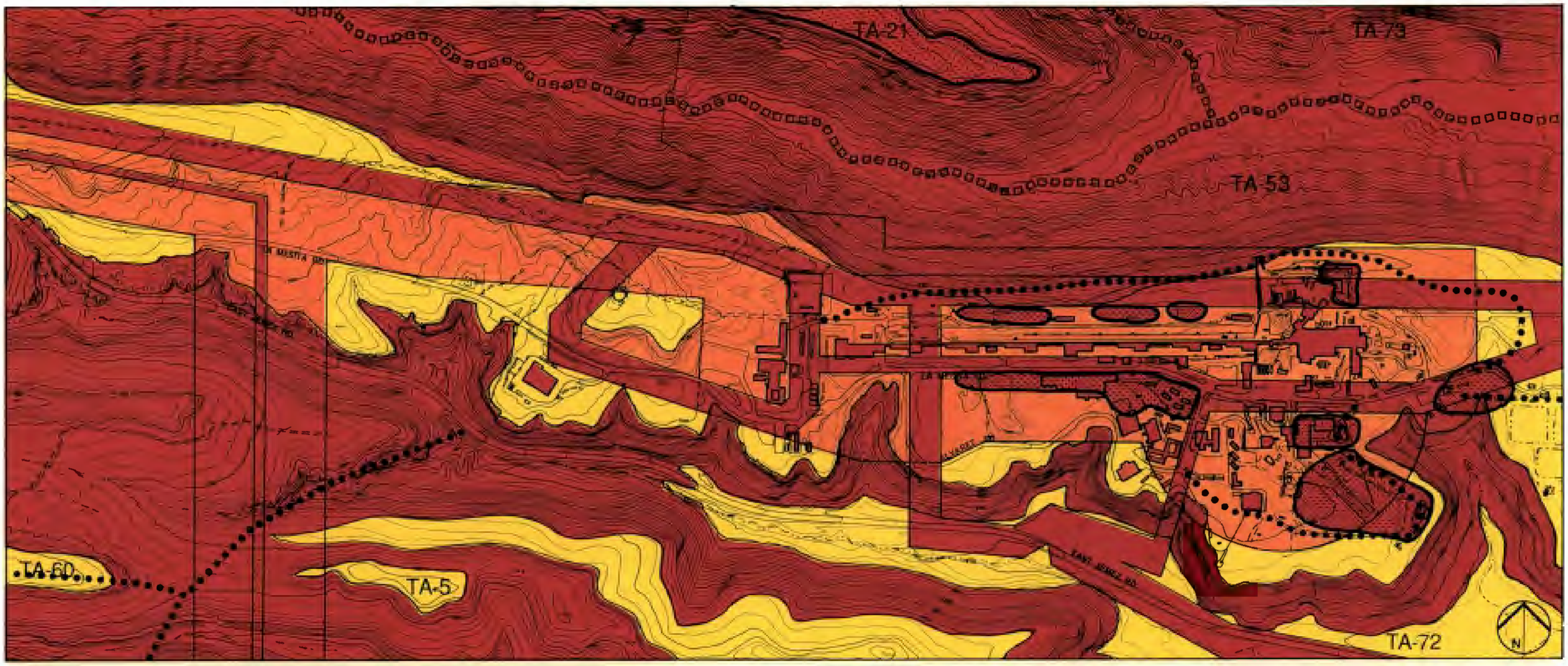
The long mesa on which LAMPF is located is an ideal site for such a linear facility. Steep canyons flank the mesa and only a few developable parcels remain. However, ample opportunity exists to redevelop certain parcels that are either underutilized or inappropriately used.

Many redevelopment sites are available where temporary and transitional structures are now located. Some of these areas provide substantial opportunity for the future expansion or addition of permanent facilities. These sites are scattered throughout the development area.

An area west of LAMPF above La Mesita Road exists that is available for expansion. Areas below the mesa along East Jemez Road and in Los Alamos Canyon may also be suitable for TA-53-related facilities and uses.

A secondary ingress/egress route is also important for safety reasons and to alleviate difficulties should the primary entry road become blocked.

*Opportunities and Constraints*




Severe Constraints

Moderate Constraints

Minimal Constraints

Potentially Contaminated Area

Potentially Contaminated Drainage Shed

Future Road

100 50 0 100 200 Meters

400 200 0 400 800 Feet

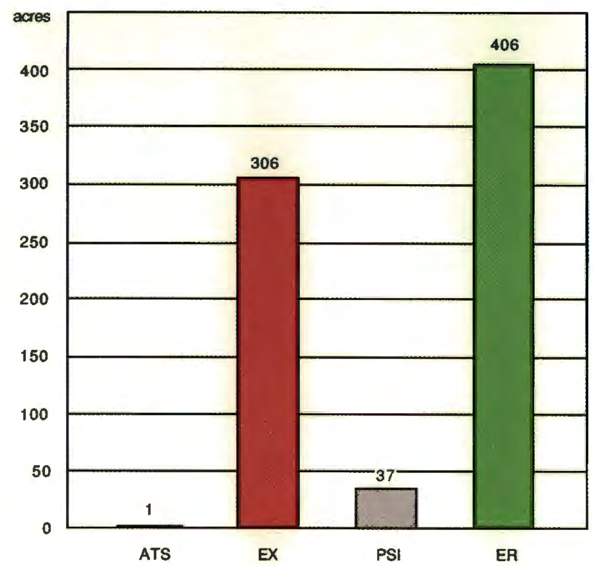
## LAMPF Master Plan

### Future Land Uses

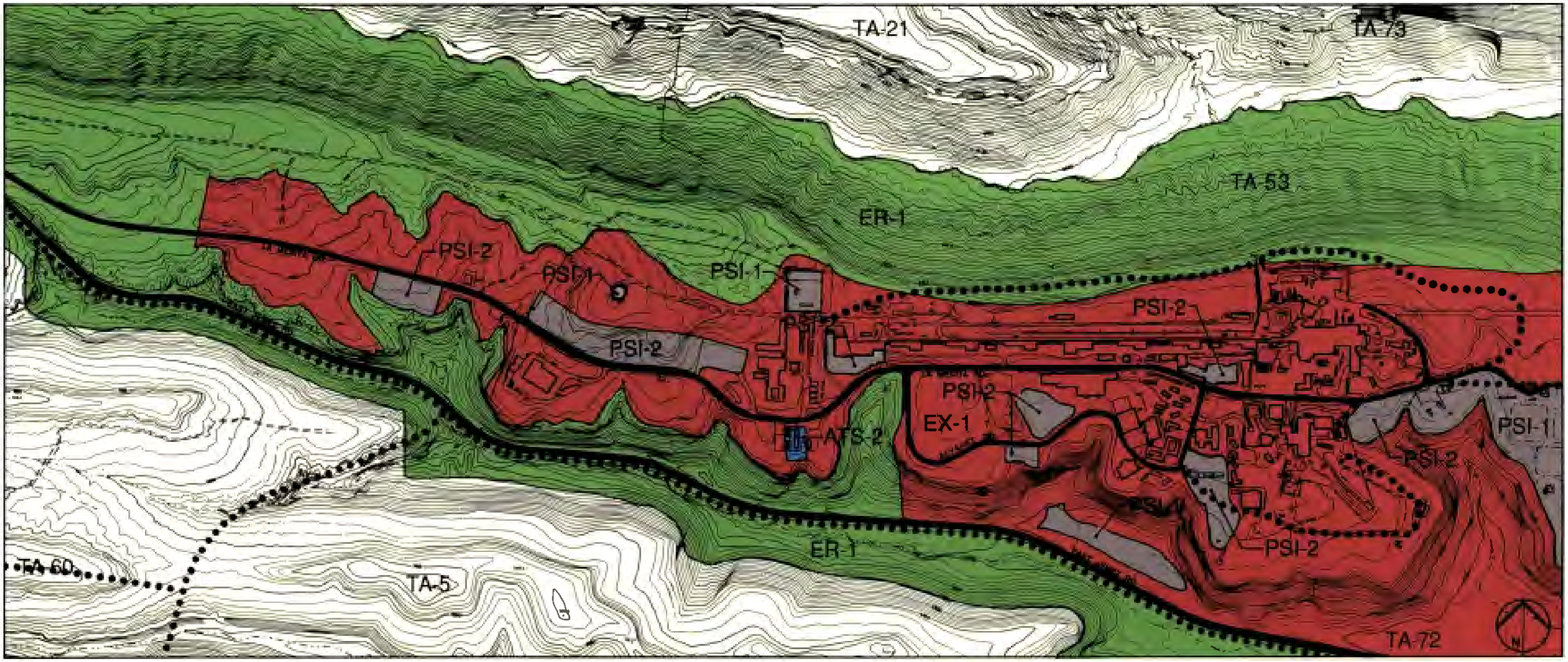
Proposed future land uses for this development area are indicated on the accompanying map. Reference the future land use zones section of this plan (Pages 24 and 25) for definitions of the uses.

TA-53 will continue to focus on experimental science, emphasizing accelerator-related technologies. Although it will be important to preserve most of the remaining developable land at TA-53 for this expansion, some areas will also be required for physical support and infrastructure functions necessary to accommodate the growth in experimental science. The possibility exists for an expansion in technology transfer programs, particularly working with industry on developing the superconducting supercollider and achieving the accelerator production of tritium. Additional laboratory and office space would be required for these efforts.

*Future Land Use Analysis*



*Future Land Uses*




Environmental Research / Buffer (ER)
ER-1: Security and Safety Buffers

Physical Support and Infrastructure (PSI)
PSI-1: Physical Plant
PSI-2: Transportation and Circulation

Experimental Science (EX)
EX-1: Accelerator Related Technology

Administration and Technical Services (ATS)
ATS-2: Technical Services

Existing Major Roads

Future Circulation Improvements

**Future Trends – Population and Facilities**

In recent years, numerous new line-item projects have contributed significantly to population growth at TA-53. For the near future, the TA-53 population should remain relatively stable until such projects as the planned expansion of LAMPF and other new scientific concepts are developed into actual facilities.

Consolidation of technical and employee support functions such as engineering, and health, safety, and environment groups located in this development area will improve working conditions and increase their functional efficiency. This consolidation would also encourage the redevelopment of the temporary and substandard facilities these functions now occupy, thereby freeing up redevelopable acreage. It would be appropriate to locate a full-service wellness satellite facility adjacent to the technical support functions. Physical Support facilities and functions should also be consolidated and upgraded to optimize utilization of the limited land available at LAMPF.

The project that could have the biggest impact on TA-53 is the proposed expansion of LAMPF to make it a more powerful research accelerator. The 1988 Los Alamos 2000 Strategic Plan identifies this facility as the highest basic research priority at the Laboratory. It will support continued excellence in nuclear and particle physics research. The expansion would require considerable land at, around, and underneath TA-53. A significant upgrading of electrical power would also be required.

More office, laboratory, and dedicated storage space is required to meet expanding programmatic needs at TA-53. Much of the existing space in these categories is temporary or substandard. There has been a proliferation of trailers, transportables, and transportainers to deal with the growing space shortage at TA-53.

*Recommendations*

- Prepare a TA-53 site-specific master plan to address future planning needs for all users.
- Redevelop existing temporary facilities and replace with permanent multistory office and light laboratory buildings.
- Construct permanent dedicated storage space to replace transportainers now encroaching into existing dedicated parking areas and taking up valuable space.
- Advocate funding of the proposed expansion of LAMPF in accordance with the Los Alamos 2000 Strategic Plan.

## Development Sites

The development sites map identifies the sites in the LAMPF Development Area that are suitable for siting new facilities and land uses. The designations indicate the following:

- "Future buildings" sites are suitable for large new facilities or complexes of facilities.

- "Future parking" sites are that suited for parking needs of future buildings.

- "Buildings to buildings" sites are presently occupied by buildings that can either be renovated or demolished, and the site reused for new buildings.

- "Parking areas to buildings"means the site should be used for future buildings, and existing parking areas should be relocated.

The accompanying development sites evaluation table presents a brief description of each site in terms of future land use and security categories, approximate size, planned projects, and significant site constraints that could contribute to increased site development costs. More specific information on the development sites within this development area is available from the Planning Group, ENG-2.

*Recommendations*

- Reserve areas south of La Mesita Road for accelerator-related experimental science programmatic expansion.

- Reserve land necessary for siting the proposed expansion of LAMPF.

- Redevelop existing temporary and substandard facilities and replace them with permanent multistory office and laboratory buildings.

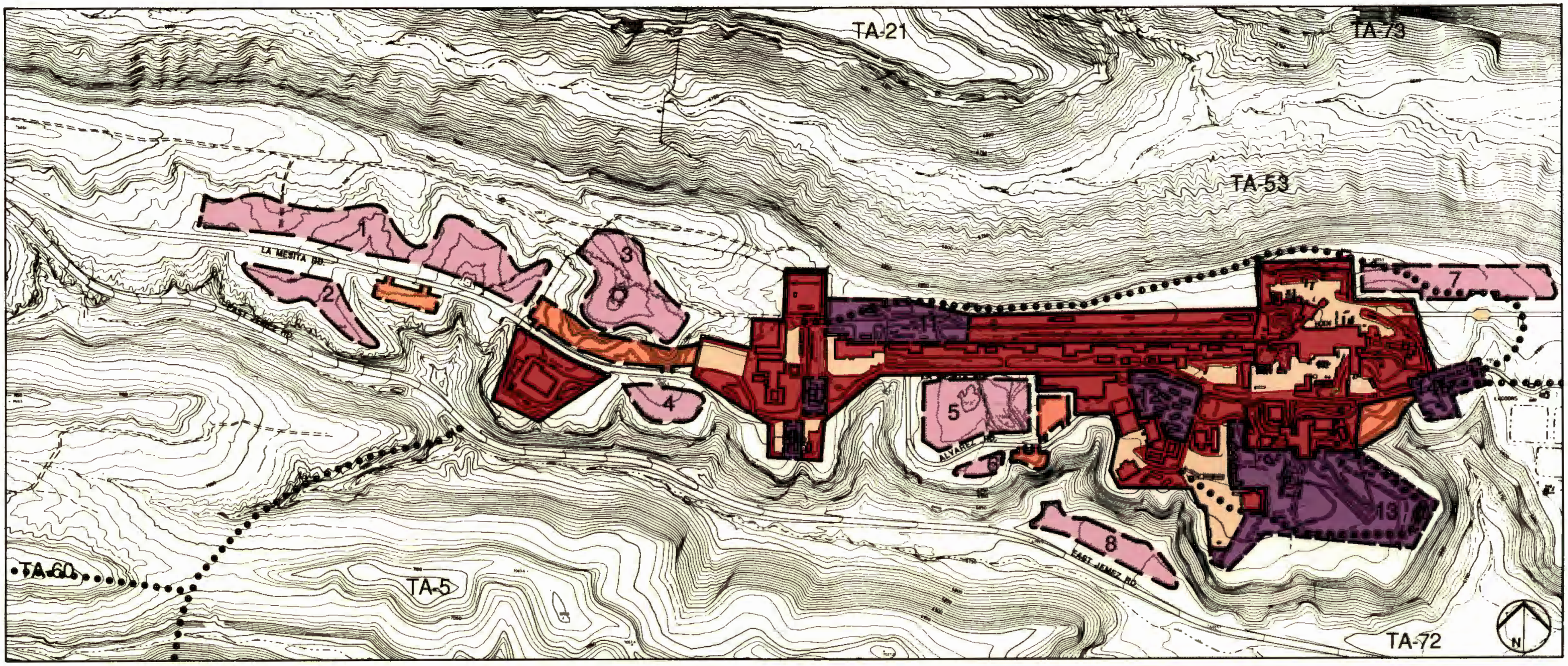
*LAMPF Development Sites Evaluation*

| Undeveloped Sites Site | Area | Future Security[1] | Future Land Use | Comments |
|---|---|---|---|---|
| 1 | 12 ac. | Controlled | EX-1 | Future site for laboratory or heavy experimental expansion. Future possible land uses might also include a site for the relocation and consolidation of a physical support and infrastructure (PSI-1) service area, or technical services (ATS-2) satellite complex (for HSE and ENG offices) for all of TA-53. Improved access required. Moderate topographic constraints. Near high radio frequency interference area. |
| 2 | 3 ac. | Controlled | EX-1 | Future site for office expansion. High-voltage electrical line and related high radio frequency interference areas bisect site. |
| 3 | 6 ac. | Controlled | EX-1 | Future site for offices, possibly as a consolidated trailer/transportable park for TA-53. Possible site for consolidated physical support (PSI-1) service area. Improved access required. Moderate topographic constraints. Partially in utility corridor and near high radio frequency interference area. |
| 4 | 2 ac. | Limited | EX-1&PSI-1 | Future site for new permanent offices. Partially in a utility corridor. |
| 5 | 5 ac. | Controlled/ Limited | EX-1 | Future site for new permanent classified offices and laboratory expansion. Archaeological site. Partially in a utility corridor. Within a high radio frequency interference area. |
| 6 | 1 ac. | Controlled | EX-1 | Future site for offices or laboratory expansion. |
| 7 | 5 ac. | Controlled | EX-1 | Future site for offices, laboratory, or heavy experimental expansion. Also a possible site for a future electrical substation to serve TA-53. Improved access required. Partially in a utility corridor and within a high radio frequency interference area. |
| 8 | 3 ac. | Controlled | PSI-1 | Future site on East Jemez Road below TA-53 for physical support and infrastructure functions. Rockfall potential. In a utility corridor. |
| Total | 37 ac. | | | |

| Redevelopable Sites Site | Area | Future Security[1] | Future Land Use | Comments |
|---|---|---|---|---|
| 9 | 1 ac. | Controlled | ATS-2 | Possible site for a consolidated TA-53 technical services satellite complex. Partially in a utility corridor. |
| 10 | 1 ac. | Controlled | EX- 1 | Future site for new permanent GPP offices. Utility corridor adjacent. Within high radio frequency interference area. |
| 11 | 5 ac. | Controlled | EX- 1 | Future site for new permanent GPP office and laboratory buildings. Also a possible site for permanent storage. Existing temporary storage requires relocation or reconfiguration to maximize use of site. In a utility corridor and within a high radio frequency interference area. |
| 12 | 3 ac. | Controlled/ Limited | EX-1 | Future site for new permanent office, laboratory, or heavy experimental expansion. Within a high radio frequency interference area. Potential contamination may impose constraints on redevelopment. |
| 13 | 14 ac. | Controlled | EX-1 | Future site for new permanent office, laboratory, or heavy experimental expansion. Within high radio frequency interference area. Potential contamination and radiation impacts may impose constraints on redevelopment. |
| 14 | 2 ac. | Controlled | EX-1 | Future site for physical support functions if they cannot be relocated to Sites 1, 3, or further east. Potential contamination may impose constraints on redevelopment. |
| Total | 26 ac. | | | |

1 See page 46 in the Security/Safeguards element master plan for an explanation of security definitions.

*Development Sites*




**Undeveloped Sites**

Future Buildings

Future Parking

Future Roads

**Redevelopable Sites**

Buildings to Buildings

**Existing**

Buildings to Remain

Parking to Remain

100 50 0 100 200 Meters
400 200 0 400 800 Feet

**Transportation/Circulation**

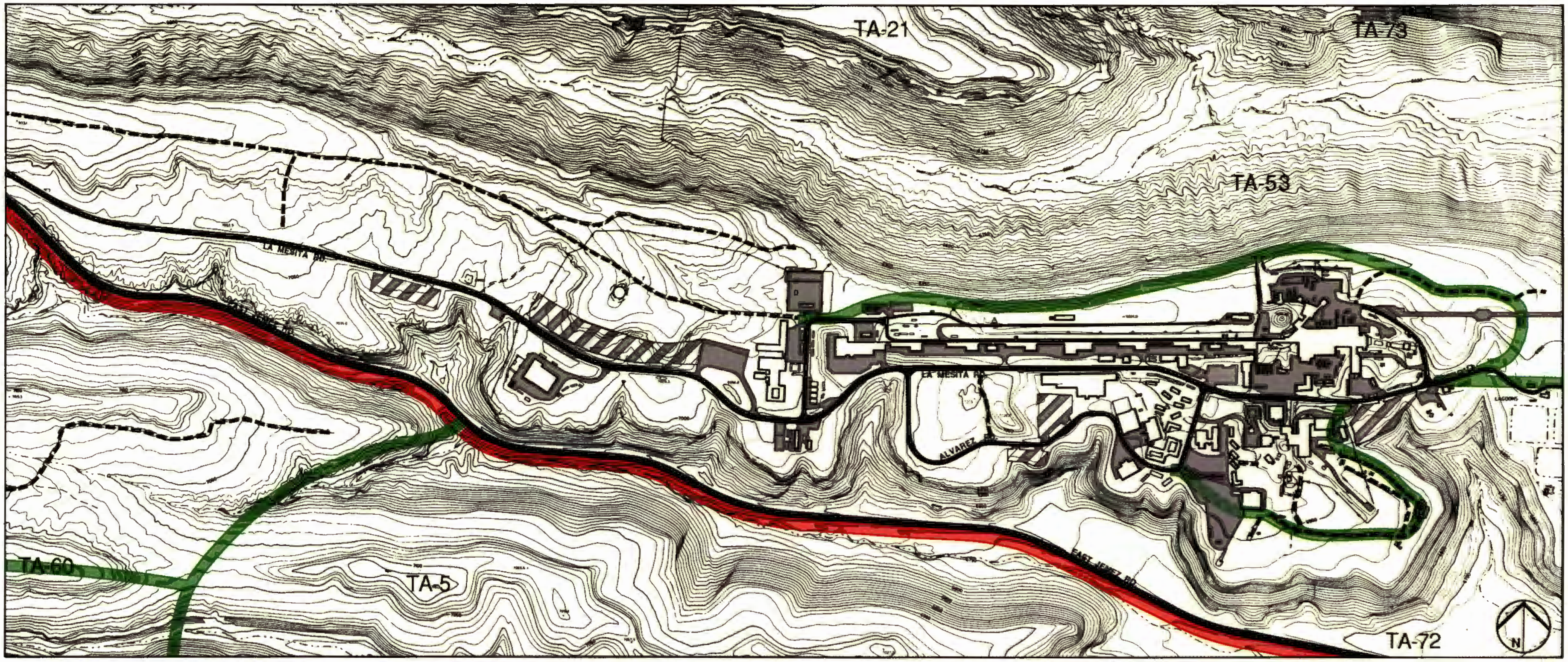
TA-53 is located on a dead-end mesa top. Secondary or emergency access is needed because the present single access/egress drive creates a potential hazard in emergency situations. This secondary access could be constructed at the east end of the development area, east of the lagoons, and connect to East Jemez Road. Alternately, a loop road could be constructed linking Alvarez Road to La Mesita and along the northern mesa edge, as depicted on the transportation map on the facing page.

Parking has been adequate at TA-53. However, the siting of trailers, transportables, and temporary storage containers within existing parking lots is depleting the supply of dedicated parking and causing localized parking difficulties.

*Recommendations*

- Explore the feasibility of constructing an alternate access road linking TA-53 east of LAMPF with East Jemez Road.
- Develop a loop road encircling the mesa top to provide secondary access around, and egress to, East Jemez Road using the existing service road as a link.
- Eliminate the siting of temporary facilities within dedicated TA-53 parking lots.

*Existing and Future Transportation/Circulation Improvements*




Future Low Priority
Future High Priority
Existing Paved Roads
Existing Unpaved Roads
Existing Parking Areas
Future Parking Areas

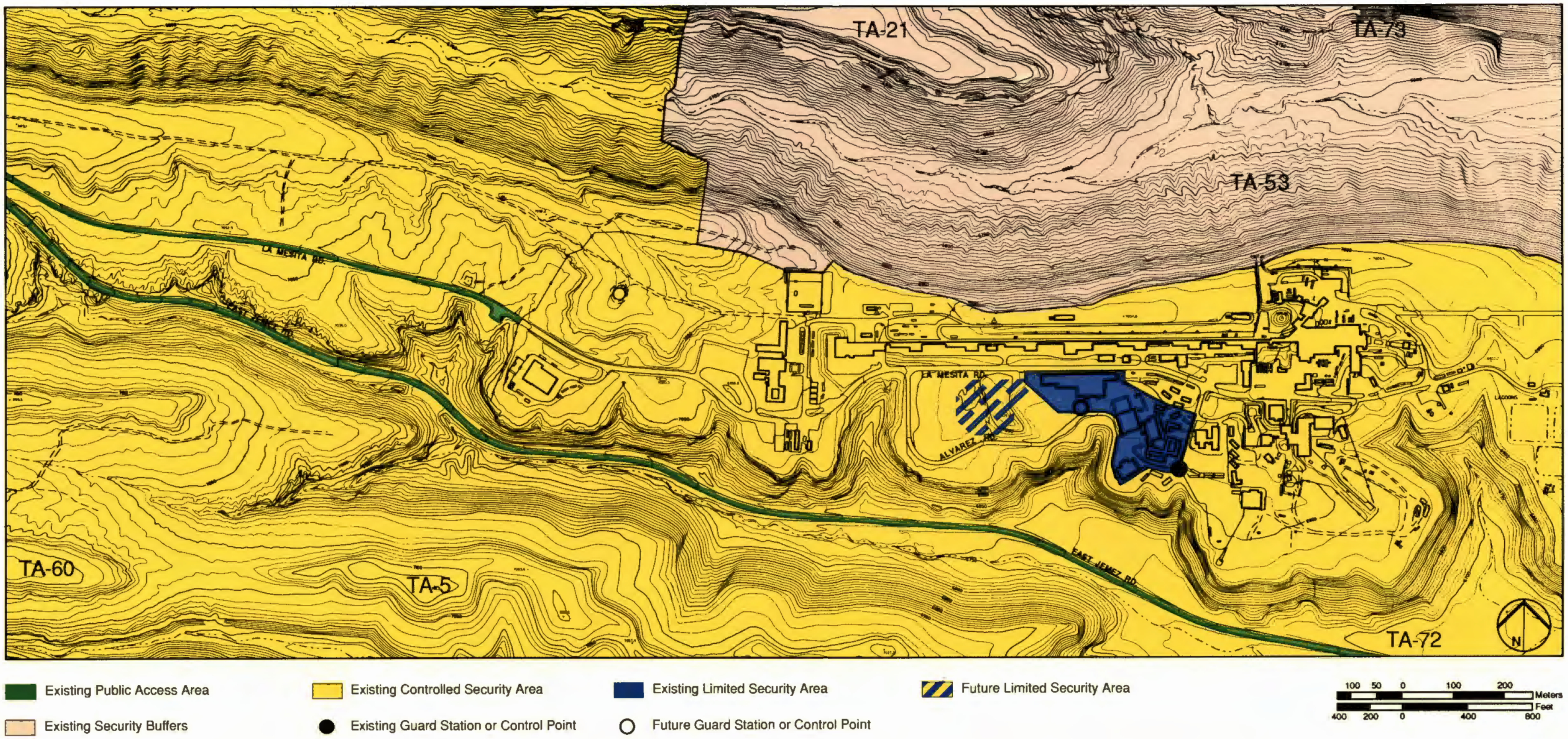
## Security

The majority of TA-53 is used for unclassified basic research requiring controlled security. One small section of the development area, located between Alvarez and La Mesita Roads, includes the Ground Test Accelerator and related facilities used for Strategic Defense Initiative research. This facility requires limited-security.

*Recommendation*

- Site any additional programs requiring limited-security within or adjacent to the existing limited-security area to minimize the number of security islands within the LAMPF Development Area.

*Existing and Future Security*



**Utilities**

LAMPF is the single largest consumer of electricity at the Laboratory. During the five months when it is operating, the facility uses approximately 42% of the Laboratory total.

Expansion of major programs within this development area will mean large increases in electrical requirements. Meeting the additional power need is the contractual responsibility of the Laboratory's supplier, and should not be a problem. However, the Laboratory's existing power lines are at their carrying capacity now. Any expansion of programs would require additional carrying capacity.

TA-53's water demand is nearing the capacity of present water system sources. Two independent water supplies are required to service LAMPF to comply with DOE Order 5480.1B. This will assure that both fire protection requirements and current water demands are satisfied.

LAMPF has its own self-contained radioactive liquid waste disposal system that utilizes one of the lagoons to the east. This system serves present generators of liquid radioactive waste. It can also accommodate new sources.

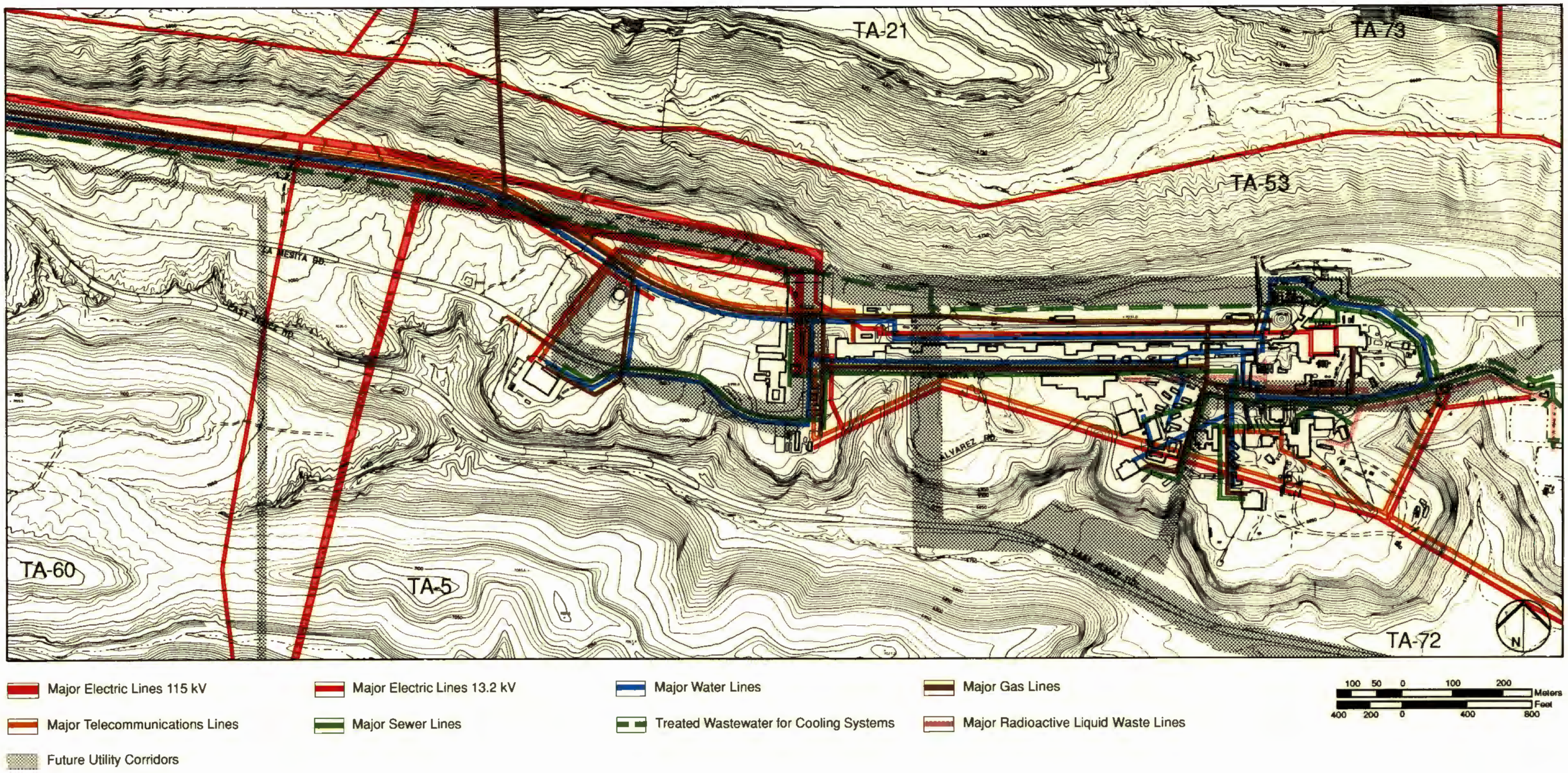
*Recommendations*

- Expand the carrying capacity of electric lines concurrent with any expansion of programs or major facilities at LAMPF.

- Provide a secondary water source for TA-53 to ensure two independent water supplies as required by DOE Order 5480.1B for fire safety and to maintain adequate water service for the existing site population.

- Extend the radioactive liquid waste line to the Ground Test Accelerator building to hook into the TA-53 radioactive liquid waste treatment system. Reserve the potential to link into the Laboratory-wide radioactive liquid waste system in the long-term.

*Utilities and Utility Corridor Master Plan*



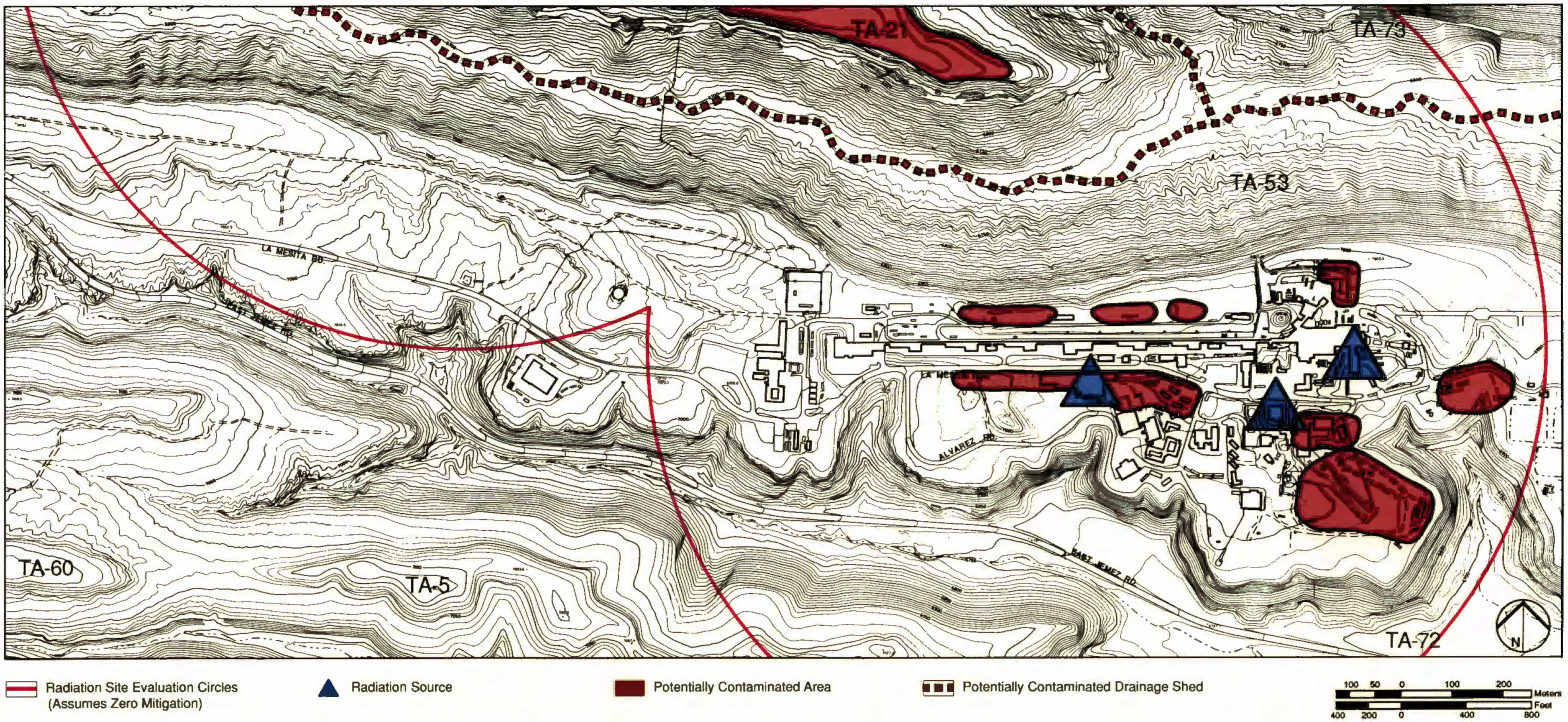
## Environment, Safety, and Health

There are several basic environment, safety, and health concerns relevant to TA-53 and LAMPF. There are some potentially contaminated areas at TA-53, some of which occupy sites that could be redeveloped for programmatic expansion if remediated. High radio frequency interference zones are associated with the facilities operating at LAMPF. Neutron emission zones and radiation site evaluation circles surround TA-53. Finally, there are three liquid waste lagoons east of LAMPF. Two of these have been used for radioactive liquid waste and should be replaced by linking into the radioactive liquid waste treatment system.

*Recommendations*

- Monitor potentially contaminated sites and determine whether they can be redeveloped for expanding programmatic needs at TA-53.
- Consider adequate safety precautions utilizing distance and/or shielding within or around neutron emission zones and related radiation site evaluation circles when planning the location of new facilities.
- Replace the radioactive liquid waste lagoons by hooking into the planned Radioactive Liquid Waste Treatment Plant at TA-50, and restore lagoon area for other uses.

*Potential Hazards*



# APPENDIXES

## Table of Contents

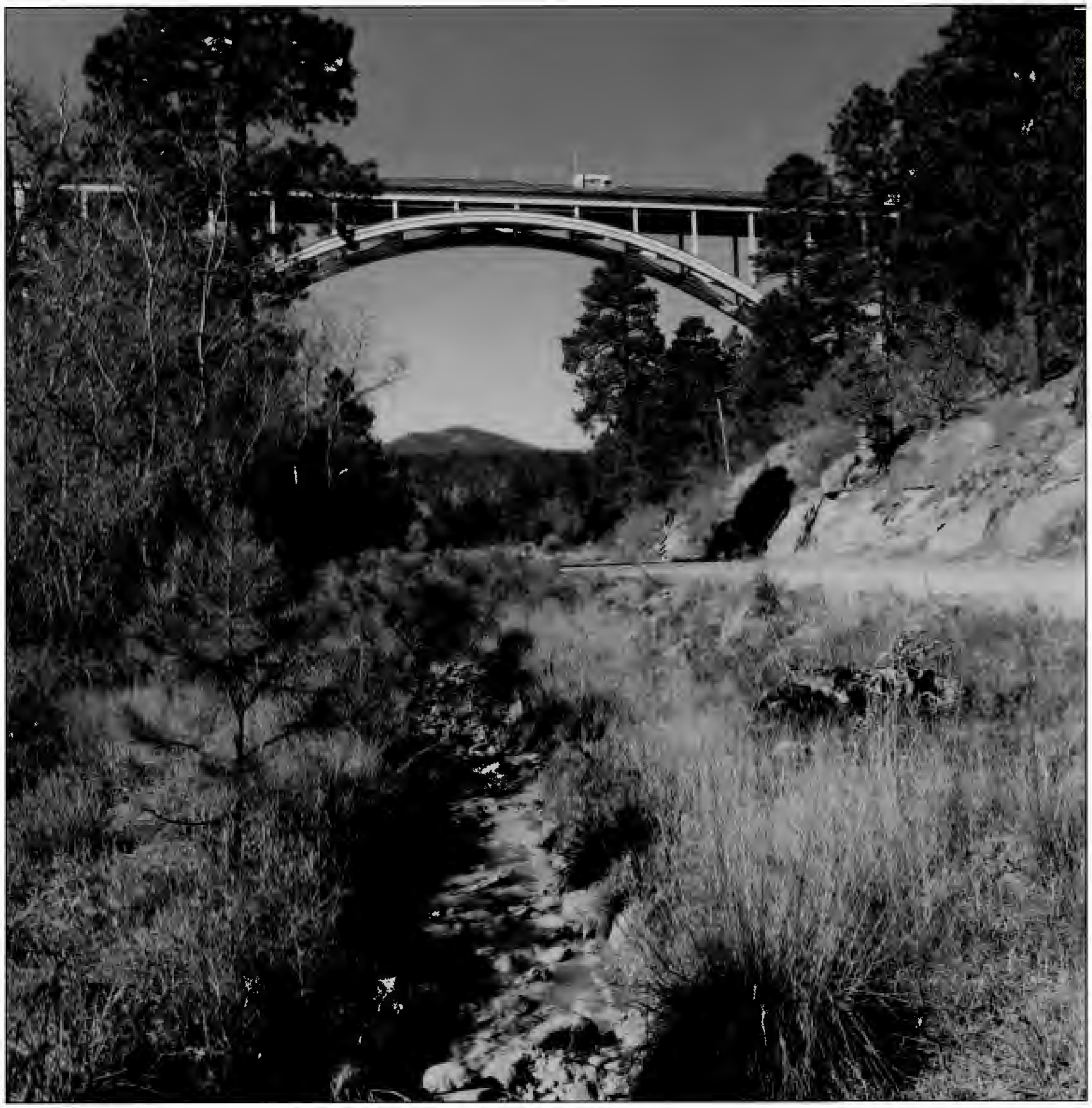
## Appendix A

## Existing Conditions Data

The initial step in the Site Development Plan planning process was to document existing characteristics and conditions at the Laboratory. Volume II of the 1982 Site Development Plan provided the initial background information for these studies. Members of the site development plan technical advisory team provided further documentation and review in their respective areas of expertise throughout the process. The resulting data is mapped in the pages that follow and provides a convenient resource for those involved in land use and facilities planning and management.

Many of the recommendations contained in the SDP are a direct outgrowth of the opportunities and constraints inherent in the environment. The natural characteristics that were mapped and analyzed, and that constitute major determinants of site opportunities and constraints include slope, soils, geology, climate, vegetation, wildlife, archaeology, and surface hydrology. Brief overviews of these determinants and accompanying maps are presented on the pages that follow.

*Los Alamos Canyon and Los Alamos Canyon Bridge*



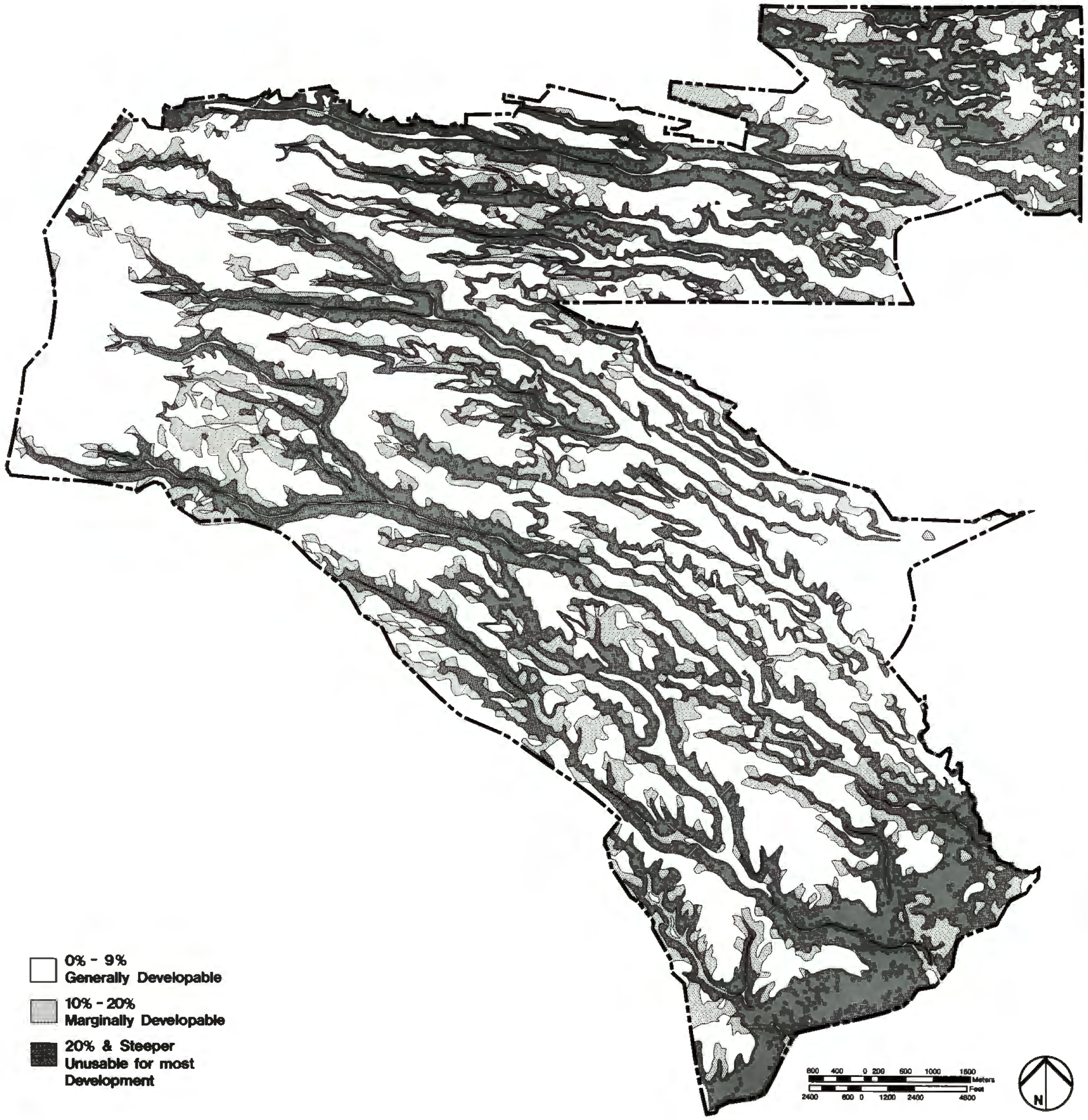
## Slope

Much of Los Alamos County is located on the Pajarito Plateau, which occupies the eastern flank of the Jemez Mountains in north-central New Mexico. The plateau occupies about 47% of the land area of the county from the 6,300 to 7,800 foot elevation, with the Jemez Mountains occupying about 32% of the land area above the latter elevation.

Many portions of the plateau have been deeply eroded by runoff, resulting in a series of mesas separated by canyons, many of which are several hundred feet deep. Most of the canyons contain intermittent streams, which flow during the rainy season. Frijoles Creek, located on the southern border of the county, and the Rio Grande, located along the eastern border of the county, are the only permanent natural streams in the area.

Individual slope gradient classes occur in extensive areas through several portions of the county. The 20% or greater slope class, comprising about 54% of the county land area, occurs extensively in the mountainous regions of the county in areas with steep canyon side slopes, and along the Rio Grande. Similarly, many portions of the broad mesa tops and canyon floors have slope gradients of 0%-5%. More frequently, however, two or more slope gradient classes occur within an area the size of White Rock which, for example, has mostly 0%-5% slopes, but also 5%-10%, and 10%-20% slope classes. Areas with a wide range in slope gradient, such as found in the northeastern section of the county, generally represent a more complex topography than areas with a narrow range of gradient. In addition, the pattern of the various topographic areas in different sections of the county is an indication of the complexity of the topography. Within the Laboratory site, steep slopes and deeply cut canyons are severe constraints to development. Much of the land is unusable given

*Slope*



the prevalence of these conditions. Over half the Laboratory has slopes that exceed 20%. Facilities siting must consider slopes in terms of safety (i.e. stability, landslides and rockfalls) and development costs.

## Soils

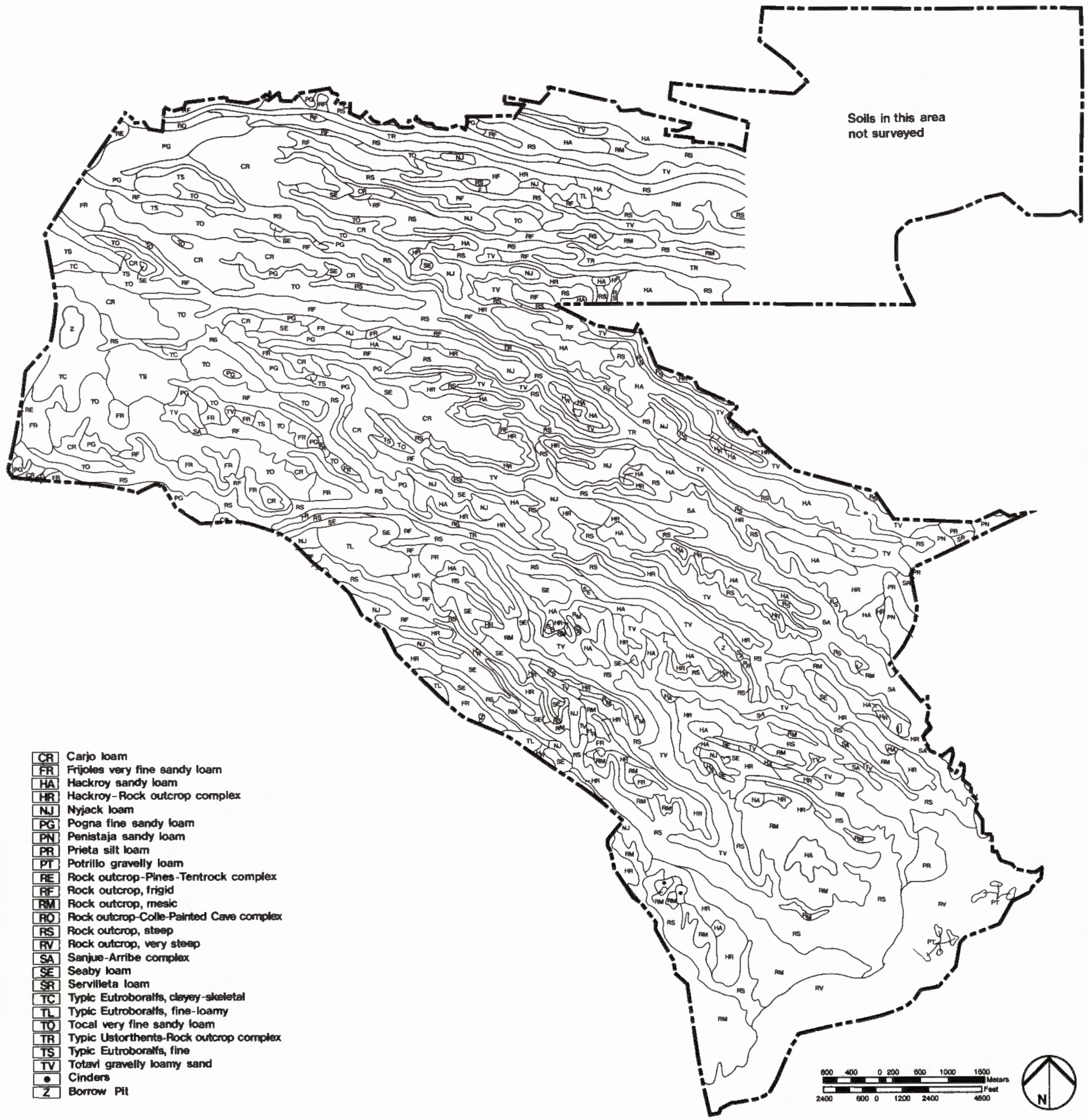
Information on the numerous present and potential uses of soils is essential for planning the best possible use of land and water resources. Soils information can be applied in managing land for conservation, wildlife habitat, urban planning, and for recreational, agricultural, and military uses. For example, a detailed soils data base can be used in selecting sites for local buildings, sanitary facilities, roads, ponds, and other structures, and for locating suitable source materials for roadfill, sand, gravel, and topsoil. Soils information is also needed in the radioecological and stable element research performed at the Laboratory.

The properties that characterize a soil are a result of the influence of a particular combination of the five soil formation factors of parent material, climate, living organisms, topography, and time.

Parent material provides a soil with a mineral skeleton, consisting of unconsolidated and partly decayed rocks. Most soils are formed from the weathering of bedrock in place, but many soils in the Los Alamos area formed from material that was transported from the site of the parent rock and redeposited at a new location. Ice, water, wind, and gravity are transporting agents, which may act independently or in combination with two or more agents. Wind and water are the significant agents in transporting and redepositing the parent materials from which Los Alamos soils developed.

The principal parent materials of about 95% of Los Alamos soils are Bandelier Tuff, volcanic rocks of the Tschicoma and Puye Formations, the basaltic rocks of Chino Mesa, and the remnants of the El Cajete pumice. The remaining 5% formed from colluvium, alluvium, andesitic rocks of the Paliza Canyon Formation, Cerro Rubio quartz latites, and tuffs and associated sediments of Cerro Toledo rhyolite.

*Soils*



Almost all of the parent materials of Los Alamos soils were formed millions of years ago during periods of volcanic activity. The Rio Grande Depression began to form as a result of local downfaulting over 20 million years ago and was followed by accumulations of rocks of the Santa Fe Group, and the Tesuque Formation, as fill in the depression. Final volcanic activity in the Los Alamos area occurred 42,000 years ago in the form of a mantle-bedded, air-fall deposit of rhyolite pumice, the El Cajete member of the Valles rhyolite.

Faulting and erosion of the geologic materials found in the county have continued to influence the soils of the county. Topography is important in determining the pattern of occurrence of soil types within different areas of the county. This pattern is closely related to topography because of topographic influences on drainage, erosion, climate, and plant growth. Soil suitability for various uses is also closely related to topography.

## Geology

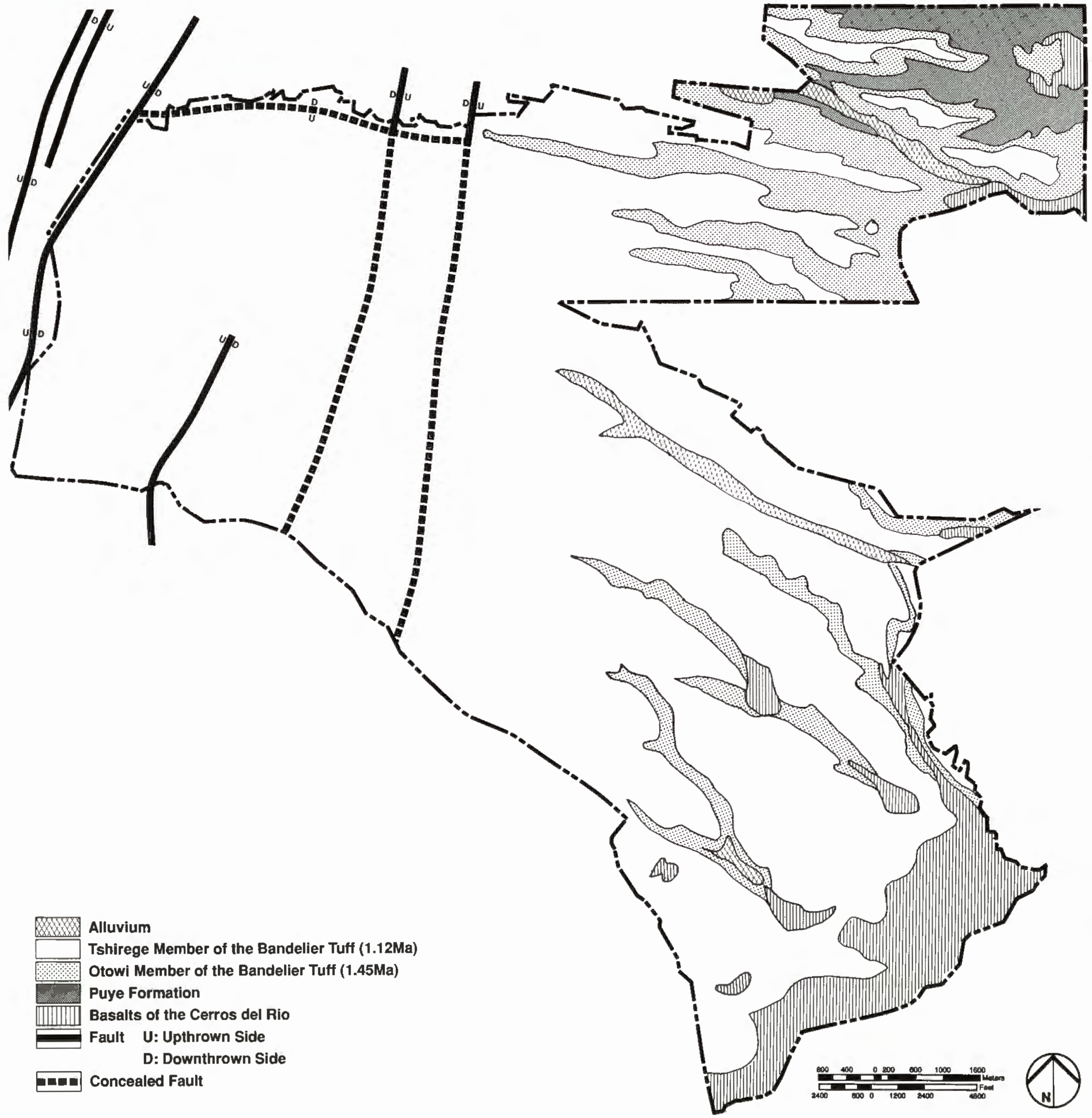
Los Alamos National Laboratory lies atop the Pajarito Plateau, which is composed of voluminous deposits of volcanic ash and ejected material collectively referred to as the Bandelier Tuff. On the Pajarito Plateau the Bandelier Tuff consists of two members, each formed with cataclysmic eruptions from the Jemez Mountains 1.45 million years ago (Otowi Member) and 1.12 million years ago (Tshirege Member). Shortly after deposition the material became lithified or consolidated into tuff. Tuff is easily excavated in most locales and forms an excellent base for building foundations.

Planning and development considerations with respect to the placement of facilities within fault zones focus primarily on the question of maintaining integrity of containment systems. This question is of greatest importance regarding certain special nuclear materials and waste management facilities.

It is thought that earthquakes larger than magnitude 6 on the Richter Scale may occur in the Los Alamos area, but the frequency of such events may be as long as several thousand years. Data are not adequate to reliably estimate the sizes or recurrence intervals of earthquakes that may affect the Los Alamos area in the next few decades.

In the event of large earthquakes within the local fault systems, one must conservatively anticipate surface rupture along the fault traces. Thus, any building built within a fault zone could be seriously damaged or destroyed by surface rupture, depending on the magnitude of the rupture. This damage could result in destruction of containment structures, violating containment integrity, allowing possible release of hazardous materials into the environment. Additionally, faults and their associated fracture systems penetrate deeply into the shallow crust. Some faults in this region penetrate to at least 10 kilometers depth. Thus, unless complete-

*Geology*



ly sealed by secondary depositional processes, the faults and fault zones can provide pathways and access for widespread circulation of fluids. As such, it is probably not wise to place waste facilities in proximity to faults.

Given these considerations, the siting of some kinds of facilities must be constrained by the locations of major faults within the Laboratory.

Sparse deposits of pumice and alluvium occur within the Laboratory. The minable deposits of pumice are scattered at the base of each member of Bandelier Tuff.

Slope stability within the area of the Laboratory is extremely variable and is dependent on many factors specific to a given site. Steep canyon walls, however, are susceptible to massive failures, posing rockfall hazards in most canyon bottoms and long-term stability problems at mesa edges.

## Climate

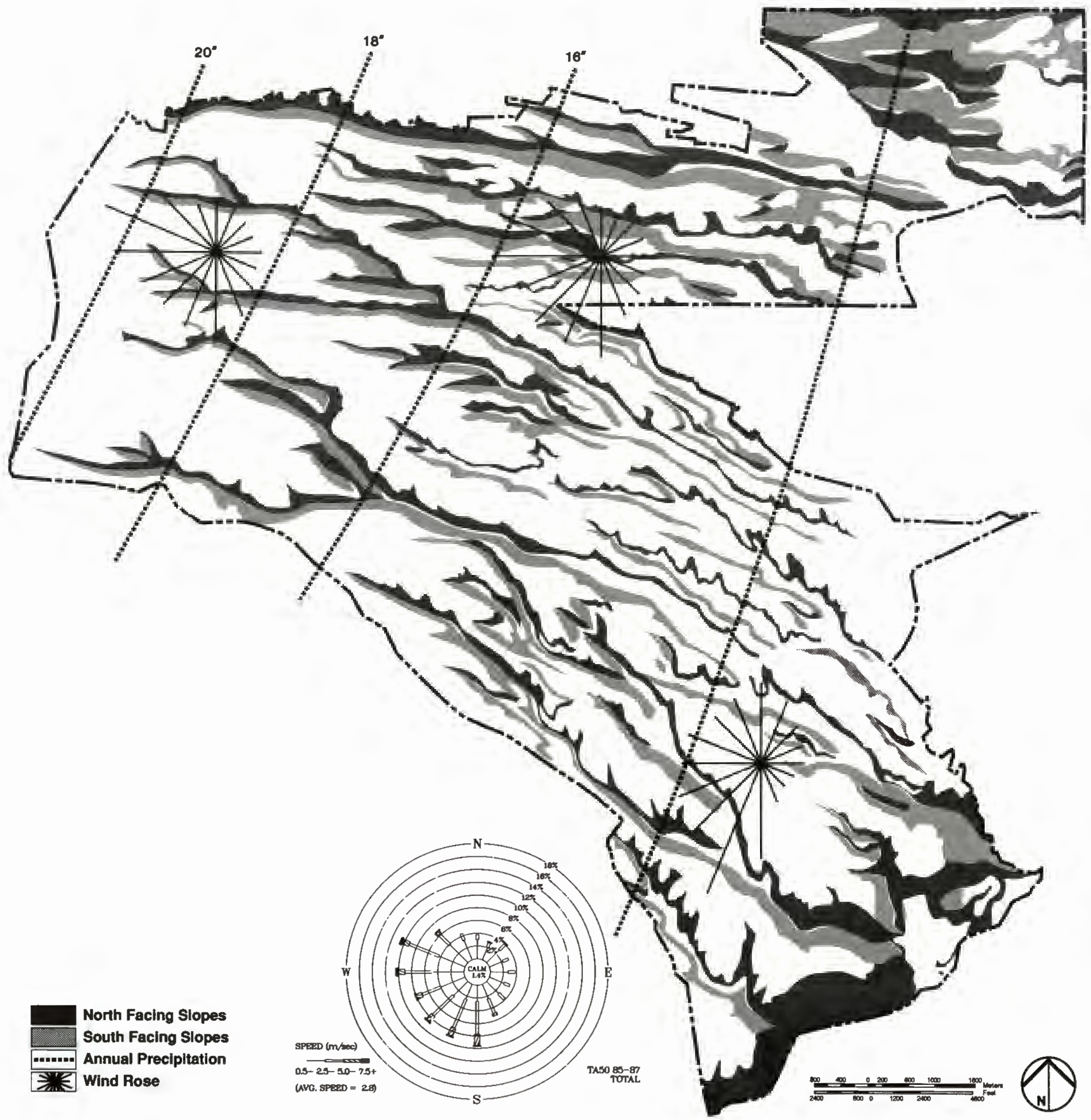
Los Alamos County has a semiarid continental mountain climate. The climate near the Rio Grande is an arid continental climate.

The annual precipitation pattern throughout the county reflects the 5,000 foot elevation gradient from the southern portion of the county near the Rio Grande to the high mountains in the northwestern sections of the county. Although no climatological data exist for the Rio Grande area in Los Alamos County specifically, the Española weather station, at an elevation of 5,594 feet, approximates this climate with a total annual precipitation of 9.5 inches. Proceeding up the elevation gradient, the White Rock (6,378 feet) and the Los Alamos (7,411 feet) stations received 13.4 and 19.3 inches of mean annual precipitation, whereas the high mountain areas in the county (10,300 feet) probably receive about 35 inches of precipitation annually. More than two-thirds of the yearly moisture falls during the months of May through October, and rainfall activity peaks in August. Most of the winter precipitation falls as snow, with 50 inches descending during an average winter and as much as 59 inches often falling in a 24-hour period. Summer rains make up 75% of the annual precipitation. Relative humidity averages 40% on an annual basis, ranging from 30% in May and June to greater than 50% in January, February, and July.

The overall seasonal temperature variations are similar throughout the county, the hottest and coldest months occurring in July and January respectively. The annual mean temperature for Los Alamos is 46.5 degrees F. Monthly temperature means varying from 28 degrees F in January to 68 degrees F in August.

Summer daytime temperatures are generally below 90 degrees F, while evening temperatures

*Climate*



drop into the mid fifties. Winter temperatures vary from 14 degrees F to 41 degrees F, with a record low of -17 degrees F. Winter days are generally clear with light winds. Even though the winter air is cold, the strong solar radiation makes the clear winter days quite comfortable.

There is no clearly defined prevailing wind direction in Los Alamos. The unusual terrain in the Los Alamos area causes a spatial variation in surface winds. However, there are two predominant air flows in the area. Drainage off the Jemez Mountains creates a westerly flow that converges with a southerly air flow channeled through the Rio Grande depression along the eastern edge of the county. The downslope drainage may account for light westerly and northwesterly winds in the area. Wind speeds vary with the pressure gradient and the diurnal cycle. Wind conditions are near calm 10% to 15% of the time, while light winds of less than seven miles per hour occur 80% of the time. Strong winds reaching speeds greater than 35 miles per hour for 10 minutes or longer occur less than 1% of the time.

Microclimates at various locations can influence the siting of roads and facilities and energy costs for facility heating and cooling. These microclimates should be used to some advantage when feasible.

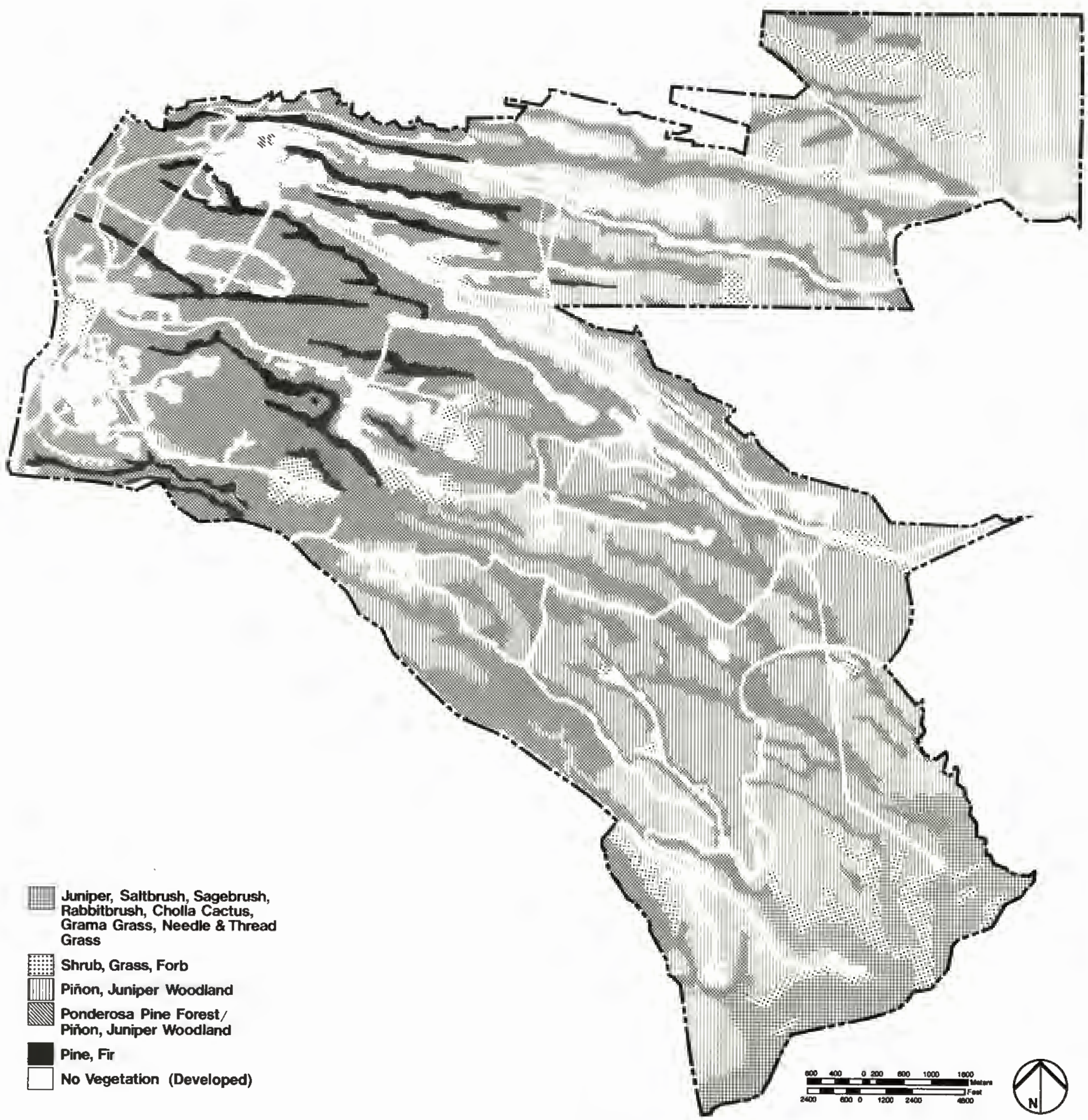
## Vegetation

Plant diversity within the Laboratory is extensive and varies with the localized topography, elevational gradients, and microclimates.

Seven major overstory vegetation types exist throughout the 4,900 foot gradient in the county. These are, from east to west, the juniper of the Upper Sonoran life zone, the pinon-juniper, ponderosa pine/pinon-juniper, and ponderosa pine-fir of the Transition life zone, and the fir and fir-aspen of the Canadian life zone. A nonforested, shrub-grass-forb component occurs primarily within the Upper Sonoran and Transition life zones. A variety of habitats is created by the east-west orientation of the mesa-canyon ecosystems: north-facing slopes support biota of the next higher life zone and south-facing slopes contain representatives of the next lower life zone; wide canyon floors contain biota of both life zones. The current list of understory vegetation types contains 164 plant species of 36 families, reflecting the diversity of the plant communities in the area.

The ability of the forest or grassland to absorb new structures should be evaluated prior to siting facilities. Sites should be engineered to prevent excessive erosion. Site plans should incorporate landscaping with native species to maintain continuity with the natural environment and to conserve water.

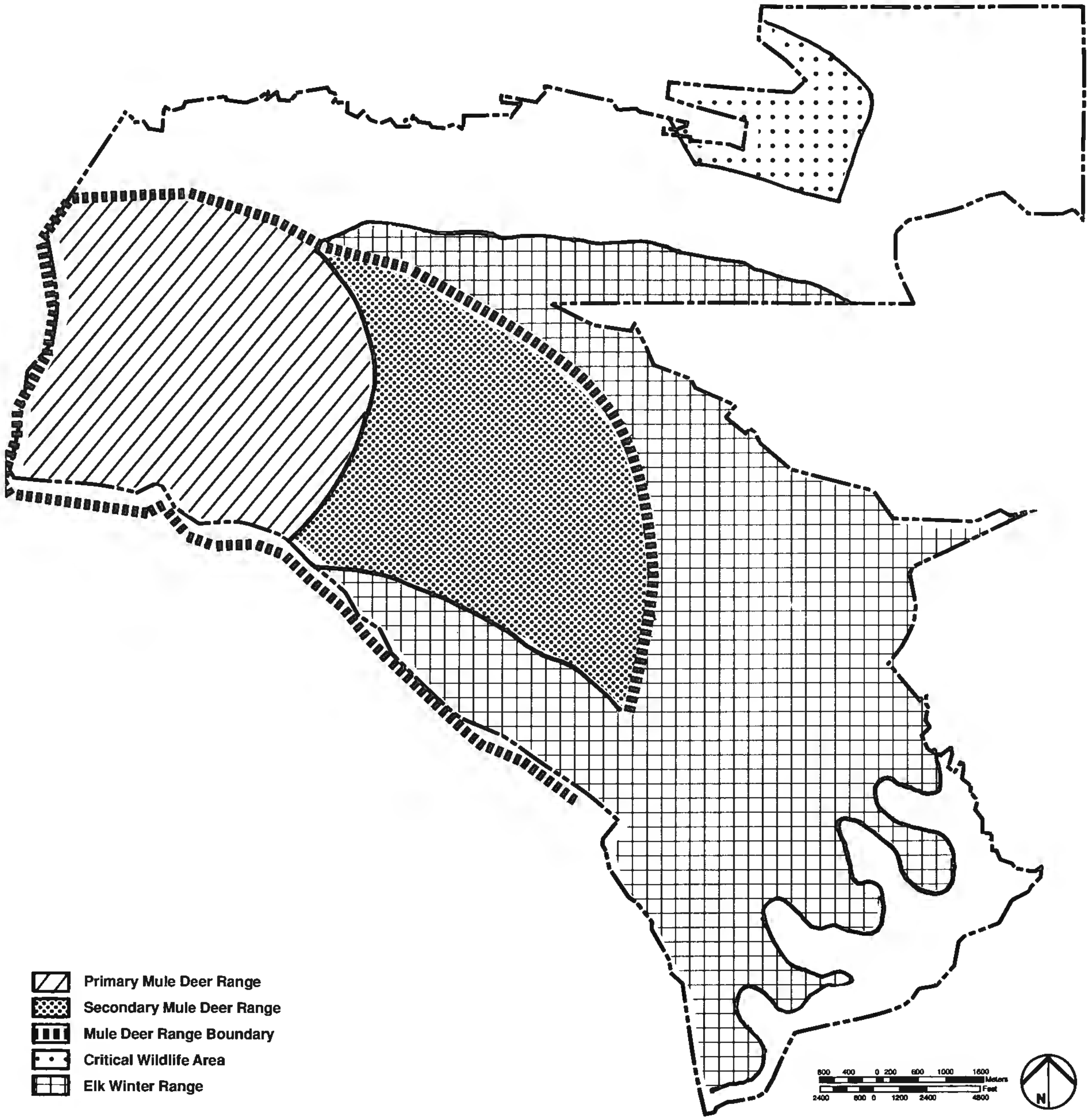
*Vegetation*



## Wildlife

The Laboratory site contains habitats for rare, threatened, and endangered plant and animal species. Of particular concern are the trees and cliffs in riparian canyons; they provide an important nesting habitat for raptors, such as eagles, hawks, and falcons. Some species are protected by the Federal Endangered Species Act, others by the State of New Mexico Rule No. NRD 85-1. Their habitat areas are very sensitive to development. Maintenance of the habitats of endangered species is mandated by law. Project planning should include a wildlife survey of the area to determine the presence of endangered or rare species and include efforts to develop measures to minimize adverse impacts on the habitat. Personnel in the Health, Safety, and Environment Division will assist with the surveys and the development of habitat maintenance and impact mitigation measures.

*Wildlife*



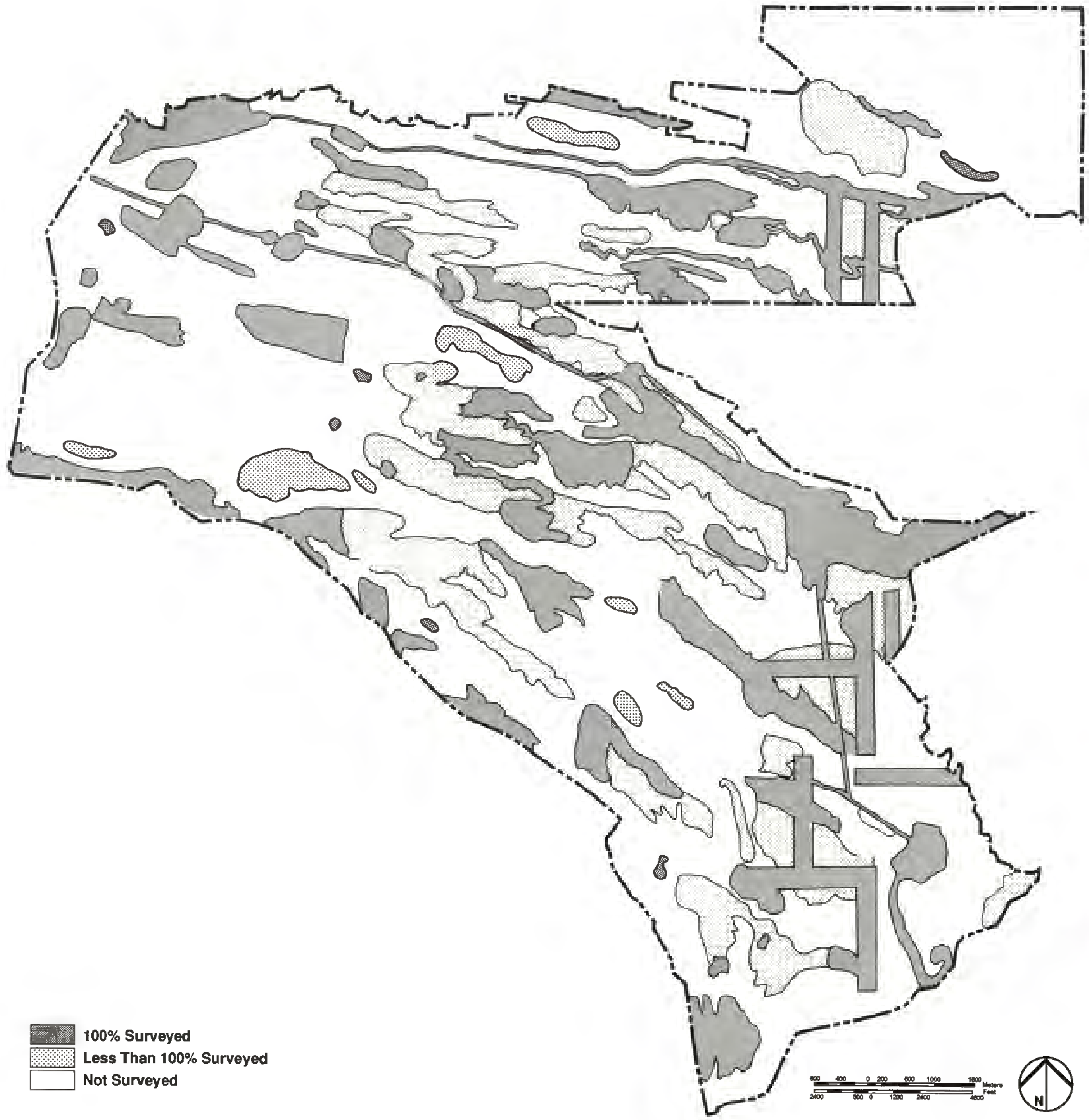
## Archaeology

The Laboratory site and the area surrounding it contain the material remains of over 8,000 years of human occupation. The Laboratory has established a cultural resource management program to conserve this heritage for future generations.

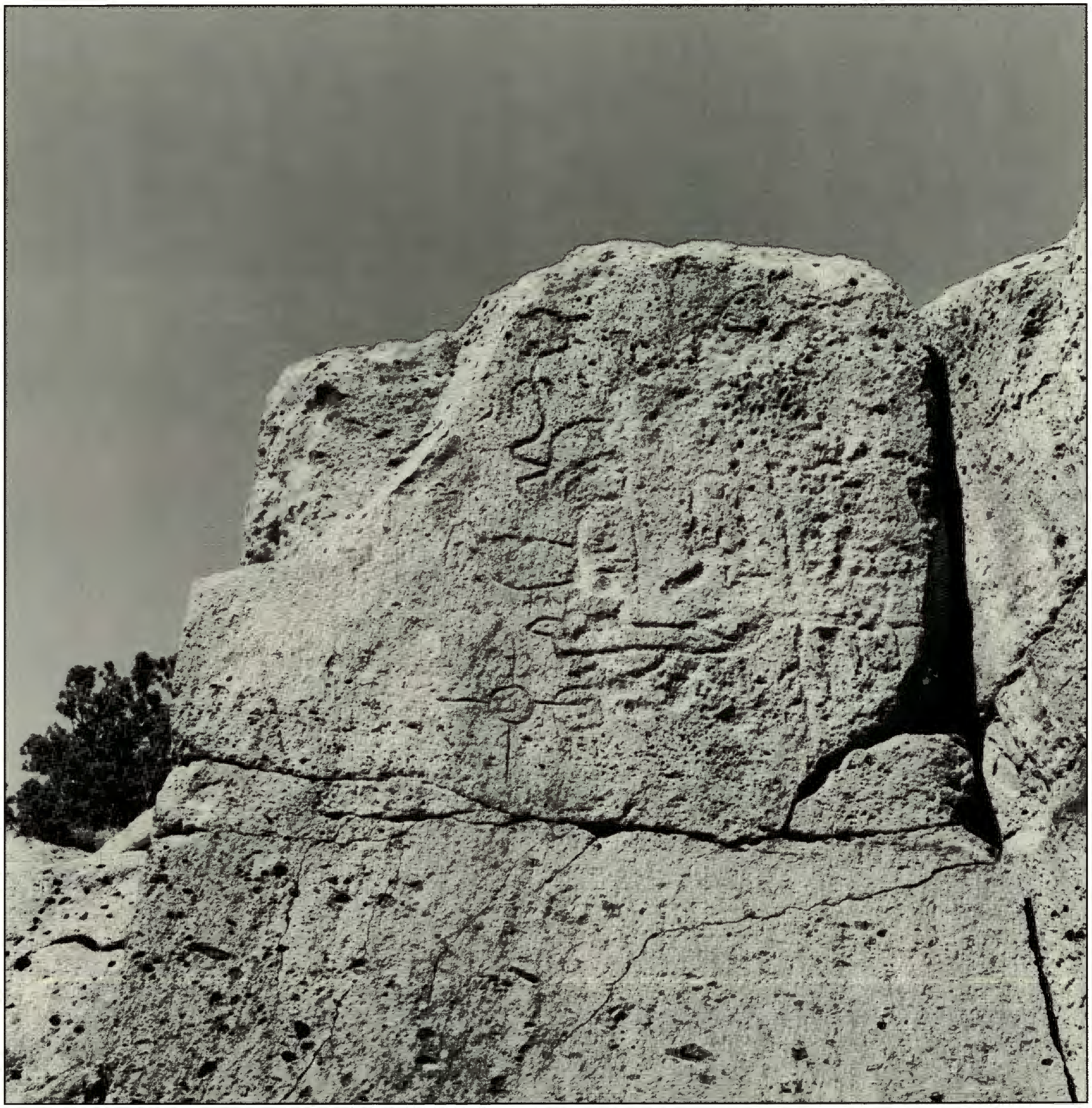
The Laboratory's cultural resources are significant to site development planning in the following ways:

- All Laboratory land potentially contains archaeological resources.
- Section 110 of the National Historic Preservation Act (NHPA) of 1966 requires federal land managers to inventory cultural resources on their properties and to nominate eligible properties for inclusion on the National Register of Historic Places. Nearly half the Laboratory land has been surveyed to determine the presence of cultural resources. Over 1,000 archaeological sites have been recorded to date.
- Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and provide the New Mexico State Historic Preservation Officer (SHPO) a reasonable opportunity to comment on the undertaking prior to licensing or approving the expenditure of funds.
- Laboratory archaeologists survey proposed project areas for cultural resources. If no archaeological resources are found, development of those areas is not constrained. If archaeological sites are found, determinations of eligibility for inclusion on the National Register of Historic Places are made. The first priority is to avoid any project impact to eligible cultural resources.

*Archaeology*



Petroglyphs at Tsirege Ruins, near TA-54



- When alternative facility siting is not feasible, a data recovery plan is prepared and reviewed by the SHPO, the Advisory Council for Historic Preservation, and other interested parties before the ruin is excavated.

- When excavation of the ruin is complete, development of project areas will most likely be unconstrained by archaeological concerns.

- If excavation of archaeological sites is not performed, development of potential project sites is constrained indefinitely.

The darker shaded areas on the archaeology map have been intensively surveyed for cultural resources; lighter shaded areas have been examined to a lesser degree of accuracy. Within the combined areas, nearly 1,000 archaeological ruins have been recorded. Over 95% of the ruins date from the fourteenth and fifteenth centuries. Most of the sites are found in the piñon-juniper vegetation zone, with 80% lying between 5,800 and 7,100 feet in elevation. Almost three-quarters of all ruins are found on mesa tops, which are the preferred locations for development at the Laboratory today.

## Surface Hydrology

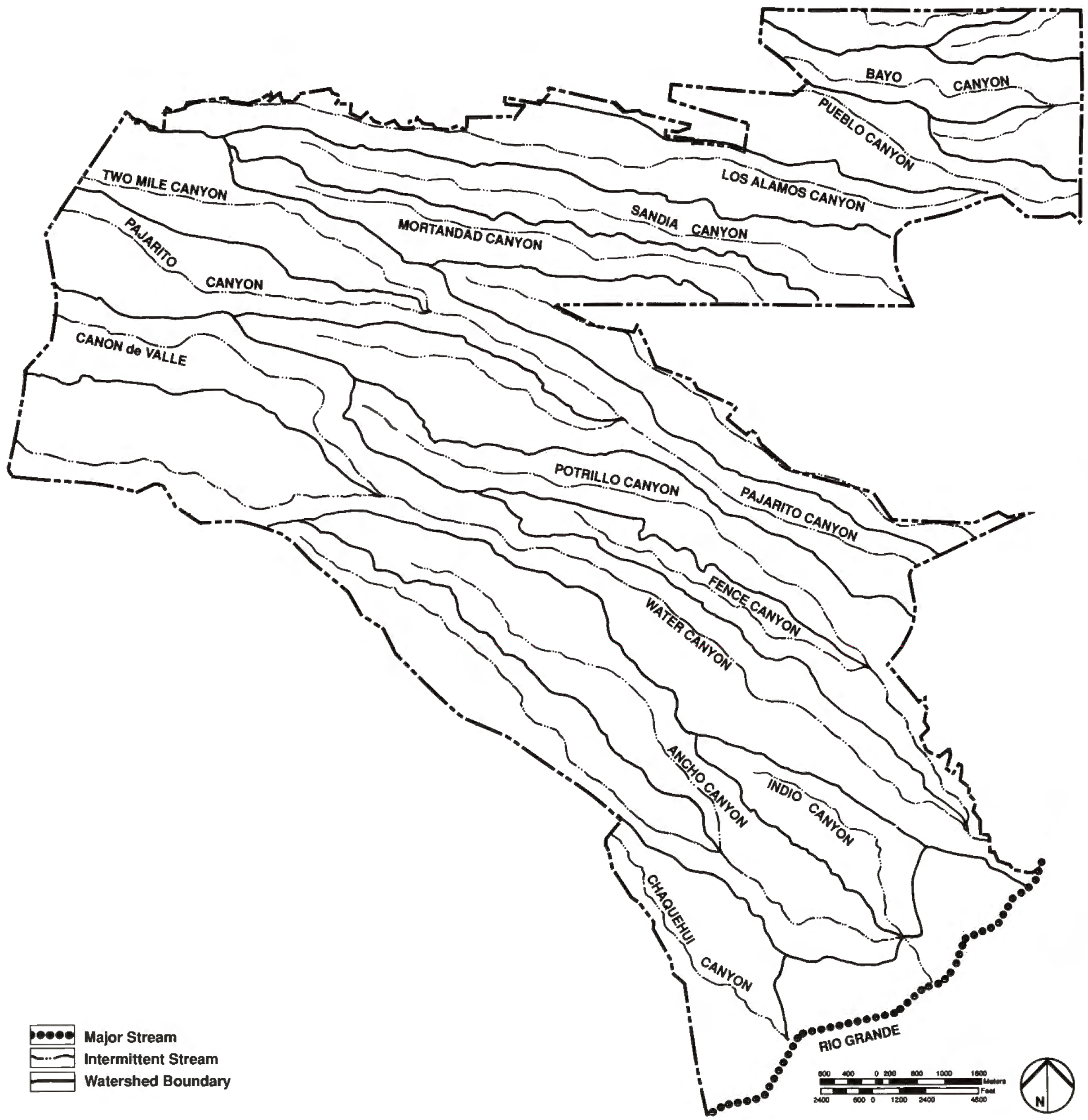
The Rio Grande is the master stream of the region and drains an area of more than 14,000 square miles in northern New Mexico and southern Colorado. There are many drainage areas originating or passing through the Laboratory, Los Alamos and the White Rock area. Stream flow in these canyons is intermittent. The only perennial flows that reach the Rio Grande occur in the Rio de los Frijoles south of the county and the Santa Clara to the north.

Precipitation that provides moisture to the soil to support plant growth infiltrates the Bandelier Tuff of the Pajarito Plateau. The moisture penetrates not more than a few meters into the tuff on the mesa tops. As a result, the tuff retains a low moisture content of approximately 5% by volume, too low for most plants to extract water.

Surface hydrology is a function of the topography of the Laboratory site and precipitation patterns. Fifty-four percent of the site has a slope of 20% or greater. Mesa top locations are generally free from any risk of flooding; however, storm water and snowmelt runoff concentrate in the site's deep, narrow canyons, thereby increasing the risk of flooding for any facilities constructed on the canyon bottoms. The floodplains and wetlands in the canyon bottoms are cautionary zones for building siting purposes.

Executive Orders 11988 and 11990 require floodplain and wetland assessments to be performed for any potential siting within a floodplain or a wetland. A statement of findings and notification of involvement must be submitted to the Federal Register, with a period allowed for public comment prior to any construction. Laboratory personnel in the Health, Safety, and Environment Division will assist with the preparation of this documentation.

*Hydrology*



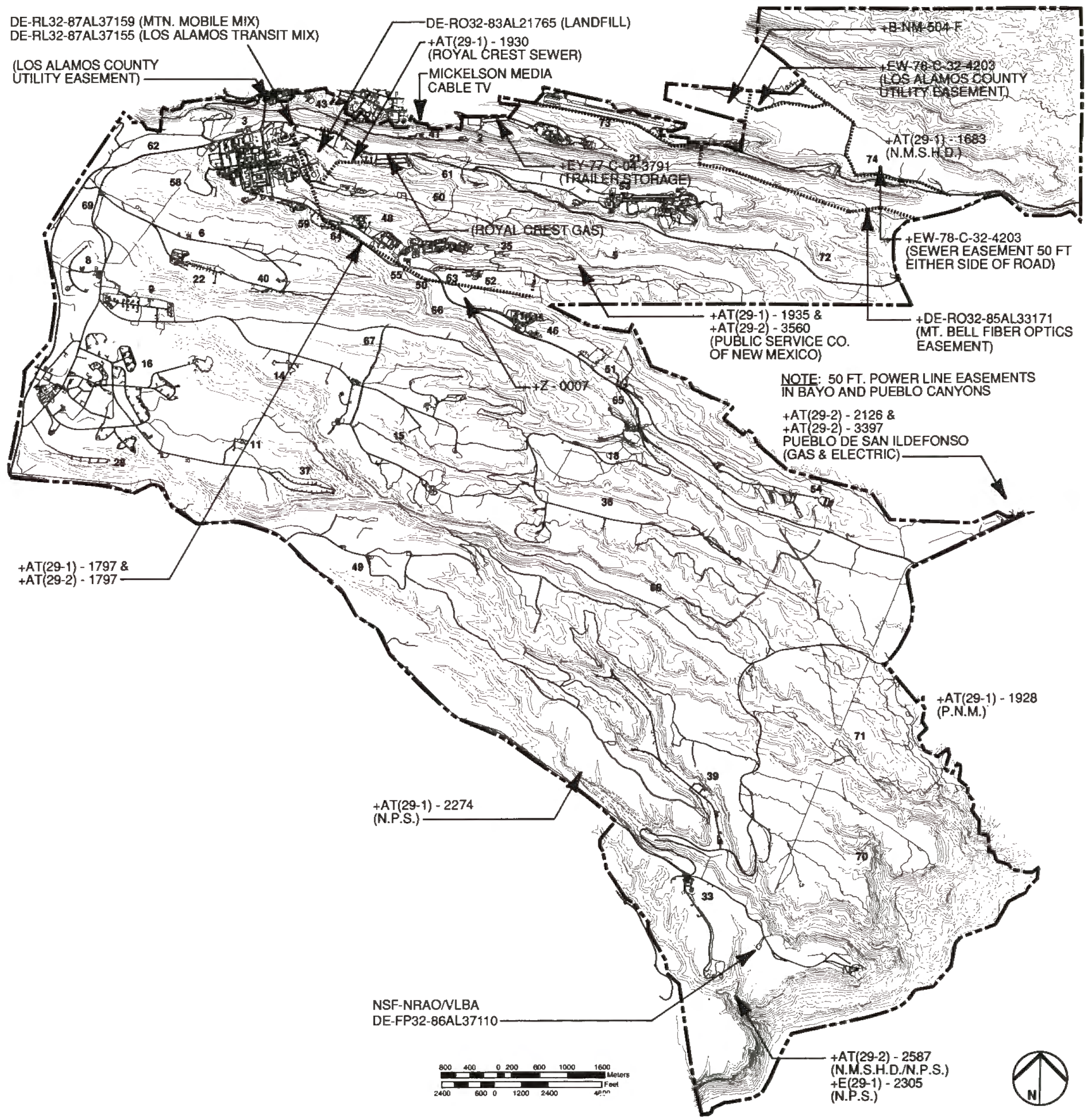
## Land Outgrants

Outgrants are lands owned by DOE but used for both DOE and non-DOE purposes, and include easements, leases, permits, and licenses. The Laboratory has several outgrants within its boundaries which allow other uses of DOE land by public or private enterprise. Most of these are for major electric, water, or sewer lines and also include the following parcels:

- The sanitary landfill and contractors' yards located east of the Core Area on East Jemez Road;
- The trailer storage yard west of TA-21 south of DP Road, adjacent to the Los Alamos townsite;
- The Los Alamos Credit Union at TA-3;
- The National Radio Astronomy Observatory's Very Large Baseline Array telescope at TA-33;
- Los Alamos Sportsmans Club in Rendija Canyon; and
- The tourist information/visitor center across from White Rock on NM 4.

The Royal Crest Trailer Park on East Jemez Road is not an outgrant. It is privately owned, having been sold by DOE in 1974.

*Outgrants*



# Appendix B

## Visual Assessment

The physical setting of Los Alamos is as dramatic as the famous achievements of the Laboratory. The topography creates spectacular views to the surrounding landscape of forested mountains, deep canyons, and the Rio Grande Valley. The mountain scenery, unusual geology, archaeological heritage, and mild climate creates an enchanting environment.

As one enters the Los Alamos National Laboratory, the scenery contrasts greatly with the Laboratory's austere, military/industrial facilities. Extensive unsightly fencing and poorly identified entrances produce a confusing sense of entry or place. A majority of the site's parking lots, security gates, and service and storage yards are highly visible to employees and visitors. Pedestrians compete with service vehicles for the right-of-way along poorly defined walkways and roadways.

Because the Laboratory was established in response to a national emergency, many buildings were intended to be temporary structures. Today, many older buildings are still used that are outdated and substandard. Other structures lack architectural unity, an appearance of permanence, or even identity. Many buildings have unattractive mechanical equipment located on their roofs or in surrounding areas, which creates a cluttered appearance. Overall, the site appears disorganized, lacks respect for visual impacts, and is poorly integrated with its surroundings.

A few newer large buildings have architectural merit, such as the Otowi Building, the Oppenheimer Study Center, the Space Science Laboratory, the Ground Test Accelerator, and others. The entry sign south of the Los Alamos Canyon Bridge is successful in creating an identity for the Laboratory.

*Los Alamos Canyon Bridge and the Jemez Mountains*

These types of improvements should continue to be encouraged through the site development and facilities planning review process.

The recommendations put forward on the following pages are aimed at improving the visual quality of the Laboratory, creating a more attractive work environment, and providing coherence and legibility to the circulation network.

*Recommendations:*

- Establish view corridors to preserve views of the Jemez and Sangre de Cristo Mountains, the canyons, and the Caja del Rio.
- Establish building and security setbacks to create and/or preserve naturalized areas along the East Jemez, West Jemez, and Pajarito corridors, adjacent national forest lands, and Bandelier National Monument lands.
- Establish canyon edge setbacks to reduce erosion and deterioration of fragile canyon edges.

*Facilities Located at Canyon Edge*

- Improve road intersections and entries with attractive, uniform, and legible signs, selective plantings, and architectural fencing to provide a sense of entry and identity.

- Provide street and building signs as an integral part of proposed projects.

- Consider development of a master plan for signs to build on existing sign making strengths and correct current problems.

*The Main Entry Portal is Well Marked.*


*Some Facilities are Clearly Identified.*


*Attractive Building Entry*

*Uniform Entrance/Delivery Signs are Required.*

- Integrate existing mature trees into sites when constructing new facilities to blend the native landscape into the sites.

- Landscape all new facilities as a part of construction or redevelopment with plant materials selected to complement the surrounding natural vegetation.

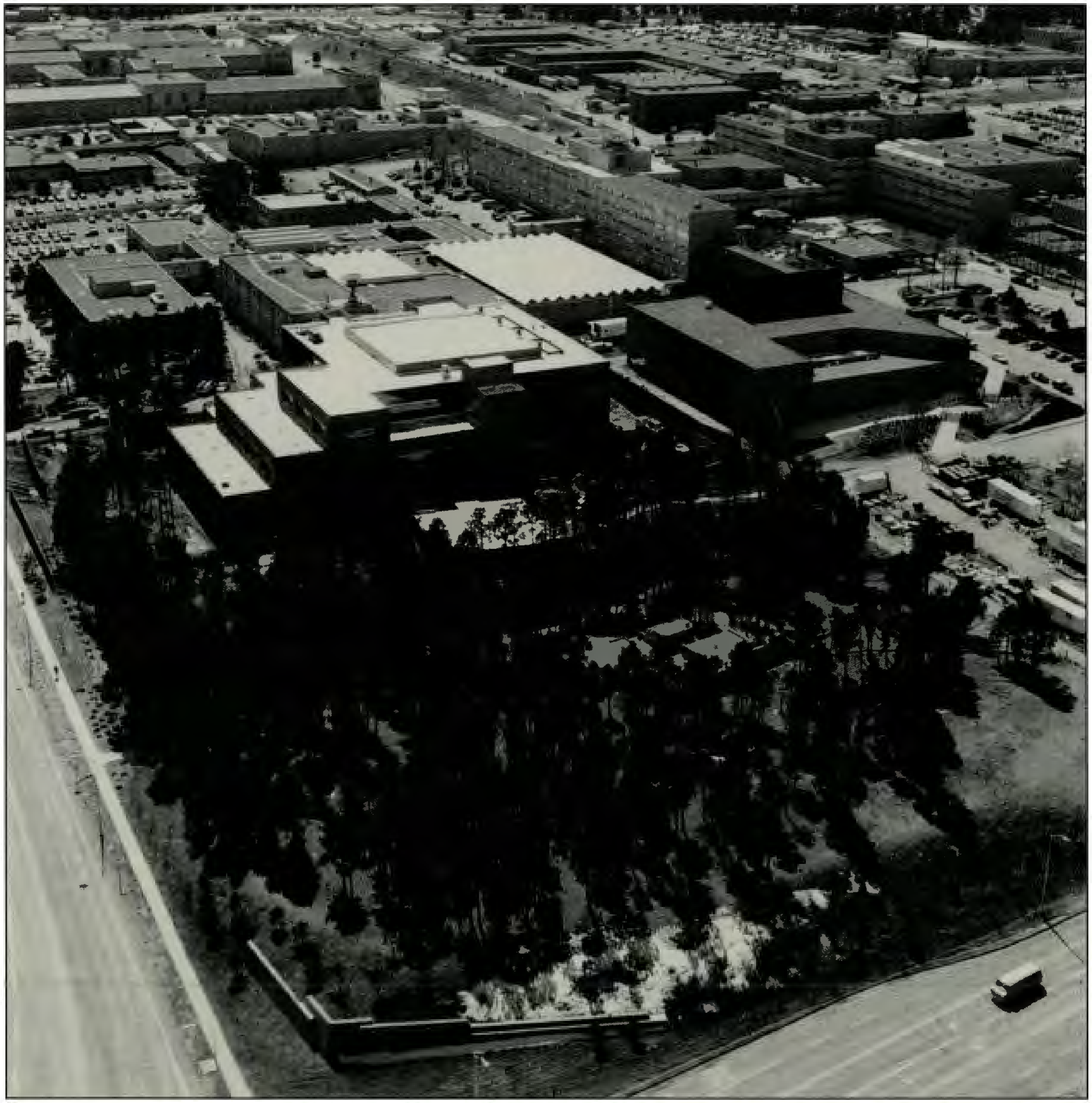
- Re-establish natural vegetation on vacated roads, parking lots and scar areas to reduce paved surfaces, control erosion, and beautify the site.

- Preserve the existing ground cover and trees for ecological and aesthetic purposes.

- Seek funding sources to encourage park-like landscaping on the periphery of temporary structures. This landscaping can remain when the temporary structures are replaced by permanent facilities.

- Provide a variety of landscaped outdoor spaces for employee activity and interaction.

*Mature Trees Integrated with Facilities*



- Develop Laboratory-wide procedures for architectural design review, the selection of building color palettes to guide the renovation of existing structures, and the construction of new facilities.

- Provide landscaping and amenities conducive to fostering a quality work environment of a fine research institute.

- Encourage attractive architecture and quality site design for all new Laboratory buildings.

*Entry to Space Science Laboratory*

- Redevelop existing entries that lack visual harmony, and are disorienting.
- Provide separate pedestrian and vehicular access to technical area entrances.
- Remove excess paving, fences, and unused or obsolete structures at highly visible main entrances.
- Provide tree masses for a sense of scale, identity, and to mitigate dissimilar structures.
- Screen unsightly service areas, storage yards and parking where visibility is prominent.
- Install consistent signs and architectural fencing to provide a better-defined sense of entry to buildings, facilities and technical areas.

*Entry to TA-46 as Seen from Pajarito Road*

- Screen storage areas and physical support facilities, and dispose of all outdated and surplus equipment.

- Screen building roof top equipment when feasible and appropriate.

- Establish designated screened or remote storage yards to keep reuseable materials, thereby diminishing unsightly and unsafe clutter typical of many Laboratory areas; and provide sufficient screened dumpsters, of like color, to handle all refuse.

- Locate dumpsters, storage sheds and similar objects so that they do not stand out, use valuable parking space or interfere with internal circulation.

*Unsightly Outside Storage Areas Project an Inappropriate Image of the Laboratory*

- Screen parking lots from public roads and main technical area entrances.
- Separate pedestrian and vehicular circulation as much as possible.
- Provide designated pull-out areas for car, van pool, and bus pick up.
- Provide trees in parking lots to mitigate expanses of asphalt paving and glare from vehicles.
- Install planting between parking lots and buildings as an energy saving measure to mitigate heat from the paved surfaces and glare from glazed surfaces.

*Parking Lot West of Diamond Drive in TA-3*

## Appendix C

## List of Major Facilities as of June 1990[1]

| TA | Building Number | Building Name | Gross Square Feet | Completion Date |
|---|---|---|---|---|
| 0 | 130 | Records Center – Townsite | 14,818 | 01-Jan-1947 |
| 0 | 199 | Canyon School – (leased) Townsite | 33,084 | 04-Jan-1988 |
| 0 | 386 | Apartment – 1027 9th St. – Townsite | 13,432 | 01-Jul -1970 |
| 0 | 387 | Apartment – 1205 9th St. – Townsite | 13,432 | 01-Jul -1970 |
| 0 | 470 | Warehouse 120 6th St. – Townsite | 15,000 | 01-Jan-1947 |
| 0 | 480 | Pajarito School | 35,831 | 01-Jul-1974 |
| 0 | 1096 | Fire Station #4 | 14,068 | 01-Jan-1964 |
| 0 | 1156 | Shop building | 14,847 | 01-Nov-1980 |
| 0 | 1197 | Mesa School (leased) – Townsite | 11,116 | 01-May-1949 |
| 0 | 1237 | Pueblo School (leased) – Townsite | 24,554 | 21-Apr-1986 |
| 2 | 1 | Main Building | 21,308 | 01-Jan-1944 |
| 3 | 16 | Ion Beam Facility | 58,842 | 01-Jan-1953 |
| 3 | 22 | Steam Plant | 70,279 | 01-Jan-1951 |
| 3 | 28 | Office building | 17,087 | 01-Jan-1951 |
| 3 | 29 | CMR Laboratory | 555,933 | 01-Jan-1953 |
| 3 | 30 | General Warehouse | 113,624 | 01-Jan-1952 |
| 3 | 31 | Chemical Warehouse | 29,279 | 01-Jan-1952 |
| 3 | 32 | Center for Materials Science | 15,155 | 01-Jan-1953 |
| 3 | 34 | Cryogenic Building | 31,412 | 01-Jan-1955 |
| 3 | 35 | Press Building | 11,245 | 01-Jan-1954 |
| 3 | 38 | Support Services Subcontractor Shops | 115,898 | 01-Jan-1952 |
| 3 | 39 | Technical Shops | 153,993 | 01-Jan-1954 |
| 3 | 40 | Physics Building | 150,261 | 01-Jan-1953 |
| 3 | 41 | Fire Station | 11,887 | 01-Jan-1952 |
| 3 | 43 | Administration Building | 316,553 | 01-Jan-1956 |
| 3 | 66 | Sigma Building | 168,768 | 01-Jan-1959 |
| 3 | 102 | Technical Shops Addition | 28,225 | 01-Jan-1957 |
| 3 | 105 | Sherwood Building | 42,380 | 01-Jan-1957 |
| 3 | 123 | Theoretical Office Building | 33,908 | 01-Jan-1966 |
| 3 | 132 | Computer Building | 120,398 | 01-Jan-1961 |
| 3 | 141 | Rolling Mill Building | 20,887 | 01-Jan-1960 |
| 3 | 142 | Warehouse | 33,044 | 01-Jan-1960 |
| 3 | 200 | Office building | 33,192 | 01-Jan-1966 |
| 3 | 207 | J R Oppenheimer Study Center | 79,217 | 01-Jan-1977 |
| 3 | 215 | Physics Analytical Chemistry Building | 27,426 | 01-Jan-1968 |

[1] Exceeding 10,000 gross square feet.

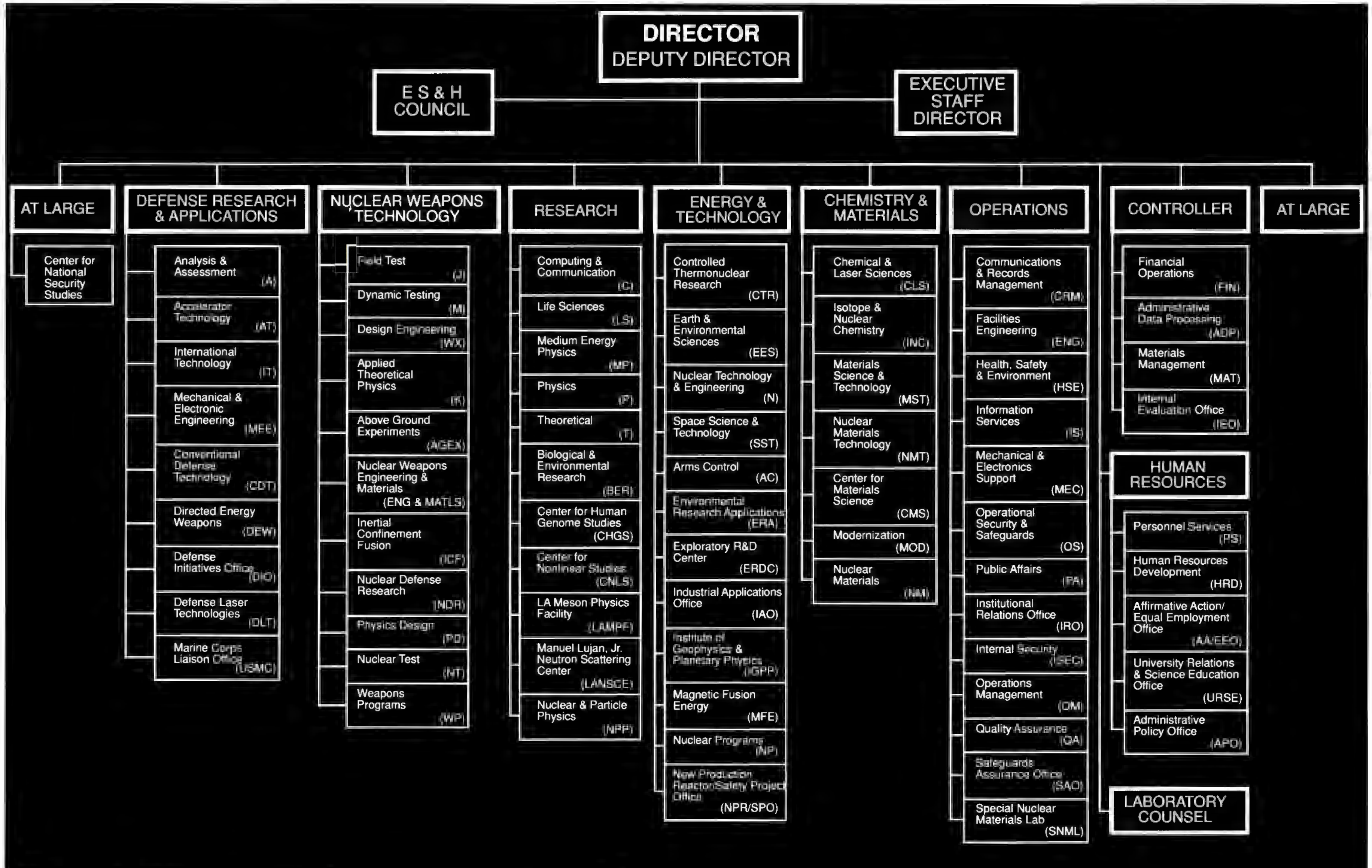
| TA | Building Number | Building Name | Gross Square Feet | Completion Date |
|---|---|---|---|---|
| 3 | 216 | Weapons Test Support Facility | 43,483 | 01-Jan-1968 |
| 3 | 261 | Otowi Building | 141,546 | 15-Nov-1982 |
| 3 | 287 | Laboratory & office building | 47,420 | 01-Jan-1970 |
| 3 | 381 | ZIA Warehouse | 36,937 | 01-Jan-1978 |
| 3 | 410 | Office building | 16,488 | 01-Jan-1977 |
| 3 | 422 | Office building | 17,664 | 01-Jan-1977 |
| 3 | 502 | Space Science Laboratory | 23,507 | 01-Apr-1988 |
| 3 | 508 | Computer Physics Office | 11,640 | 01-Nov-1987 |
| 3 | 1498 | Laboratory Data Communications Center | 103,618 | 01-Sep-1989 |
| 3 | 1663 | Wellness Center | 11,760 | 01-Feb-1984 |
| 8 | 21 | Laboratory & office building | 20,008 | 01-Jan-1951 |
| 9 | 21 | Laboratory & office building | 23,763 | 01-Jan-1953 |
| 15 | 40 | Laboratory & office building | 13,505 | 01-Jan-1952 |
| 15 | 183 | Laboratory & office building | 19,569 | 01-Jan-1961 |
| 15 | 185 | Power Control Building | 12,234 | 01-Jan-1961 |
| 16 | 193 | Change House | 11,953 | 01-Jan-1953 |
| 16 | 200 | Administration Building | 29,668 | 01-Jan-1953 |
| 16 | 202 | Shops building | 26,163 | 01-Jan-1953 |
| 16 | 204 | Program Support Facility | 13,451 | 01-Jul- 1982 |
| 16 | 207 | Warehouse | 12,506 | 01-Jan-1954 |
| 16 | 218 | Laboratory & office building | 11,200 | 01-Jul -1986 |
| 16 | 260 | Process building | 40,330 | 01-Jan-1953 |
| 16 | 300 | Process building | 12,820 | 01-Jan-1951 |
| 16 | 302 | Process building | 12,820 | 01-Jan-1954 |
| 16 | 304 | Process building | 12,820 | 01-Jan-1954 |
| 16 | 306 | Process building | 12,820 | 01-Jan-1954 |
| 16 | 332 | Process Equipment Building | 12,000 | 01-Jan-1988 |
| 16 | 340 | Process building | 23,212 | 01-Jan-1953 |
| 16 | 370 | Process building | 19,891 | 01-Jan-1953 |
| 16 | 430 | Process building | 14,829 | 01-Jan-1953 |
| 16 | 450 | Process building | 10,323 | 01-Jan-1953 |
| 16 | 460 | Laboratory building | 12,916 | 01-Jan-1953 |
| 16 | 540 | Steam Plant | 11,026 | 01-Jan-1951 |
| 18 | 30 | Laboratory & office building | 23,137 | 01-Jan-1953 |
| 21 | 2 | Laboratory building | 13,427 | 01-Jan-1945 |
| 21 | 3 | Laboratory building | 21,420 | 01-Jan-1945 |

| TA | Building Number | Building Name | Gross Square Feet | Completion Date |
|---|---|---|---|---|
| 21 | 4 | Laboratory building | 11,868 | 01-Jan-1945 |
| 21 | 5 | Laboratory building | 18,493 | 01-Jan-1945 |
| 21 | 150 | Plutonium Fuel Service Building | 14,919 | 01-Jan-1962 |
| 21 | 152 | Laboratory building | 12,110 | 01-Jan-1945 |
| 21 | 155 | Furnace Building | 14,411 | 01-Jan-1950 |
| 21 | 209 | High Temperature Chemistry Building | 33,450 | 01-Jan-1966 |
| 21 | 210 | Research Support Building | 19,236 | 01-Jan-1966 |
| 21 | 1001 | Records Center | 14,818 | 01-Jan-1947 |
| 22 | 90 | Detonator Systems Laboratory | 13,207 | 01-Apr-1984 |
| 22 | 91 | Detonator Systems Laboratory | 21,761 | 01-Nov-1983 |
| 33 | 114 | Laboratory & office building | 12,719 | 01-Jan-1960 |
| 35 | 2 | Laboratory & office building | 82,312 | 01-Jan-1951 |
| 35 | 27 | Nuclear Safeguard Research Facility | 44,688 | 01-Jan-1967 |
| 35 | 85 | Chemical Laser Facility | 24,387 | 01-Jan-1976 |
| 35 | 86 | $CO^2$ Laser Building | 21,307 | 01-Jan-1977 |
| 35 | 87 | Laboratory office building | 40,564 | 01-Jan-1977 |
| 35 | 124 | Target Building | 14,822 | 18-Aug-1980 |
| 35 | 125 | Laser Building | 59,019 | 23-Apr-1980 |
| 35 | 128 | Warehouse | 13,920 | 24-Mar-1980 |
| 35 | 213 | Target Fabrication Building | 93,800 | 01-Aug-1983 |
| 36 | 1 | Laboratory & office building | 10,151 | 01-Jan-1951 |
| 39 | 2 | Laboratory Office Building | 13,141 | 01-Jan-1953 |
| 41 | 4 | Laboratory Building | 40,962 | 01-Jan-1952 |
| 41 | 30 | Engineering & laboratory building | 21,862 | 01-Jan-1960 |
| 43 | 1 | Health Research Laboratory | 84,660 | 01-Jan-1953 |
| 43 | 39 | Department of Energy – LAAO Headquarters Building – Townsite | 39,329 | 01-Jan-1949 |
| 46 | 1 | Laboratory building | 20,106 | 01-Jan-1956 |
| 46 | 24 | Laboratory & office building | 22,975 | 01-Jan-1958 |
| 46 | 31 | Test Building | 24,352 | 01-Jan-1958 |
| 46 | 42 | Shop & equipment building | 14,830 | 01-Jan-1961 |
| 46 | 154 | Laser Isotope Building | 10,891 | 01-Jan-1980 |
| 48 | 1 | Laboratory building | 102,840 | 01-Jan-1957 |
| 48 | 45 | Advanced Radiochemistry Weapons Facility | 24,245 | 01-Sep-1988 |
| 50 | 1 | Liquid Disposal Plant | 38,125 | 01-Jan-1963 |
| 50 | 37 | Transuranic Building | 22,893 | 01-Jan-1976 |

| TA | Building Number | Building Name | Gross Square Feet | Completion Date |
|---|---|---|---|---|
| 52 | 1 | UHTREX Building | 27,884 | 01-Jan-1966 |
| 52 | 33 | Weapons Support Office Building | 14,490 | 01-Jan-1979 |
| 53 | 1 | Laboratory Office Building | 83,799 | 01-Jan-1971 |
| 53 | 2 | Equipment Testing Laboratory | 24,562 | 01-Jan-1969 |
| 53 | 3 | Accelerator Technical Building | 300,687 | 01-Jan-1971 |
| 53 | 4 | Operations Building | 15,523 | 01-Jan-1971 |
| 53 | 6 | Accelerator Technical Building | 33,872 | 01-Jan-1976 |
| 53 | 7 | WNR Building | 28,935 | 01-Jan-1976 |
| 53 | 14 | Accelerator Technical Laboratory | 10,000 | 01-Nov-1982 |
| 53 | 17 | Proton Storage Ring | 13,112 | 01-Sep-1981 |
| 53 | 18 | FMIT Building | 28,935 | 30-May-1978 |
| 53 | 19 | Accelerator Technical Building | 11,022 | 30-May-1978 |
| 53 | 24 | Data Analysis Building | 13,600 | 30-May-1978 |
| 53 | 30 | Neutron Scattering Experimental Hall | 22,520 | 01-Mar-1988 |
| 53 | 31 | Neutral Particle Beam Technical Support | 45,590 | 01-Jun-1988 |
| 53 | 365 | ATSU Facility | 82,116 | 01-Oct-1989 |
| 53 | 622 | Manuel Lujon Neutron Scattering Center | 25,349 | 01-Jun-1989 |
| 54 | 48 | WIPP Storage Bubble | 17,004 | 01-Jan-1985 |
| 54 | 49 | WIPP Storage Bubble | 12,126 | 01-Jan-1988 |
| 55 | 1 | Administration building | 13,618 | 01-Jan-1977 |
| 55 | 2 | Support office building | 18,304 | 01-Jan-1977 |
| 55 | 3 | Support office building | 38,730 | 01-Jan-1974 |
| 55 | 4 | Plutonium Building | 169,121 | 01-Jan-1979 |
| 55 | 5 | Warehouse | 16,862 | 01-Jan-1975 |
| 55 | 41 | Nuclear Materials Storage Facility | 35,391 | 01-Feb-1988 |
| 55 | 42 | Process Support Facilities | 11,806 | 01-Apr-1985 |
| 55 | 114 | Cold Support Office Building | 12,506 | 01-May-1989 |
| 59 | 1 | Occupational Health Building | 53,754 | 01-Jan-1967 |
| 59 | 3 | Office building | 17,295 | 01-Jan-1979 |
| 60 | 1 | Mobile Equipment & Repair Facility | 25,277 | 01-Jan-1977 |
| 60 | 2 | ZIA Warehouse | 36,937 | 01-Jan-1978 |
| 60 | 17 | Test Fabrication Facility | 17,993 | 01-Jul -1986 |
| 60 | 19 | Test Tower Building | 17,256 | 01-Jul-1986 |
| 64 | 1 | Central Guard Facility | 16,500 | 01-Oct-1986 |

# Appendix D

## LANL Organizational Chart [1]




1. Current as of September, 1990

# Appendix E

## Glossary of Terms and Acronyms

**AASHTO**: American Association of State Highway and Transportation Officials.

**ADT**: Average Daily Trips.

**AEC**: Atomic Energy Commission. The original predecessor of the DOE.

**ATS**: The administration and technical services land use.

**Blast fragment hazard buffer zone**: Circles centered on high explosive firing sites or HE storage /processing facilities, designed to protect non-project related personnel from blast fragments resulting from facility operations or potential accidents.

**Buildings**: Roofed structures which are enclosed. The term includes trailers and transportables.

**CBD**: Central Business District. The downtown area of a city or town.

**CCF**: Central Computing Facility.

**CDAC**: The Laboratory's Construction Development Advisory Committee.

**CMR**: Chemistry/Metallurgy Research Building.

**CSA:** Canned subassembly.

**Corridor**: An area where facilities and/or utilities are concentrated. These areas often link larger developed sites together.

**D&D:** Decontaminate and Decommission.

**DARHT**: Dual-Axis Radiographic Hydro-Test Facility.

**DOE**: Department of Energy. The cabinet-level sponsor of most Los Alamos National Laboratory research.

**DOE Order 4300.1B**: The DOE site development planning directive in effect during the time that this plan was developed.

**Development Area:** The eight geographic planning areas used by the SDP. These are composed of one or more technical areas (or portions thereof) where growth is possible or is anticipated.

**EID**: The New Mexico State Environmental Improvement Division.

**ENG:** The Laboratory's Facilities Engineering Division.

**EPA**: Environmental Protection Agency.

**ER**: The environmental research/buffer land use.

**ERDA**: Energy Research and Development Administration, (formerly the AEC and now DOE).

**E S & H**: environment, safety and health.

**EX**: The experimental science land use.

**FTE**: Full time equivalents. Part of a method of computing Laboratory employment.

**Facility**: An all inclusive term used to describe any or all types of manmade property additions to the land including structures, utilities, and pavement. Not all facilities are structures (e.g. high-explosives testing facilities).

**Goal**: A basic statement of values, essential to the planning process, that is formulated in response to identified issues, and toward the attainment of which objectives, policies, and decisions are directed.

**GPP**: Improvements to the Laboratory funded through the General Plant Projects program. These projects have a cost cap of $1.2 million.

**GSA**: General Services Administration.

**GTA:** Ground Test Accelerator.

**HE**: The high-explosives research, development and testing land use.

**HRF**: High Radio Frequency.

**HRL:** Health Research Laboratory at TA-43.

**HSE**: The Laboratory's Health, Safety, and Environment Division.

**ICN**: Integrated Computing Network.

**Infrastructure**: Utilities, transportation/circulation systems, and other site improvements.

**Infill**: Placing buildings and/or facilities to occupy spaces between earlier ones to effect better utilization of existing lands.

**ISF**: Infrastructure Support Facilities line-item program.

**LAICS**: Los Alamos Integrated Communications System.

**LAMPF**: Los Alamos Meson Physics Facility.

**Land Use Categories:** The system used in the site development plan to identify how functions are distributed at the Laboratory.

**Land Use Zones:** A farther breakdown within land use categories that are used for planning purposes.

**LANL**: Los Alamos National Laboratory; formerly Los Alamos Scientific Laboratory.

**LANSCE**: The Manuel Lujan, Jr. Los Alamos Neutron Scattering Center at TA-53.

**Line-item Projects**: Major facilities which are approved individually by Congress. They are typically programmatic research facilities, but can be major utility system improvements or central office complexes.

**LS:** The Laboratory's Life Sciences Division.

**M:** The Laboratory's Dynamic Testing Division.

**MAA:** Material Access Area. Areas in which category I & II special nuclear materials are used or stored.

**Marginal Facilities**: Any building which is no longer used or usable, is obsolete, or is not recommended for current or future use due to potentially hazardous conditions or exessive maintenance or upgrade costs which significantly outweigh the benefits of use.

**Node**: A focus or concentration of activities or facilities.

**Objective**: A specific statement denoting a measurable step needed to reach or achieve a goal.

**Obsolete Structures**: Structures that are no longer used or are not useful due to outmoded design or construction, and/or contamination. These facilities, typically built during World War II as temporary structures, are all marginal facilities.

**Outgrants**: DOE owned lands used for both DOE and non-DOE purposes and include easements, leases, permits, and licenses.

**PC**: The public and corporate interface land use.

**PCB**: Polychlorinated biphenyls.

**PSI**: The physical support and infrastructure land use.

**Policy**: A statement to guide and determine present and future planning decisions.

**Q Clearance**: A security clearance from the DOE.

**RLW**: Radioactive liquid wastes.

**Radiation Site Evaluation Circles:** Provide distance between facilities to protect non-project personnel from potential radiation exposure resulting from facility operations and potential accidents.

**RCRA**: The Resource Conservation and Recovery Act. A federal law enacted in 1981 that regulates hazardous waste generation, transportation, treatment, storage, and disposal.

**Recommendation**: A specific course of action or strategy necessary for the attainment of objectives and translating policy into action.

**ROW:** Right-of-way.

**SDP**: The Laboratory's Site Development Plan.

**SNM**: The special nuclear materials land use. Category I & II SNM areas require a Q clearance and special authorization that are area-specific.

**SMG**: The Laboratory's Senior Management Group.

**SPCC**: Spill prevention control compliance.

**SSB**: The Laboratory's Siting and Space Board that is composed of deputy associate directors and makes major policy decisions about space and siting matters.

**SSC**: The Laboratory's Siting and Space Committee that is composed of directorate representatives and oversees space aquisition and facility siting.

**Satellite service area**: An area removed from the central Core Area containing administrative and technical support functions and employee facilities.

**Site**: Within DOE, site is used to refer to the location of an entire organization such as the Laboratory. The Los Alamos National Laboratory is a DOE site. Within the Laboratory, *site* is used as a noun to refer to the precise location of a facility.

**Structures**: Identifiable, individual, three-dimensional constructed additions to the land, which are not buildings but which have a structure number assigned. These include radio towers, dish antennas, parking lots, etc.

**TC**: The theoretical/computational science land use.

**TSM**: Transportation systems management-methods used to improve roadway capacity without large capital expense.

**TA:** Technical Area. A geographically defined area containing buildings and facilities clustered by function.

**Temporary Facility**: A building or facility intended for use for a limited time: not permanent. These are typically mobile or portable structures like trailers.

**Transitional Facility**: Buildings intended for long-term use but not having the attributes of a permanent facility or all of the characteristics of a temporary facility. Transportable buildings are typically transitional in nature.

**Utility Corridor**: Designated routes or paths planned to accommodate and consolidate existing and future utilities.

**WIPP**: Waste Isolation Pilot Project.

**WM**: The waste management land use.

**WX:** The Laboratory's Design Engineering Division.

## List of Reference Documents


1. *Design Engineering Division, "Design Engineering (WX) Division Long-Range Plan,"* Los Alamos National Laboratory document LALP-85-42 (December 1986).

2. *Dynamic Testing Division, "Dynamic Testing (M) Division Long-Range Plan,"* Los Alamos National Laboratory document (December 1983).

3. *Emergency Management Group, OM-1, "Emergency Response Plan,"* Los Alamos National Laboratory document (May 1989).

4. *Environmental Surveillance Group, HSE-8, "Environmental Surveillance at Los Alamos National Laboratory During 1988,"* Los Alamos National Laboratory document LA-11628-ENV (June 1989).

5. *Facilities Engineering Division, "Five-Year Plan Update FY91-FY95,"* Los Alamos National Laboratory document LA-UR-88-3473 (October 1988).

6. *Facilities Engineering Division, Long-Range Facilities Planning Group, "Long-Range Site Development Plan,"* Los Alamos National Laboratory document (September 1982).

7. *Facilities Engineering Division Planning Group, ENG-2, "Sanitary Landfill Site Locations Study,"* Los Alamos National Laboratory document (November 1989).

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# Los Alamos National Laboratory
## Site Development Plan Summary

**September 1990**

**LA-LP 90-42**

11291

## Introduction

The Los Alamos National Laboratory Site Development Plan provides a Laboratory-wide vision of how we can shape our future in an era of limited funding but seemingly unlimited scientific discovery. Implementation of the plan will enable the Laboratory to grow or change while carrying out its mission of maintaining the nation's nuclear deterrent and applying its vast technical capabilities to solving a wide range of problems critical to the national interest, thereby ensuring the nation's scientific and technological competitiveness in a rapidly changing world.

The Site Development Plan has been developed to guide Laboratory land use, facilities, and infrastructure decision making. Its purpose is to serve Laboratory program needs and increase the efficiency of Laboratory operations in a cost-effective manner, while making the Laboratory a more desirable place to work.

The plan is intended as both a short-range and long-range guide for future building and facilities planning. It recommends the best use of existing land holdings and identifies the need to expand and upgrade facilities so the Laboratory can more efficiently conduct state-of-the-art research.

The plan assumes a zero net growth rate for the Laboratory during the short-term. In the long-term, beyond the five-year planning horizon, the plan assumes that the Laboratory could grow at an average annual rate of up to one percent. This growth includes projected contractor and non-Laboratory personnel, which currently constitute approximately one-third of the on-site population. Certain programs will experience expansion while other programs will decline or be phased out as dictated by changing national priorities.

Three basic principles guided the site development planning process:

- Optimizing the use of Laboratory lands by balancing specific space, facility, circulation, utility, security, and program requirements with Laboratory-wide functional considerations.
- Providing a framework that facilitates management of changing site, facility, and programmatic needs.
- Building a safe, pleasant, and secure working environment conducive to creativity, productivity, and job satisfaction.

It is important to ensure that the overall Laboratory site remains functional. Therefore, the facility and site needs of individual programs must be examined in the context of Laboratory-wide requirements. Currently, problems are created through uncoordinated expansion and infrastructure development. Although this pattern will be difficult to change, the Site Development Plan provides the foundation to establish a better and more logical pattern of development.

## Background

Los Alamos National Laboratory is located in north-central New Mexico, an area that is dominated by the Jemez Mountains to the west and Sangre de Cristo Mountains to the east. The Laboratory is located on the Pajarito Plateau, a volcanic shelf on the eastern slope of the Jemez Mountains, at an approximate elevation of 7,000 feet (2,134 meters). The Pajarito Plateau is cut by a number of steeply sloped, deeply eroded drainage canyons which have formed isolated finger-like mesas running west to east.

The relative isolation of Los Alamos National Laboratory was considered ideal when the site was selected in 1942 by the U.S. Army Manhattan Engineering District. Its initial mission was to develop the world's first nuclear fission weapon, a project that lasted for the duration of World War II. From its inception the Laboratory was operated under contract by the University of California, although in its earliest years Los Alamos was under Army control.

With the end of World War II and the growth of international competition, a national policy of maintaining pre-eminence in the field of atomic energy was established. Congress chose to sustain Los Alamos; the Atomic Energy Commission received control of the Laboratory from the Army and renewed the operating contract with the University of California. Thereafter, a major construction program was started south of Los Alamos Canyon and in subsequent years the Laboratory expanded at a steady rate. Currently, the Laboratory operates under the aegis of the Department of Energy (DOE).

The Laboratory is situated on approximately 27,500 acres (43 square miles) of DOE land, 24,000 acres of which are located within Los Alamos County. There are currently 50 designated technical areas with locations and spacing that reflect historic development patterns, topography, and functional relationships. Presently, the Laboratory's on-site population is approximately 12,000 people (including employees and contractors) housed in more than 1,800 buildings totalling about 7,300,000 square feet.

Highways provide the primary access to the Laboratory. Los Alamos has no bus or rail connections but regularly scheduled commuter air service is available between Los Alamos and Albuquerque.

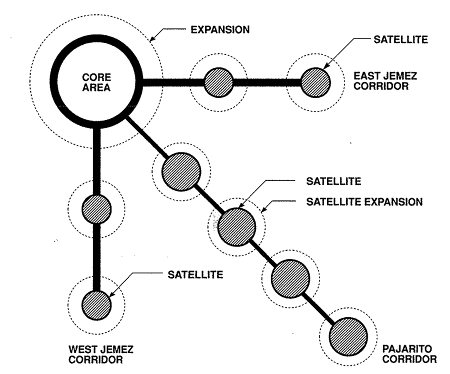
Sixty percent of the Laboratory employees live in the adjacent communities of Los Alamos and White Rock. The balance of the employees commute from Santa Fe, Española Valley, and other areas.

Although there appears to be sufficient land for future expansion at the Laboratory, the majority of it is very difficult to develop given the severe and significant physical constraints – over half of the acreage consists of slopes that exceed twenty percent. In addition, large reservations of land are required for security and safety buffers so that essential Laboratory programs can continue unhindered, and without adversely affecting surrounding areas.

## Laboratory Planning Model

The Laboratory planning model illustrates the basic functional and spatial organization of the Laboratory. This model establishes the framework and rationale for site planning. As such, the model proposes building upon and strengthening existing development patterns to achieve effective functional working relationships, and considers locations for the accommodation, expansion, and sometimes the relocation of programs and facilities to enhance the compatibility of land uses. In the model, the Core Area (TA-3 and immediate surroundings) remains as the Laboratory's primary administrative and functional center.

*Laboratory Planning Model*




Three main development corridors emanate from the Core Area, each with its own major programmatic emphasis:

- East Jemez Corridor, which consists of LAMPF, used primarily for accelerator-related experimental science; Sigma Mesa, proposed for administrative, technical, and physical support functions; and East Jemez Road which is proposed for physical support functions and primary access to the Laboratory.
- Pajarito Corridor is used primarily for nuclear materials research and development, fusion and laser research and development, waste management, and other multi-use experimental science.
- West Jemez Corridor has been used basically for weapons engineering and dynamic testing. Some experimental science uses will be located at Two-Mile Mesa South in the long-term.

Each of the three main development corridors is planned to have satellite support and service areas for Laboratory administrative, technical, and physical support functions.

## Opportunities and Constraints

Establishing areas within the Laboratory where development can best be accommodated required the identification and ranking of potential constraints to such development. The best development opportunities occur where the fewest constraints exist on a given parcel of land. For the Site Development Plan constraints were classified as severe, moderate, or minimal.

Existing development patterns and topography at Los Alamos National Laboratory impose major constraints on future development. The extreme topographical changes of flat mesas dissected by steep canyons critically affect road, utility, and facility development and layout. While little can be done to modify topography, historical development patterns can be modified through the application of a rational set of land use and facilities policies and related recommendations. For example, roads and parking can be relocated to the perimeter of developed areas, freeing up prime building sites for more appropriate development.

Most technical areas pose limitations to expansion because of the scarcity of suitable land for building. In addition, special hazardous testing facilities requiring security and safety buffers limit some developable sites. Archaeological sites and other constraints put additional limitations on the Laboratory's development. Other manmade land use constraints include

- Existing circulation and utility patterns;
- Parking areas and temporary or substandard structures that occupy prime developable land;
- High-explosive safety buffers that restrict development on flat mesa tops in some areas (primarily Two-Mile Mesa South);
- Potentially contaminated sites that must be characterized and remediated by the Laboratory Environmental Restoration Program before they can be reused; and
- A privately owned mobile home park located on 25 acres close to the Core Area and completely surrounded by the Laboratory.

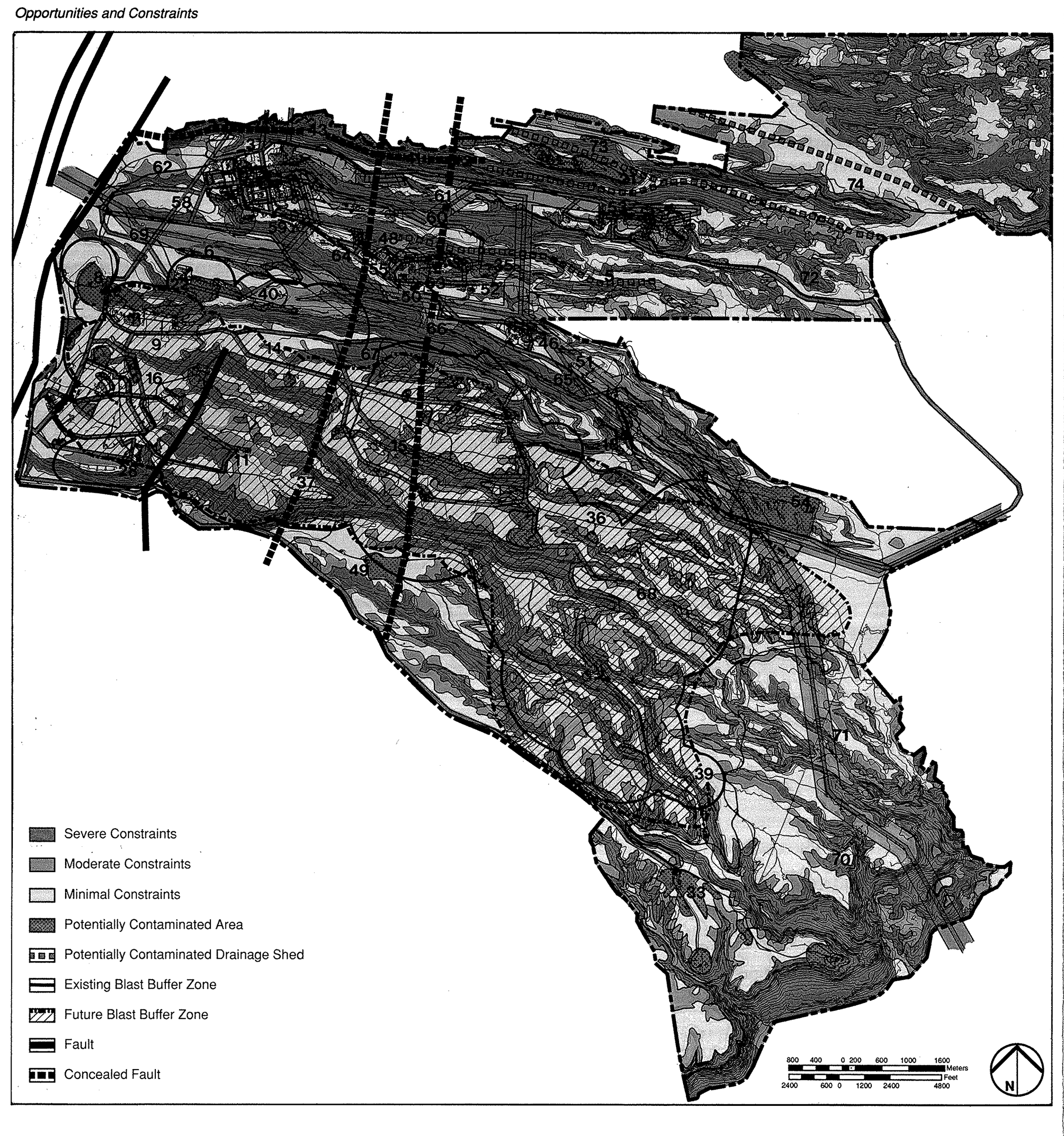
A major Laboratory-wide development opportunity would result from consolidating or relocating some of the high-explosives research areas to the south-central portion of the site as proposed in the Dynamic Testing Division Long-Range Plan. This would enable the future development of Two-Mile Mesa South.

There are also development opportunities at Two-Mile Mesa North, just west of the Core Area and to the east at Sigma Mesa. Additional development opportunities include smaller parcels of land at existing technical areas such as at LAMPF, the East Jemez Corridor, and the Pajarito Corridor.

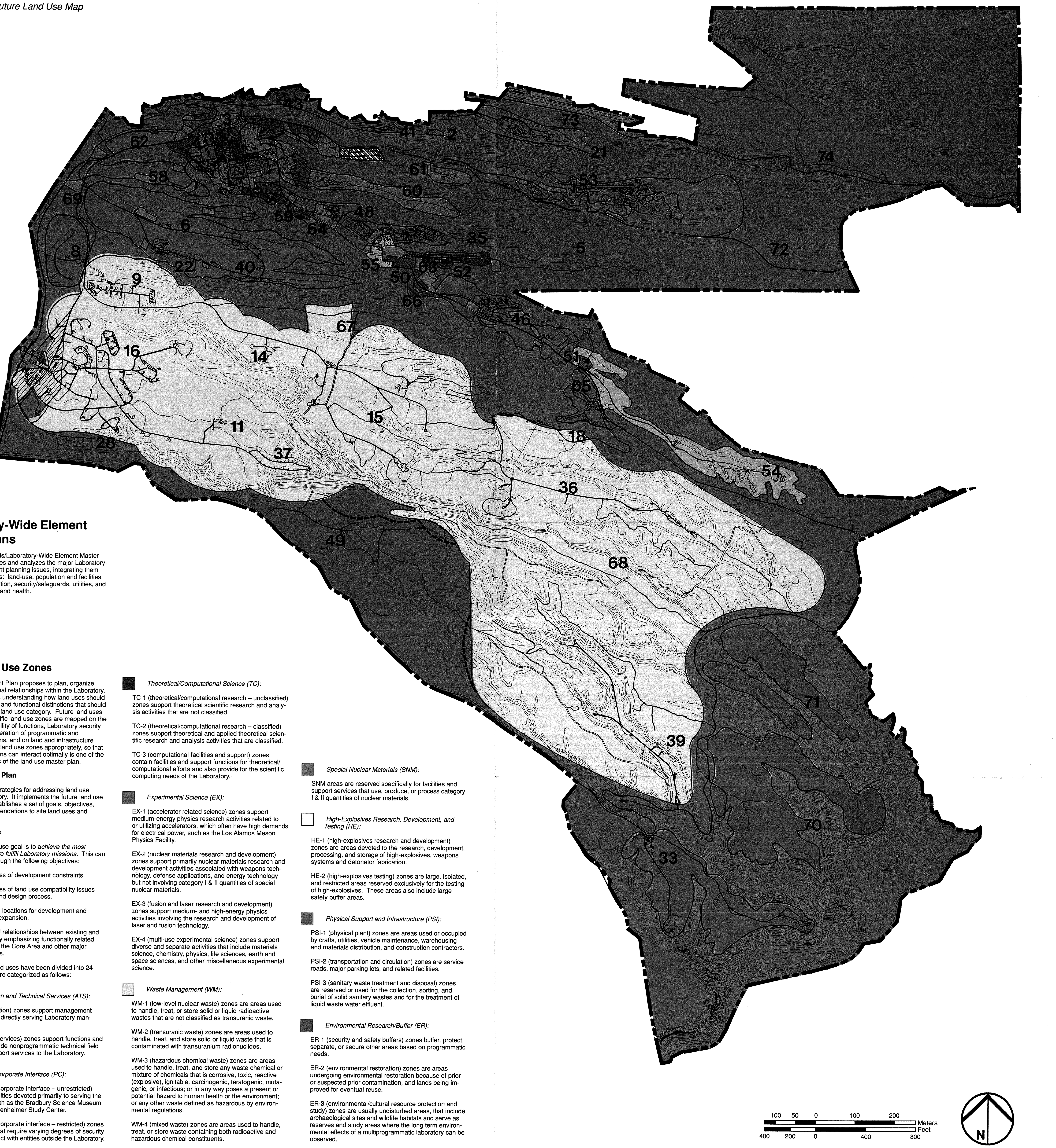
A large area of undeveloped and minimally constrained land exists at TA-70 and 71 in the southeastern portion of the Laboratory north of TA-33 and east of NM 4. Other undeveloped lands are located in TA-74, (known as the Otowi Tract), situated in the northeast corner of the Laboratory. These lands are remote, and large investments in utility and circulation improvements would be required for their use, however, they provide a valuable land reserve offering future development potential for as yet undetermined needs. Other potential development areas are restricted because of the blast fragment hazard buffers essential for high-explosives testing.

Unless programs expand or change significantly, the existing Laboratory site will be able to accommodate anticipated future needs. The strategies and recommendations contained in the Site Development Plan provide the direction necessary to facilitate such accommodation. However, should changing national priorities dictate the need for large experimental facilities that the current Laboratory site could not accommodate, the acquisition of large, new areas may be required. The only such lands nearby that are currently available are owned by the federal government and lie to the southeast across the Rio Grande in the Caja del Rio area

*Opportunities and Constraints*




*Future Land Use Map*




## Laboratory-Wide Element Master Plans

The Planning Analysis/Laboratory-Wide Element Master Plans section identifies and analyzes the major Laboratory-wide site development planning issues, integrating them into six element plans: land-use, population and facilities, transportation/circulation, security/safeguards, utilities, and environment, safety, and health.

## Future Land Use Zones

The Site Development Plan proposes to plan, organize, and enhance functional relationships within the Laboratory. Key to this process is understanding how land uses should relate to one another and functional distinctions that should be made within each land use category. Future land uses are defined and specific land use zones are mapped on the basis of the compatibility of functions, Laboratory security requirements, consideration of programmatic and operational interactions, and on land and infrastructure availability. Locating land use zones appropriately, so that programs and functions can interact optimally is one of the key guiding principles of the land use master plan.

### Land Use Master Plan

The plan sets forth strategies for addressing land use issues at the Laboratory. It implements the future land use zone system and establishes a set of goals, objectives, policies, and recommendations to site land uses and facilities.

**Goal and Objectives**

The Laboratory land use goal is to *achieve the most effective use of land to fulfill Laboratory missions.* This can be accomplished through the following objectives:

- Increase awareness of development constraints.
- Increase awareness of land use compatibility issues during the siting and design process.
- Identify alternative locations for development and provide areas for expansion.
- Improve functional relationships between existing and future land uses by emphasizing functionally related corridors between the Core Area and other major development areas.

Future Laboratory land uses have been divided into 24 land use zones that are categorized as follows:

*Administration and Technical Services (ATS):*

ATS-1 (administration) zones support management and staff activities directly serving Laboratory management.

ATS-2 (technical services) zones support functions and activities that provide nonprogrammatic technical field expertise and support services to the Laboratory.

*Public and Corporate Interface (PC):*

PC-1 (public and corporate interface – unrestricted) zones contain facilities devoted primarily to serving the general public, such as the Bradbury Science Museum and Robert J. Oppenheimer Study Center.

PC-2 (public and corporate interface – restricted) zones contain facilities that require varying degrees of security and serve or interact with entities outside the Laboratory.

*Theoretical/Computational Science (TC):*

TC-1 (theoretical/computational research – unclassified) zones support theoretical scientific research and analysis activities that are not classified.

TC-2 (theoretical/computational research – classified) zones support theoretical and applied theoretical scientific research and analysis activities that are classified.

TC-3 (computational facilities and support) zones contain facilities and support functions for theoretical/computational efforts and also provide for the scientific computing needs of the Laboratory.

*Experimental Science (EX):*

EX-1 (accelerator related science) zones support medium-energy physics research activities related to or utilizing accelerators, which often have high demands for electrical power, such as the Los Alamos Meson Physics Facility.

EX-2 (nuclear materials research and development) zones support primarily nuclear materials research and development activities associated with weapons technology, defense applications, and energy technology but not involving category I & II quantities of special nuclear materials.

EX-3 (fusion and laser research and development) zones support medium- and high-energy physics activities involving the research and development of laser and fusion technology.

EX-4 (multi-use experimental science) zones support diverse and separate activities that include materials science, chemistry, physics, life sciences, earth and space sciences, and other miscellaneous experimental science.

*Waste Management (WM):*

WM-1 (low-level nuclear waste) zones are areas used to handle, treat, or store solid or liquid radioactive wastes that are not classified as transuranic waste.

WM-2 (transuranic waste) zones are areas used to handle, treat, and store solid or liquid waste that is contaminated with transuranium radionuclides.

WM-3 (hazardous chemical waste) zones are areas used to handle, treat, and store any waste chemical or mixture of chemicals that is corrosive, toxic, reactive (explosive), ignitable, carcinogenic, teratogenic, mutagenic, or infectious; or in any way poses a present or potential hazard to human health or the environment; or any other waste defined as hazardous by environmental regulations.

WM-4 (mixed waste) zones are areas used to handle, treat, or store waste containing both radioactive and hazardous chemical constituents.

*Special Nuclear Materials (SNM):*

SNM areas are reserved specifically for facilities and support services that use, produce, or process category I & II quantities of nuclear materials.

*High-Explosives Research, Development, and Testing (HE):*

HE-1 (high-explosives research and development) zones are areas devoted to the research, development, processing, and storage of high-explosives, weapons systems and detonator fabrication.

HE-2 (high-explosives testing) zones are large, isolated, and restricted areas reserved exclusively for the testing of high-explosives. These areas also include large safety buffer areas.

*Physical Support and Infrastructure (PSI):*

PSI-1 (physical plant) zones are areas used or occupied by crafts, utilities, vehicle maintenance, warehousing and materials distribution, and construction contractors.

PSI-2 (transportation and circulation) zones are service roads, major parking lots, and related facilities.

PSI-3 (sanitary waste treatment and disposal) zones are reserved or used for the collection, sorting, and burial of solid sanitary wastes and for the treatment of liquid waste water effluent.

*Environmental Research/Buffer (ER):*

ER-1 (security and safety buffers) zones buffer, protect, separate, or secure other areas based on programmatic needs.

ER-2 (environmental restoration) zones are areas undergoing environmental restoration because of prior or suspected prior contamination, and lands being improved for eventual reuse.

ER-3 (environmental/cultural resource protection and study) zones are usually undisturbed areas, that include archaeological sites and wildlife habitats and serve as reserves and study areas where the long term environmental effects of a multiprogrammatic laboratory can be observed.

## Environment, Safety, and Health

The Laboratory has long operated with a commitment to develop state-of-the-art methods for mitigating the impact of its primary work on the environment, both on- and off-site, while maintaining and enhancing the quality of the environment that it controls. The Laboratory has prepared an Environment, Safety, and Health Long-Range Plan that contains detailed information about environmental management and the environmental protection program conducted at Los Alamos.

Land use decisions must consider the potential effects proposed facility developments will have on the environment, must comply with government regulations, and must be coordinated with environmental monitoring and restoration efforts, particularly concerning the handling, transport, treatment, storage, and disposal of hazardous materials.

### Environmental Resources

The Laboratory has established an environmental resource management strategy consisting of three components:

- *Preservation* of the Laboratory's valuable non-renewable resources requires direct Laboratory action within its borders and a commitment to active preservation of these resources.
- *Conservation* of renewable resources is accomplished at the Laboratory through cooperative agreements with many state and federal agencies. The Soil Conservation Service has assisted the Laboratory with conducting inventories of soil types and the development of engineering practices to be used during construction. The New Mexico Game and Fish Department has assisted the Laboratory in annual game inventories and habitat enhancement projects. The U.S. Forest Service provides consulting service to the Laboratory in such matters as timber management, fire and fuel breaks, and erosion and disease control.
- *Restoration* has rightfully become a high priority not only for the Laboratory, but for the DOE weapons complex and the nation as a whole. The Laboratory has an Environmental Restoration Program that is now identifying potentially contaminated sites, verifying the presence or absence of contamination, characterizing contaminants, and beginning initial restoration efforts.

The Laboratory can use its resources in basic and applied research to take the lead in developing methods to clean up contaminated nuclear weapons production facilities in accordance with the Secretary of Energy's mandate to be good stewards of the environment. This leadership could focus on four specific areas:

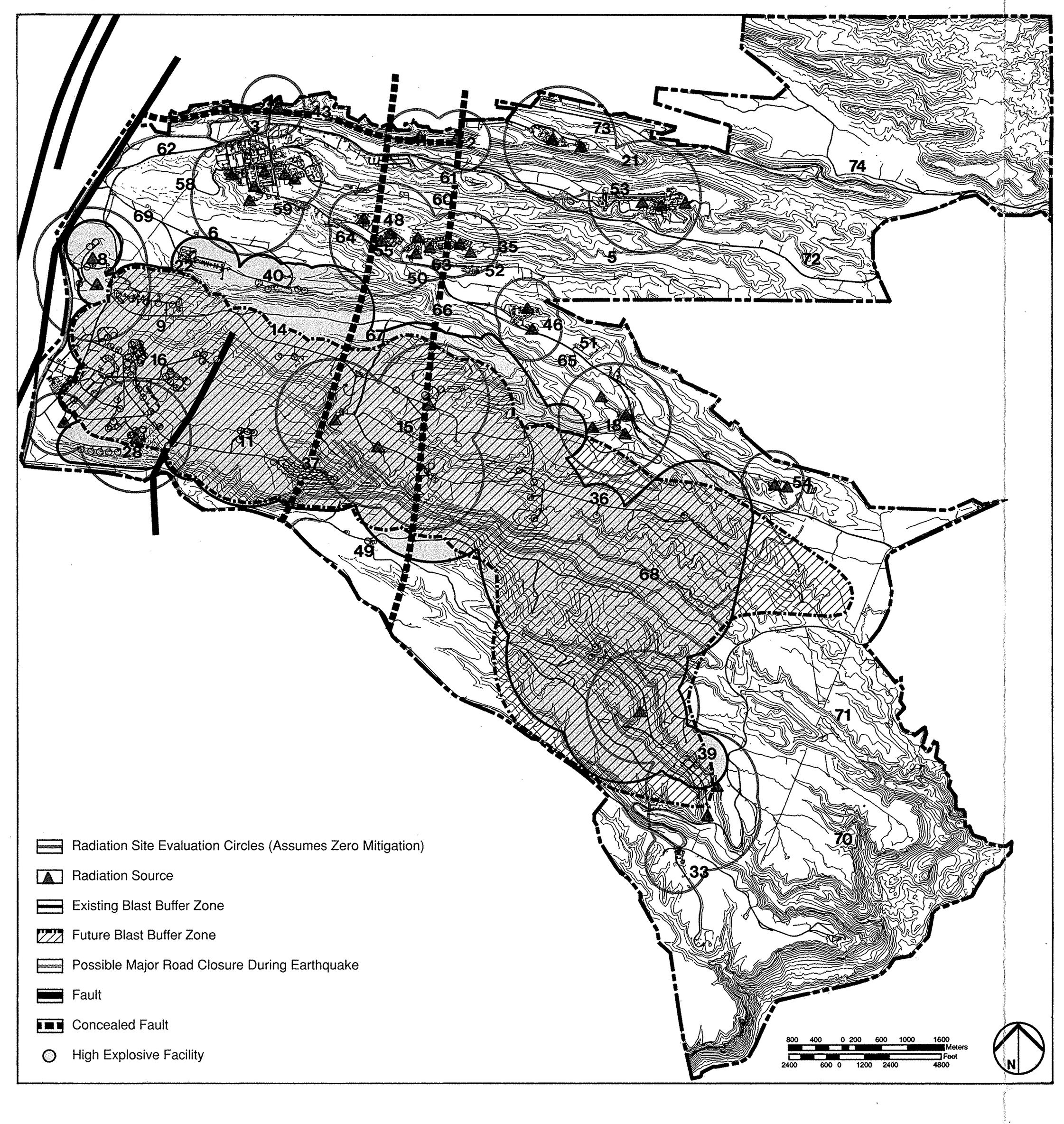
- The development of new methods to minimize the amount of hazardous and radioactive waste generated at DOE facilities;
- The development of chemical extraction techniques or methods using microorganisms to reduce current environmental and health hazards at DOE facilities;
- The development of robotics to reduce hazards to the public and workers involved in the cleanup; and
- The investigation of research technologies used in oil and gas exploration, chemical and laser separation of compounds, soil melting methods, and other innovative heating technologies, to determine if these processes might be adaptable to environmental uses.

### Waste Management

Los Alamos National Laboratory generates two basic categories of solid waste: operational waste and municipal waste. The nuclear programs and the high-explosives program produce some wastes which are particularly difficult operational wastes to process. These include radioactive, toxic, hazardous, biological, medical and mixed wastes. Municipal solid waste can be legally disposed of in a sanitary landfill. Two kinds of liquid waste are also generated by the Laboratory: radioactive liquid waste and sanitary liquid waste.

The TA-54 operational radioactive waste disposal facility will eventually require expansion and/or relocation into an area that shares similar geological and hydrological attributes. The Pajarito Corridor Central Development Area proposes one such area near the existing site. TA-49 is another such area.

*Potential Hazards*




Consolidation of the Laboratory's sanitary liquid waste water treatment system is underway and will result in the elimination of many discharges. Also, a new radioactive liquid waste treatment plant is proposed at TA-50. Both will be in full compliance with state and EPA regulations.

### Safety

The nature of Laboratory work creates specific and unique safety concerns. Research with high-explosives materials, a broad range of radioactive materials, and other hazardous and toxic materials requires that strict and specific safety precautions be taken at all times. Two of the most important safety features used at the Laboratory are the blast fragment hazard buffer zones and radiation site evaluation circles.

There are currently many Environmental, Safety, and Health compliance initiatives of Laboratory-wide importance being implemented. These projects will upgrade and improve existing Laboratory facilities and systems to comply with federal and state environmental regulations. These projects include the following:

- Establishment of a new RCRA/mixed-waste disposal site;
- Spill prevention control compliance measures (SPCC) at TAs 3, 16, 35, and 57;
- Modifications of the process isotope separation facility at TA-46 to eliminate large volumes of acids;
- A solvent recovery/recycling facility for high-explosive contamination control at TA-16;
- Ventilation improvements at the TA-50 waste process facilities; and
- Replacement of transformers containing polychlorinated biphenyls (PCB's) at several technical areas.

### Health

The Laboratory maintains an environmental surveillance program that routinely monitors the Laboratory and environs for radiation, radioactive materials, and chemical substances on the Laboratory site and in the surrounding region. The Laboratory also takes a very active role regarding the health of its employees. A central medical clinic and wellness facility are located in TA-3 and wellness facilities have been established at 28 other locations.

### Goal and Objectives

The primary Laboratory environment, safety, and health goal is to *continue to protect the environment, the public, and Laboratory personnel and facilities.* This goal can be accomplished through the following objectives:

- Minimize the effect of Laboratory operations on the environment.
- Minimize safety risks to protect Laboratory personnel and the public.
- Minimize the amount of waste being generated by the Laboratory.
- Continue Laboratory health monitoring and regulatory compliance efforts.

## Security/Safeguards

Security at Los Alamos National Laboratory involves protecting personnel and facilities in a manner appropriate to respond to postulated threats. Safeguarding consists of guarding, protecting, or providing a defense based on several considerations: the sensitivity of the facility, the level of threat, the Laboratory's vulnerability, and the defense options.

The hazardous nature of much of the Laboratory's work, the dispersion of facilities within the large site, and constraints imposed by the rugged terrain have led to the development of many scattered and separate security areas within Los Alamos National Laboratory. Most research at the Laboratory is performed under the DOE rules and regulations that govern the protection of national security interests. There are five levels of security maintained by the Laboratory:

- Public access areas
- Buffer areas
- Controlled areas
- Limited-security areas
- Category I & II special nuclear materials areas

The Laboratory must maintain and strengthen security protection and meet DOE security regulations and requirements. Consolidation and centralization of secure functions, and the control of public access in and around public areas should be accomplished through careful land use and facilities planning that considers security in the context of overall Laboratory missions, conflicting goals, and competing programmatic needs. Concern for the potential for terrorism and vulnerability to outside forces are other considerations.

Certain items need careful security planning to facilitate their siting: communications lines, electrical substations, the central computing center, and the cooling water facilities for the computing center.

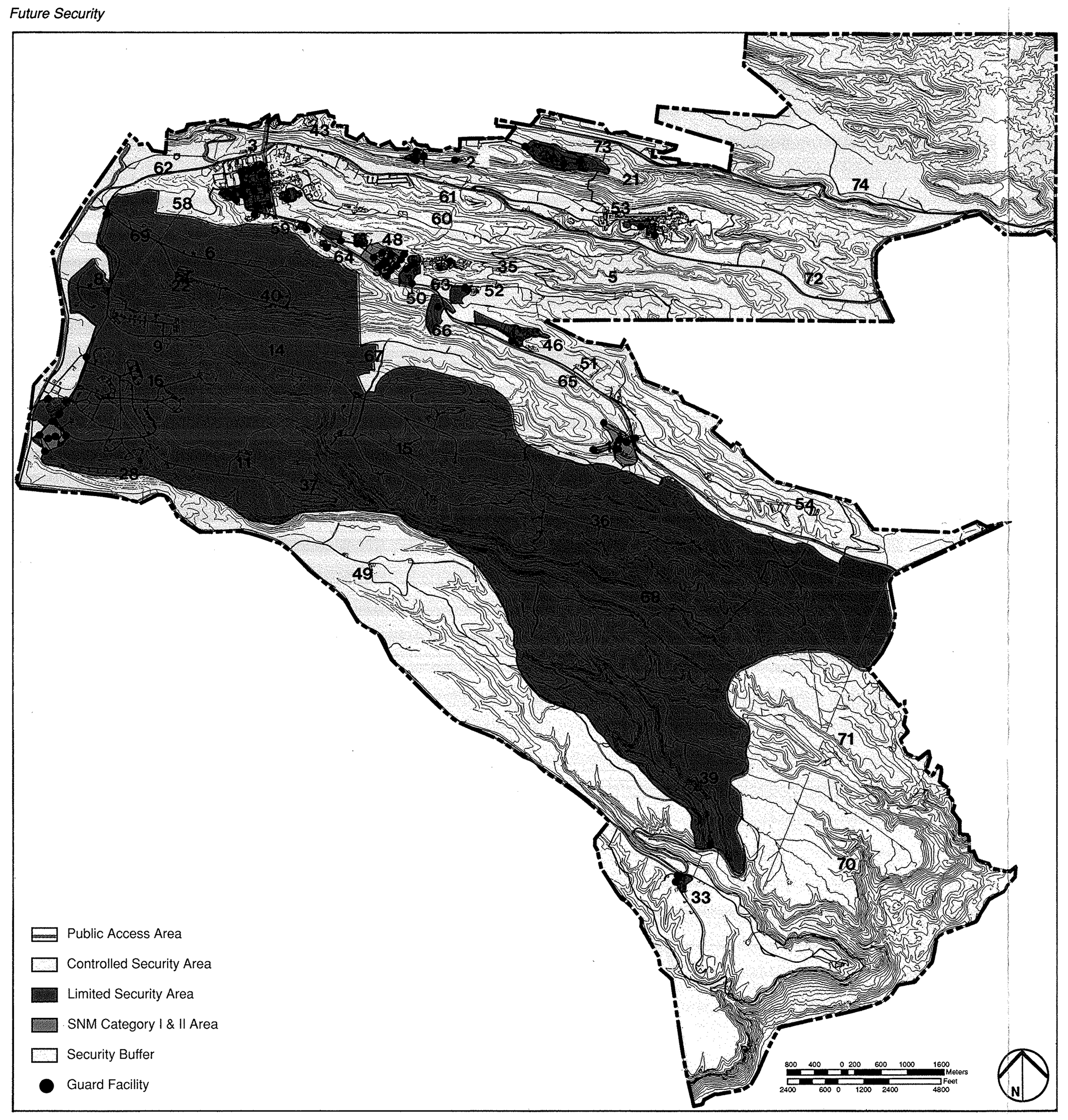
Ideally, the Laboratory site should be arranged concentrically, with the lowest-level security zone (public access and buffer areas) at the perimeter and the highest-level zone (category I & II SNM areas) at the center. This optimal model is limited by the Laboratory's historic land use pattern and natural topography.

### Goal and Objectives

The Laboratory physical security/safeguards goal is to *maintain and strengthen security protection through long-term site development planning.* This goal can be accomplished through the following objectives:

- Consolidate secure functions and interests to the extent permitted by other Laboratory functional and technical requirements.
- Limit public access to, and visibility of, limited-security and category I & II SNM areas.
- Minimize public proximity to secured areas at the Laboratory by locating public interface functions at the perimeter of the site.
- Establish buffer zones to protect limited-security and category I & II SNM areas from unauthorized access.
- Surround or buffer higher-security functions with lesser security functions to protect and insulate these functions from security threats.

*Future Security*




## Transportation/Circulation

The Laboratory's remote location, topography, and development patterns create unique transportation problems both to and within the site. Mesa tops separated by deep canyons, and the dispersion of the technical areas combine to make access to and between Laboratory facilities difficult and circuitous. As a result, the transportation of employees at the Laboratory is difficult and time consuming, particularly during peak traffic hours. Many major roads and intersections currently provide poor and unsatisfactory levels of service during these times.

The development of roads and parking at the Laboratory has thus far occurred in an incremental fashion, often guided by short-term requirements. This has resulted in difficulties such as

- Infrastructure development lagging behind growth;
- Peak-period traffic congestion on major roadways;
- Insufficient parking in certain areas;
- Transportation of hazardous materials using roads currently accessible to the public;
- Costly utility relocations necessitated by roadway expansion;
- Single access/egress points to technical areas with large employment concentrations in potential high-risk locations containing hazardous materials or conditions;
- Laboratory and non-Laboratory traffic conflicts; and
- Conflicts between vehicles and pedestrians, bicyclists, and joggers.

Potential changes to the existing Laboratory and regional road network may drastically alter commuting patterns and traffic counts. A significant increase in traffic is projected along East Jemez Road because of

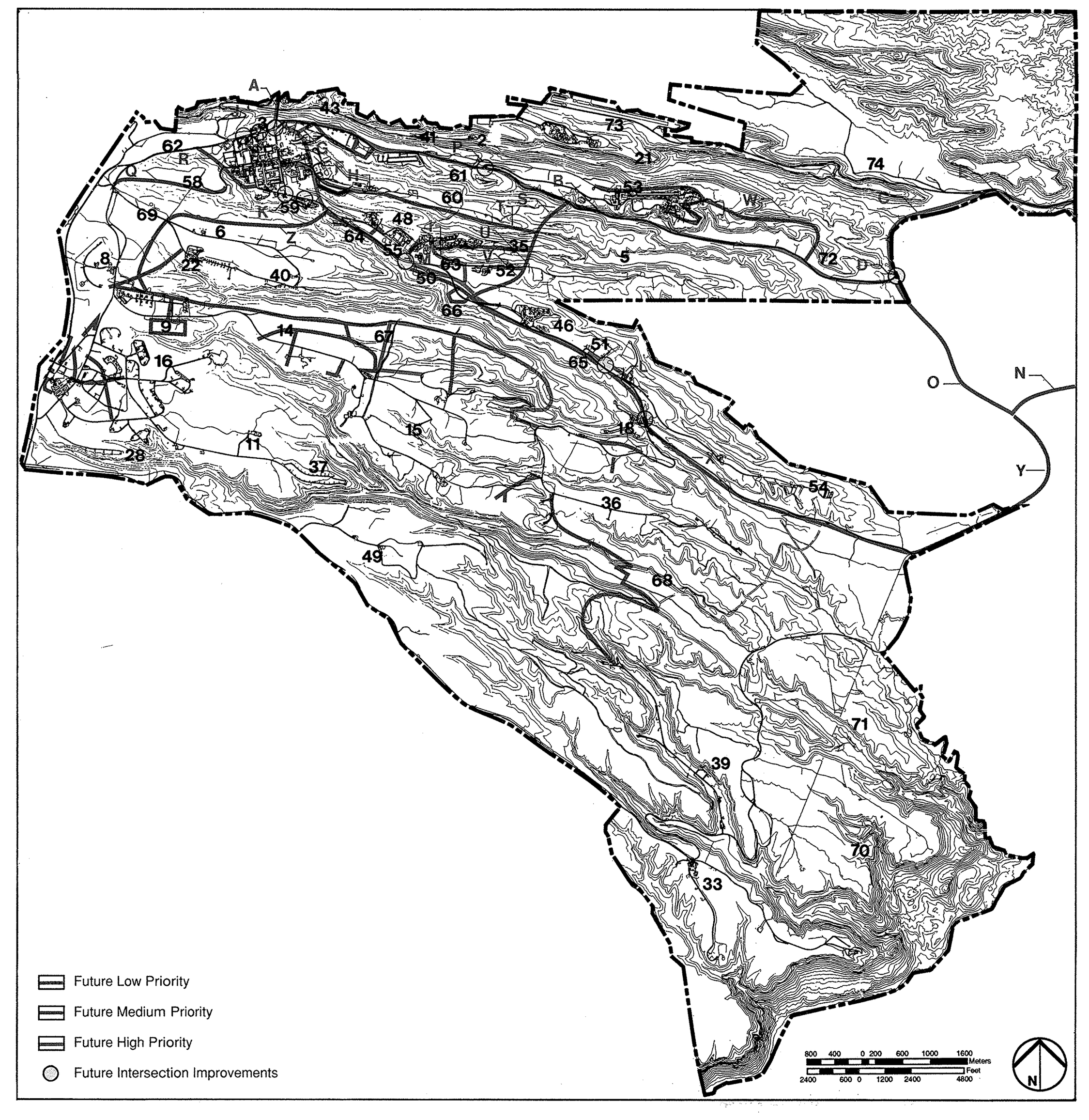
- Recent reconfiguration of the White Rock wye, and improvements to NM 4 and 502;
- Potential for closure of Pajarito Road to public traffic for safety and security reasons; and
- Planned construction of the new alternate Los Alamos/Santa Fe connector.

The need for new internal and regional roadways is another important transportation issue at the Laboratory. These roadways are required to lessen congestion, enhance security, facilitate the transport of hazardous materials, and improve traffic safety.

Parking lots and roads are currently the single largest non-programmatic users of Laboratory land. Consequently, the increased parking demand and construction and maintenance costs of on site parking is of concern. Furthermore, interior parking lots utilize valuable land that could be better used for major new buildings.

Alternative transportation modes need to be encouraged by the Laboratory. The relative costs of planned roads and parking areas must be weighed against the benefit of encouraging modal options such as carpools, vanpools, intra-Laboratory shuttlebuses, and other alternatives to the use of private vehicles.

*Future Transportation/Circulation Improvements*




A complete transportation master plan has been developed for Los Alamos National Laboratory. The plan integrates vehicular circulation, parking, pedestrian circulation, bicycle ways, and other modes of transportation used or proposed at the Laboratory. The plan provides transportation and circulation policies to guide improvements and prioritized recommendations for physical transportation improvements.

### Goal and Objectives

The Laboratory transportation/circulation goal is to *develop and improve site circulation for efficient transportation, improved operations, reduced energy costs, and increased safety and security.* The objectives for improving the Laboratory's transportation/circulation system are

- Design technical areas and building sites for efficient circulation and parking to minimize pedestrian and vehicle conflicts and to maximize operational efficiency.
- Improve connections between Laboratory technical areas.
- Improve methods and routes for transporting hazardous materials.
- Encourage safe and efficient multimodal transportation options for Laboratory employees.
- Promote improved connections between the Laboratory and surrounding communities.

## Utilities

The Laboratory's extensive utility network is its life support system. Providing utility service is the single largest component of the Laboratory's site development costs.

Currently the Laboratory's utility system contains approximately 400 miles of lines. Six primary utilities make up the utility system – electricity, telecommunications, water, sanitary sewer, radioactive liquid waste, and natural gas with associated steam plants.

**Electricity** – The Laboratory is supplied with electricity by a Los Alamos County/DOE power pool. It also has a 20 megawatt (MW) gas-fired generating plant in TA-3. Electricity is transmitted to the Laboratory and the county over two 115 kilovolt (kV) lines, one from Santa Fe (Norton Generating Station) and one from Albuquerque (Reeves Generating Station). Electricity is distributed throughout the Laboratory via 13.2-kV lines. The 115-kV system includes a loop that ties substations at TAs 3, 5, and 53 together. This looping ensures a power supply throughout the Laboratory should outages in any major line occur. The Laboratory's total annual consumption of power is considerably below the transmission capacity of the system. Efforts are made to level out the peak demand load and conserve energy by running equipment with large demands for power at night.

**Telecommunications** – The central goal of voice, data, and video communications planning at the Laboratory is to provide an effective, secure, and economical communications system that helps maximize the productivity of employees in accomplishing the Laboratory's mission. A key factor in providing effective communications service is staying abreast of and applying new technologies. Currently, U.S. West Communications provides leased CENTRON service to the Laboratory using a switching system located in the U.S. West building in downtown Los Alamos. The system provides the Laboratory and associated organizations with approximately 15,000 stations and 11,000 main lines.

**Water Supply** – Water for the Laboratory and adjacent areas (including Los Alamos townsite, White Rock and Bandelier National Monument) primarily comes from three DOE-owned well fields and surface water from the Jemez Mountains. The system depends on gravity flow for distribution from high elevation terminal storage facilities.

**Sanitary Sewer** – The existing sanitary sewer system includes nine treatment facilities. In addition, approximately 70 septic tanks are dispersed throughout the Laboratory. Consolidation of the sanitary waste water treatment system is underway and will eliminate eight of the existing treatment facilities. Areas not served by the existing sanitary sewer system use septic tanks.

**Radioactive Liquid Waste** – The radioactive liquid waste system service area includes TAs 2, 3, 21, 48, 50, 55, and 59. Radioactive liquid wastes from TAs 16, 35, 43, and 54 are collected and treated at TA-50. TA-53 has a self-contained radioactive liquid waste collection system. Functions that produce radioactive waste water should be located within this service area.

**Natural Gas and Steam Plants** – Natural gas used by the Laboratory comes from the San Juan Basin in northwest New Mexico. The lines are owned by DOE but operated and maintained by the Gas Company of New Mexico under contract to the DOE. The Laboratory depends on natural gas for most space heating requirements.

The Facilities Engineering Division has completed a draft Long-Range Utilities Development Plan. It proposes integration of the existing infrastructure and identifies future corridors for major utilities. Implementation of the plan will result in coordinated utilities support for major construction items and a reduction in utility relocations necessitated by such projects. The major recommendations of the Long-Range Utilities Development Plan have been incorporated into the Site Development Plan.

The major utility issues at the Laboratory are

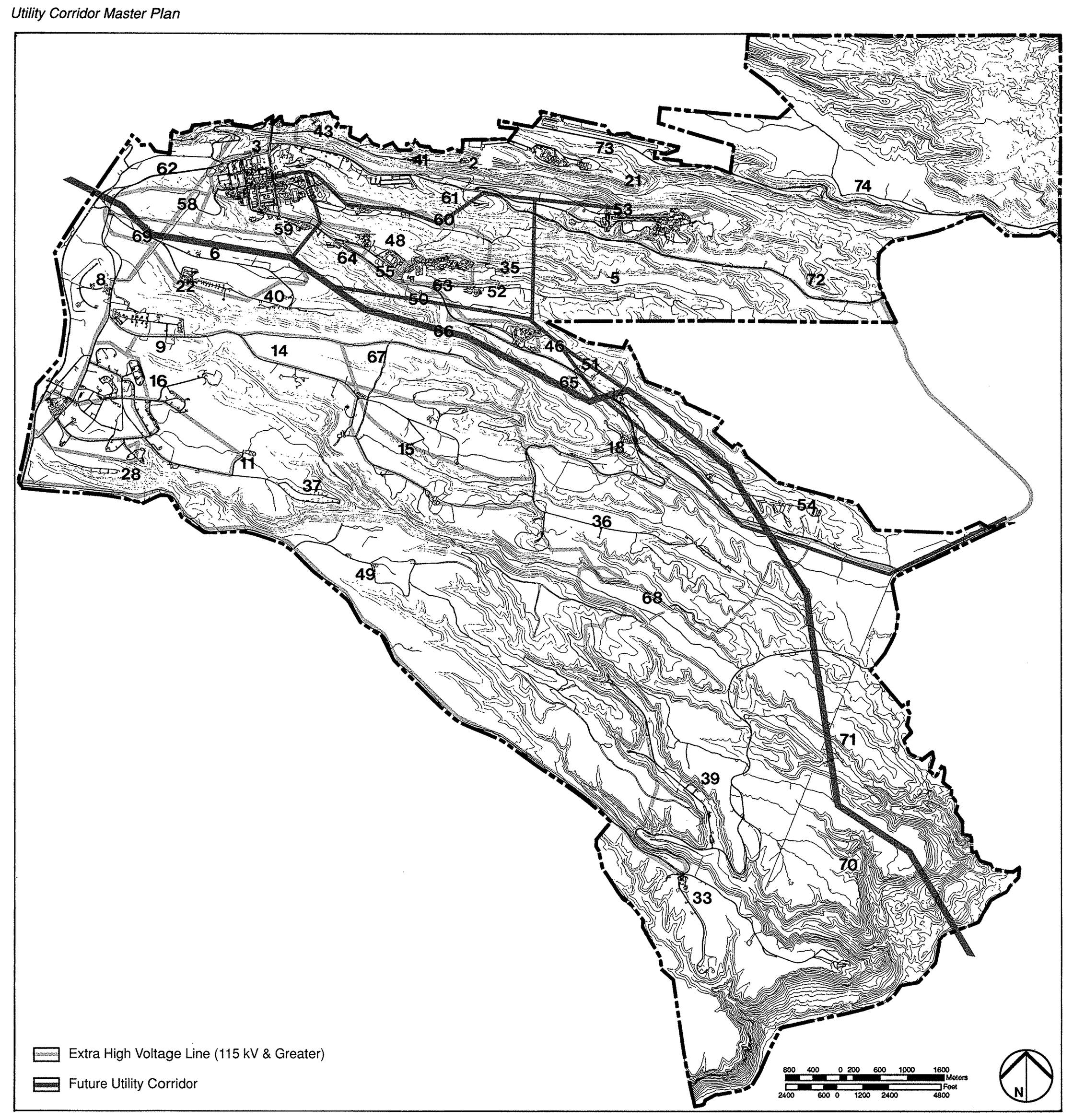
- Utility lines have been installed throughout the Laboratory as required. This seemingly haphazard siting of utilities has resulted in a maze of tangled utility lines. By locating utilities only in corridors planned to accommodate future expansion and planning developments accordingly, the Laboratory would be able to grow efficiently and to achieve its mission.
- The existing layout and size of the Laboratory has resulted in the decentralization of utility systems and service. This decentralization has resulted in reduced efficiency and increased costs. Focusing growth in development areas serviced by major utility corridors, and providing infrastructure in areas projected to grow would permit the cost-efficient and effective development and maintenance of the utility system.
- The incremental nature of development at the Laboratory along with programmatic changes has resulted in the piecemeal retrofitting of utilities to accommodate expansion. This has been expensive, energy inefficient, and resulted in utility downtime. Planning and constructing looped utility systems to accommodate needs projected for the expansion of any development site would eliminate the costly and inefficient retrofitting of systems.
- The Laboratory's major utility systems are aging. Deterioration of these systems could cause service disruptions and create safety hazards. Modernizing of the Laboratory's utility infrastructure is therefore important.

### Goals and Objectives

The Laboratory utilities goal is to *develop and improve utility systems that are efficient and cost-effective in support of programmatic development.* This goal can be accomplished through the following objectives:

- Define, develop, and reserve utility corridors to minimize costs and conflicts with other site improvements.
- Modernize utility systems to provide safe, reliable, and cost-effective services for Laboratory facilities.
- Develop stable funding sources that can be used to modernize Laboratory utilities.

*Utility Corridor Master Plan*



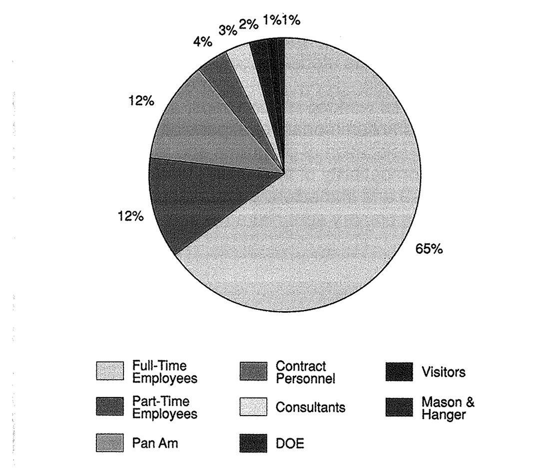

## Population and Facilities

### Population

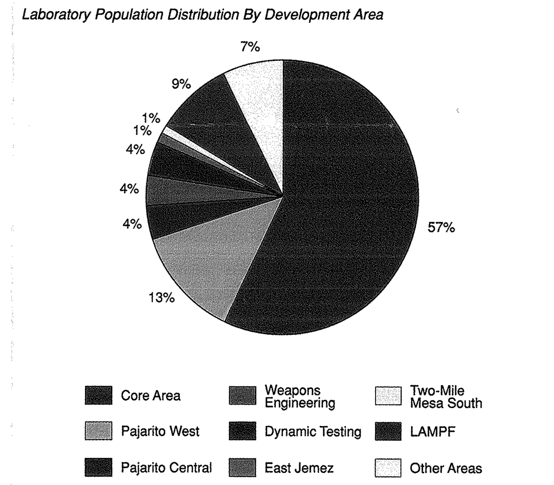
As of June 1990, about 12,000 people worked at the Laboratory including approximately 7,900 full-time equivalents. The remainder is composed of about 2,500 casual and contractual employees, consultants, visitors, and about 1,600 support services subcontractor employees. Ninety-three percent of the Laboratory population is concentrated in the eight development areas identified in the Site Development Plan.

Laboratory population growth has historically averaged 3.4% per year since 1942. Despite changes in the federal administration, the national outlook, and the political environment, this upward trend has persisted. However, major geopolitical changes occurring in the late 1980s have caused the Laboratory to re-evaluate earlier population growth assumptions such that a short-term steady state (zero net growth) and up to one percent long-term net growth is assumed for facilities planning in the plan.

*Laboratory Population Breakdown*




*Laboratory Population Distribution By Development Area*




### Facilities

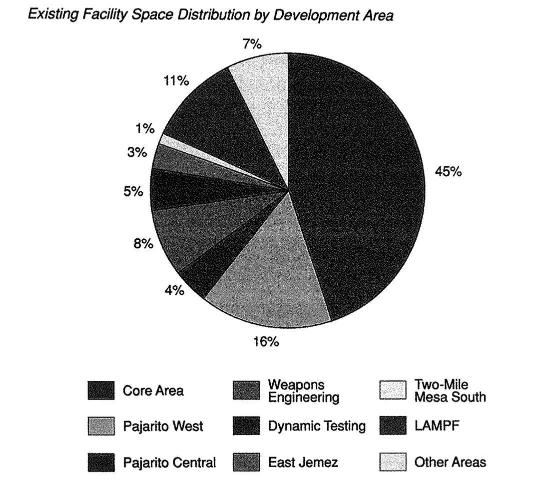
As of January 1990, Los Alamos National Laboratory had approximately 7.3 million gross square feet of space contained in 1,835 buildings. Forty-five percent of this space is contained in the Core Area (TAs 3, 43, 58, 59, and 62). The Pajarito Corridor is the second largest cluster of facilities, containing about 20% of the total net square footage. The eight development areas identified in the Site Development Plan account for about 93% of the total net space at the Laboratory. The estimated re-placement value of these buildings is roughly $2.7 billion, while the total replacement value of the Laboratory (including land, buildings, and infrastructure) approaches $4.3 billion.

Space utilization at the Laboratory falls into six basic categories:

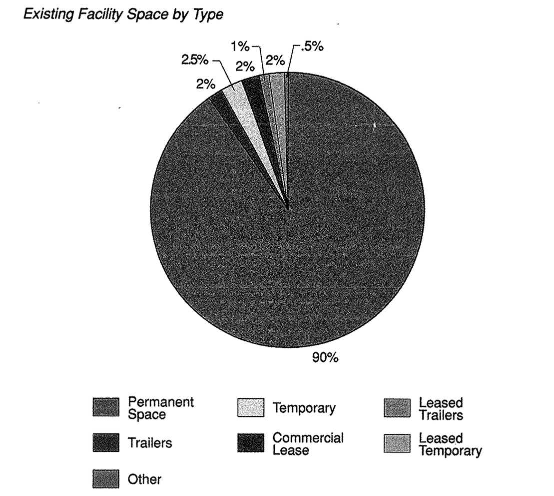
- Office space – 1.3 million net square feet.
- Laboratory space – 706,000 net square feet
- Heavy experimental space – 603,000 net square feet.
- Storage space – 891,000 net square feet.
- Service space – 2,143,000 net square feet.
- Other space – 1,340,000 net square feet.

There are about 370 buildings at the Laboratory that exceed 2,000 square feet in area. These major buildings account for 6.5 million square feet or 89% of all Laboratory gross square footage. One hundred thirty-three buildings in this group exceed 10,000 square feet and comprise 75%

*Existing Facility Space Distribution by Development Area*




*Existing Facility Space by Type*



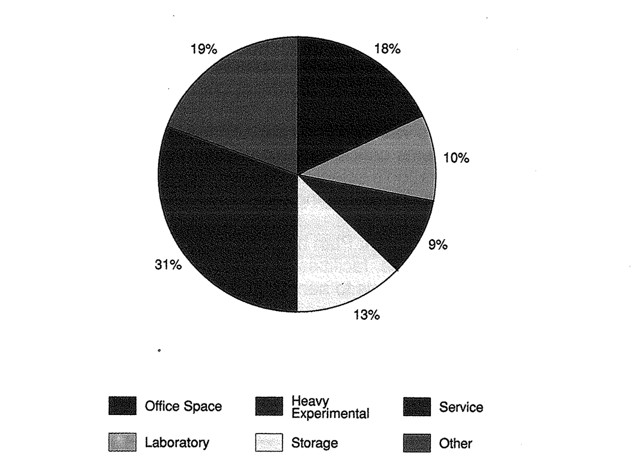

of all Laboratory facility space. The average size of these major buildings is about 17,700 square feet. The remaining buildings (approximately 1,160) are small and less than 2,000 square feet in size. Half of these small buildings are either temporary or transitional and include both owned and leased buildings. The average size of these buildings is 650 square feet, the area of a typical trailer.

Many of the buildings used by the Laboratory for conducting state-of-the-art science are old and outdated. Fifty-one percent of all Laboratory buildings larger than 2,000 square feet are more than 30 years old. Only 16% of the square footage in buildings larger than 2,000 square feet was constructed after 1980.

Ninety percent of the buildings at the Laboratory are permanent while the remaining 10% are either transitional, temporary, or leased. The heavy use of temporary and transitional space at the Laboratory masks the real need for additional high quality permanent space. For example, if transitional, temporary, and leased space is excluded, a deficit of at least 670,000 square feet of permanent office space exists. Moreover, conversion back and forth from office to laboratory space is very inefficient, disruptive, and expensive. If there was adequate space in each category to maintain a small surplus for allocation, the expense and inconvenience of such conversions would be lessened.

Historically, the Laboratory growth pattern has consisted of small additions and satellite buildings surrounding large original structures. The resulting development pattern is often dispersed and chaotic. While this pattern is difficult to change given programmatic funding realities, it is possible to organize and plan growth around major Laboratory facilities. For example, areas near such facilities can be

*Facilities Space Categorization*




reserved for either future parking needs or for consolidating temporary structures in a well planned complex. Also, permanent storage space should be included in the design of line-item project facilities as well as for satellite buildings. Another option for making better use of facilities at the Laboratory is the long-term increase in density of facilities, thereby reserving more land for future needs.

### Goal and Objectives

The Laboratory facilities goal is to *implement permanent facility improvements in a manner consistent with the Laboratory mission.* The following objectives have been established to accomplish this goal:

- Emphasize quality site design and careful site planning for new Laboratory facilities.
- Provide new permanent facilities based on Laboratory programs and operations needs as set forth in the Los Alamos 2000 Strategic Plan.
- Eliminate leased buildings, trailers and temporary facilities when feasible and cost effective and replace with permanent facilities.
- Continue to rehabilitate or replace obsolete structures when cost effective and appropriate.
- Continue to decontaminate and decommission facilities for adaptive reuse or disposal.
- Increase scheduled maintenance efforts to enhance facility lifetimes, reduce unanticipated repair costs, and provide an environment more conducive to professional scientific work.

## Development Area Master Plans

The Los Alamos National Laboratory Site Development Plan has identified eight development areas within the Laboratory where future growth and development is anticipated or can easily be accomodated. The technical areas and dominant land uses within each development area are identified below.

Together the eight development areas account for approximately three-fifths of the total Laboratory land area. These areas house 93% of the total Laboratory population and contain approximately 93% of the total facility net square footage.

Master plans have been prepared for each of the eight development areas. Each master plan reviews existing site conditions, identifies significant opportunities and constraints to facilities development, and discusses future land uses and planning considerations crucial to site and facilities development under six specific elements — population and facilities, transportation/circulation, security/safeguards, utilities and environmental, safety, and health issues.

Development sites maps and evaluation charts have been prepared for each of the eight development areas. These identify opportunities for new construction or redevelopment of existing sites. The evaluation charts detail site characteristics, development possibilities, and any associated constraints.

**A. Core Area and Two-Mile Mesa North**
(TAs 3, 43, 58, 59, and 62)
The Core Area and Two-Mile Mesa North Development Area includes the central technical, administrative and physical support facilities of the Laboratory as well as experimental science and theoretical/computational science land uses.

**B. Two-Mile Mesa South**
(TAs 6, 22, and 40)
This development area is presently used for the research and testing of special detonators and high-explosive systems and as a buffer zone for this function. Large portions of this development area therefore remain undeveloped.

**C. Pajarito Corridor West**
(TAs 35, 48, 50, 52, 55, 63, 64, and 66)
Experimental science and special nuclear materials (SNM) land uses, which include radiochemistry, nuclear safeguards studies, analytical chemistry, reactor development, waste management, and plutonium processing occur in this development area.

**D. Pajarito Corridor Central**
(TAs 18, 46, 51, and 65)
The Pajarito Corridor Central Development Area includes experimental science land uses where research is performed in chemistry, photochemistry, solar energy, biological exposure effects, and nuclear chain reaction behavior.

**E. East Jemez Corridor and Sigma Mesa**
(TAs 2, 41, 60, and 61)
The East Jemez Corridor and Sigma Mesa Development Area is used primarily for physical support and infrastructure land use activities and is the site of the existing sanitary landfill. The Omega West reactor is located in Los Alamos Canyon, as are special nuclear materials land uses involving the engineering design of nuclear components. It is also the location of lands leased to construction contractors and the privately owned Royal Crest Trailer Park.

**F. Weapons Engineering**
(TA-16)
This development area is dedicated to high-explosives research, development, and testing land uses. Functions at this site include engineering design, prototype manufacture, processing and environmental testing of nuclear weapon warhead systems.

**G. Dynamic Testing**
(TAs 8, 9, 14, 15, 22, 36, 39, 40, 67, and 68)
This extensive area is reserved specifically for high-explosives research, development, and testing land uses.

**H. LAMPF**
(TA-53)
The primary facility in this development area is the Los Alamos Meson Physics Facility, a linear particle accelerator used for basic physics research, material studies, and isotope production. Other facilities at TA-53 are also accelerator-related.

### Other Technical Areas

Numerous other technical areas are spread throughout the Laboratory. These technical areas usually have small populations or are remote. They are not the focus of anticipated future growth and development at the Laboratory and therefore are not addressed in detail in the Site Development Plan.

*Development Areas and TA Boundaries*