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Los Alamos National Laboratory
2021 Campus Master Plan

Los Alamos
NATIONAL LABORATORY

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1 DIRECTOR'S FOREWORD

For more than 75 years, Los Alamos National Laboratory (the Laboratory or LANL) has been on the front line of scientific discovery, applying world-class expertise to our nation's science, technology, engineering, and energy challenges. But many of the facilities and much of the infrastructure we relied on during the Cold War are still around today, no longer able to sustainably support our cutting-edge research and development work. We are currently operating in a period of unprecedented mission growth that brings many opportunities to redevelop our infrastructure, and we are bringing a renewed vigor to revitalize and transform the Laboratory's campus over the next decade.

To create a world-class campus, we have developed the Laboratory's first comprehensive site plan in more than 20 years. This *Campus Master Plan* (CMP) is a robust institutional effort that provides the framework for facility and infrastructure development to make sure we can meet future national security challenges, enable sustainable growth, better connect our workforce and capabilities, and continue our environmental stewardship. This effort reflects close collaboration with our federal customers and an innovative sitewide approach to long-term space and infrastructure management.

The main focus for the transformation will be to replace end-of-life structures and provide modern offices and cutting-edge laboratory and experimental facilities for our critical mission work. The changes will be most visible within the two highest populated areas of the site, the main campus at TA-03 and the western end of Pajarito Road. During the next three decades, the CMP reveals more than 4 million gross square feet of new space in these areas. Other improvements will be made to our utility systems to expand onsite power generation, provide redundancy, and support new facilities. Transportation projects will upgrade roads to reduce congestion and improve safety, and the Los Alamos Canyon bridge will be replaced.

We are excited to share our infrastructure vision and look forward to revitalizing our site to support the next 75 years of mission execution, discovery, and technical breakthroughs.

Figure 1-A: Thomas (Thom) Mason is the President and CEO of Triad National Security, LLC (Triad) and serves as the Director of Los Alamos National Laboratory.

2 CAMPUS MASTER PLAN REQUIREMENT AND DRIVERS

This CMP and associated planning process provide a comprehensive site planning capability at the Laboratory. The requirement to establish a comprehensive site planning capability is identified in the Management and Operations (M&O) Prime Contract and is further emphasized in a Contracting Officer letter. Developing this capability has required significant changes in how site infrastructure and land-use planning are evaluated, prioritized, communicated, and executed to support the mission and operations (near-, mid-, and long-term) of the LANL site. This capability also better aligns the site planning process with National Nuclear Security Administration (NNSA) Headquarters (NA-50) and the NNSA Los Alamos Field Office (NA-LA) current and outyear planning, prioritization, and budgeting processes. The M&O Prime Contract and Contracting Officer letter requirements have been used to guide throughout the development of the CMP and associated planning process. For the purposes of this deliverable requirement, the Los Alamos National Laboratory *2021 Campus Master Plan* is analogous with the Site Facility Plan referenced in the Prime Contract.

The LANL M&O Prime Contract (Contract Number 89233218CNA000001, Triad National Security, LLC, (Triad) and the United States [U.S.] Department of Energy [DOE], National Nuclear Security Administration [NNSA]) includes the following specific sections that establish the requirement to develop and implement a comprehensive site planning process at the Laboratory:

- Contract Part I, Section H, Clause H-43, Performance Directions
- Contract Part I, Section H, Clause H-19, Strategic Planning
- Contract Part I, Section H, Clause H-26 (a)(2), Site Facility Plan
- Contract Part I, Section H, Clause H-26 (a)(4), Annual Real Property Acquisition Plan
- Contract Part III, Appendix J, NNSA SD 430, Real Property Asset Management

3 VISION AND SUMMARY

3.1 The Laboratory's Planning Vision

The CMP establishes a mission-driven vision for future growth and development of the LANL site and creates a roadmap for achieving success. The CMP aspires to a transformational redevelopment of the physical plant—an external appearance and functionality that complement and support the world-class standards in science, technology, and engineering for which the Laboratory is known.

The vision is anchored in principles of sustainability, resilience, environmental stewardship, innovation, preservation of cultural and historical resources, and the Laboratory's abiding commitment to excellence.

The roadmap is founded on communication and collaborative engagement with stakeholders—both internal and external to the institution—to understand and respond to their needs by establishing an iterative and inclusive process that is supported by innovative technology.

3.2 Planning Summary

Just as the Laboratory applies world-class expertise to our nation's science, technology, engineering, and energy challenges, the CMP brings that same vigor to transforming the Laboratory's campus. As described by Kelly Beierschmitt, the Laboratory's Deputy Director for Operations, the CMP—driven by expanding missions—is a "roadmap for a world-class institution."

In collaboration with LANL's operator, Triad National Security, LLC, the Laboratory's physical transformation will support work in all DOE missions: national security, science, energy, and environmental stewardship. Based on mission-driven priorities, the CMP informs NEPA compliance efforts and provides a baseline for effective space management and facility and infrastructure needs across multiple planning horizons.

This significant institutional planning effort is one of the prominent features of the 2021 Laboratory Agenda. The Laboratory Agenda is issued annually and provides a structured framework that identifies the critical outcomes, strategic initiatives, near-term research and development, and production and mission-support activities needed to accomplish the Laboratory's mission. It includes a section on Excellence in Mission Operations that establishes a commitment to "develop a comprehensive site plan that includes needs for future mission-relevant facilities, space, decontamination, and decommissioning, support infrastructure, and associated systems."

When Triad assumed management and operational control of the Laboratory, the new leadership team brought renewed commitments to mission execution, scientific, technological, and operational excellence. These commitments include improvements to the physical infrastructure that will be guided and driven by development of the Laboratory's first comprehensive site plan in more than two decades.

Drawing from current data provided by the Laboratory's business systems and multiple layers of condition analyses in GIS (Geographic Information System), the CMP enables an institutionally integrated approach to evaluating planning initiatives with development opportunities and constraints. By overlaying mission priorities and planning principles, the CMP offers a data-driven framework analysis for project development in near-, mid-, and long-term horizons. In addition to the application of new digital technology, the CMP presents the use of new construction tools and techniques including modular and prefabricated facilities. These tools and techniques have already been tested at the Laboratory, and new and expanded applications are underway.

Figure 3-A: Los Alamos Canyon Bridge and National Security Sciences Building at the Core Area

Beyond addressing facility and infrastructure needs, the plan has been developed as a communication tool across all divisions at the Laboratory and with federal stakeholders. Through early and extensive conversations with organizations across the Laboratory, the CMP created a collaborative and iterative process that would continue to inform the physical transformation of the site over time. Following the Laboratory Agenda initiative to promote organizational learning, the CMP introduces this process that will continue the dialogue between planners and organizational representatives to ensure that planning efforts reflect the most current needs and conditions of the institution.

affected the Laboratory. The first was expanding mission and the resulting increase in staff employment and pressing need for space. This issue led to a re-examined policy on leasing, which included a significantly broader reach geographically and resulted in new leased space in Santa Fe. The second (and unanticipated) event was the pandemic that started in 2020 and precipitated the Laboratory's resilient response with the implementation of several telework and hybrid models. At the same time, a new understanding of the overarching importance of addressing climate change drove a vigorous attention to energy conservation, sustainability and resilience, and support for a more deliberate approach to the distribution and aggregation of land uses, including their relation to transportation issues.

The CMP depicts four major planning areas based on aggregated capabilities and physical location: the Core Area, the Pajarito Corridor (East and West), the National Energetic and Engineering Weapons Campus (NEEWC), and the Los Alamos Neutron Science Center (LANSCE). Under Balance of Site, the CMP also addresses planning projects, site context, and considerations for the remaining portions of the entire site. The CMP adopts a vision for near-, mid-, and long-term planning horizons and identifies facility and infrastructure improvements integral to that vision. For each of the planning areas, the CMP depicts demolition and new construction for each of three timeframes: near term (within the next 10 years), midterm (10 to 20 years), and long term (beyond 20 years). To the extent known, NEPA considerations (including environmental/cultural resources and other constraints), utility infrastructure, and transportation needs are presented as a function of planning and siting for proposed facilities and infrastructure. The NEPA considerations are included to facilitate discussions that inform the CMP planning process and do not address the NEPA analysis or regulatory due diligence processes described under 10 CFR 1021: *National Environmental Policy Act Implementing Procedures (DOE, 2011, rev. 2021*).

The CMP is based on a highly transparent collaboration process that allows for evolving and increased integration with other planning processes and efforts under development. Other site goals and strategies will be integrated with the CMP process to inform, not execute or implement, future development. Specifically, CMP implementation will be coordinated with forthcoming planning efforts in the areas of Transportation and Utilities. The CMP may also be used to inform the regulatory due diligence processes required to analyze potential impacts associated with future operations, including development of a new Laboratory Site-Wide Environmental Impact Statement (SWEIS). These additional planning-related processes are considered important context for areas of the CMP and have been considered as integral parts of the planning framework for facility and infrastructure planning going forward.

The CMP, supported by new and evolving technology, is a living document with a transformative future. The final section of the plan, Campus Master Plan Implementation (Section 11), outlines the next steps as this planning process transitions from plan development to plan implementation.

4 INTRODUCTION TO THE LABORATORY

LANL is a multidisciplinary research institution engaged in strategic science on behalf of national security, applying world- class scientific and technical expertise to solve complex nuclear security and energy challenges.

The Laboratory is operated for the Department of Energy's National Nuclear Security Administration by Triad National Security, LLC, a national security science organization comprising three members: Battelle Memorial Institute, the Texas A&M University System, and the University of California.

The Laboratory enhances national security by ensuring the safety and reliability of the U.S. nuclear stockpile, developing technologies to reduce threats from weapons of mass destruction, and solving problems related to energy, environment, infrastructure, health, and global security.

4.1 History

LANL is located on the Pajarito Plateau, which was formed by volcanic eruptions 1.2 to 1.6 million years ago. Built on a series of mesas separated by deep canyons, the Laboratory spans elevations from 6,400 to 7,300 feet. The Pajarito Plateau is part of the Jemez Mountains—the southernmost extension of the Rocky Mountains. Although the topography provided the isolation and inaccessibility originally desired for a top-secret facility, it created physical constraints to development and future growth.

Archaeological and historical evidence of Native American residence in the area dates back to approximately the 10th century. Homesteading in the 19th and 20th centuries was largely for the purpose of summer grazing of livestock. In 1918, Detroit businessman Ashley Pond II founded the Los Alamos Ranch School, a boys' school named "Los Alamos" (Spanish for "the cottonwoods") after the trees that dominated the regional landscape. In 1942, the Department of War used the power of eminent domain to take over the school and other homesteads in the area to establish a secret location—known only as Site Y—for the Manhattan Project, whose single purpose was to design and build an atomic bomb. The Laboratory was established in 1943, and under the project leadership of General Leslie R. Groves and staff direction of J. Robert Oppenheimer, that purpose was accomplished in just 27 months. On July 16, 1945, the world's first atomic bomb was detonated 200 miles south of Los Alamos at Trinity Site on the Alamogordo Bombing Range.

Almost all Laboratory infrastructure—including roads, utilities, and housing—was built over a very short time to accommodate the scientists and many support staff at the site. At the time, few imagined that Los Alamos would become the permanent community it is today.

In 2018, Triad National Security, LLC, assumed management and operational control of the Laboratory, bringing renewed commitments to scientific, technological, and operational excellence. Triad and its new leadership team, headed by Dr. Thomas "Thom" Mason, the Laboratory's 12th director, also brought an invigorated dedication to regional relationships, investment in educational and economic development programs, and a focus and commitment to employees—emphasizing safety, mutual respect, and quality of the physical environment.

Today the Laboratory directly employs more than 13,000 people. The Laboratory has grown 14 percent during the past 5 years and anticipates employing more than 15,000 personnel by 2025. In a recent study, the University of New Mexico Bureau of Business and Economic Research found that the Laboratory was responsible for creating 24,169 New Mexico jobs through direct, indirect, and induced activities and contributing $3.1 billion per year to the New Mexico economy. This economic impact is largely concentrated within seven northern New Mexico

counties—Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos—with the greatest benefit going to Los Alamos, Rio Arriba, and Santa Fe Counties.

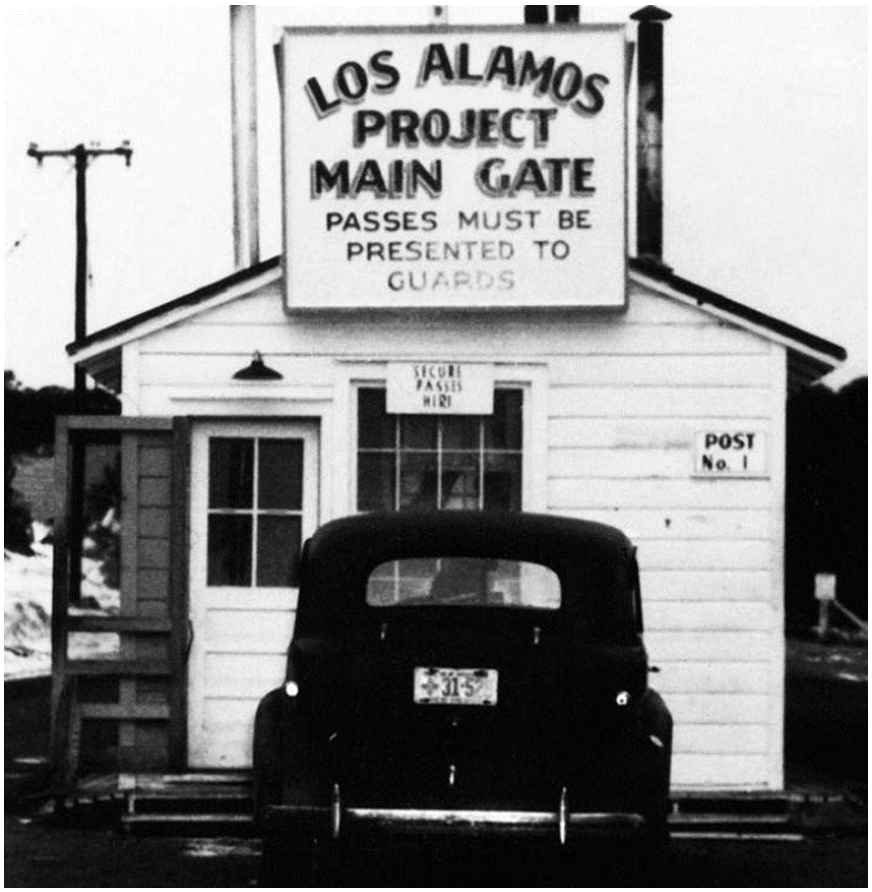

Figure 4-A: Photo of the original Los Alamos Project Main Gate

The site consists of nearly 40 square miles and contains just under 900 individual facilities, with 8.27 million gross square feet of building and $33.2 billion in replacement plant value. A significant portion of the portfolio is nearing end of life. The average age of facilities is 42 years. More than 30 percent of the portfolio is 61 years or older, and 56 percent is more than 50 years old.

With mission growth and increasing staffing, the Laboratory needs more than 1 million square feet of additional office and light laboratory space over the next 10 years to accommodate growth and replace aged facilities. The CMP projects approximately 2,400,000 gross square feet of new construction in the near term (next 10 years), coupled with over one million square feet in demolition of obsolete or excess facilities. Particular attention has been focused on eliminating high-risk, legacy-contaminated facilities; demolition also provides space for new construction on previously disturbed land.

Offsite leases have offered the opportunity to provide space with limited funding and fast turnaround. The Laboratory currently holds 42 leases totaling more than 405,104 square feet of office and storage space; however, approximately half of the leases are for class C (substandard) space. Most of these leases are located near the Laboratory—in Los Alamos, White Rock, and Santa Fe—with two facilities in Carlsbad, New Mexico.

The Laboratory continues to seek additional square footage in Santa Fe for light laboratory and possibly warehouse lease options.

Approximately 26 percent of all Laboratory employees live in Santa Fe. Housing opportunities are extremely limited in Los Alamos County (LAC); however, residential construction—especially in the rental market—is experiencing significant growth in Santa Fe. The combination of increased hiring at LANL and more opportunities for housing in Santa Fe lend added support to the Laboratory's expanded presence in the capitol city. To date, LANL's leased space in Santa Fe is 100 percent office use. The new leased space, coupled with new onsite construction, supports accelerated demolition of aged facilities. The CMP presents a facilities and infrastructure plan that details demolition, recapitalization, and new construction over the near, mid, and long terms.

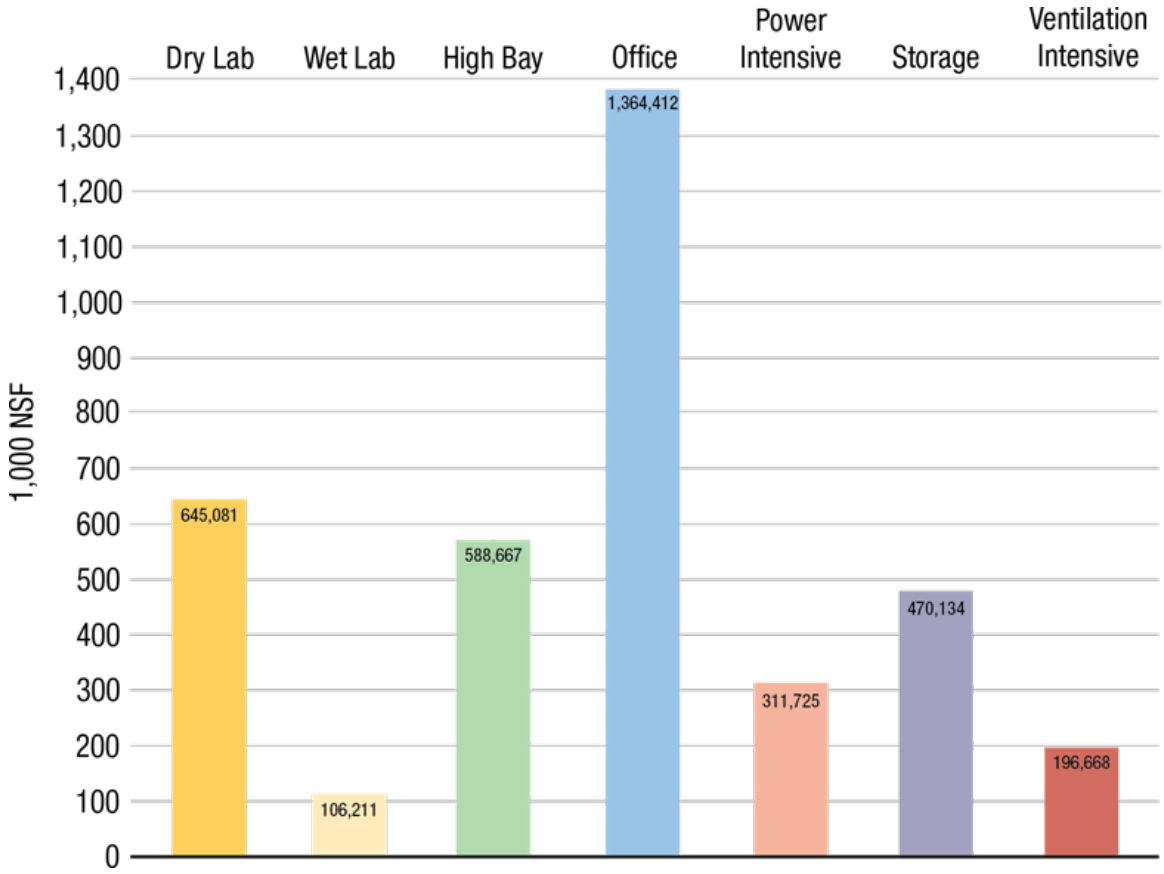

Figure 4-B: Overall Space Type Summary

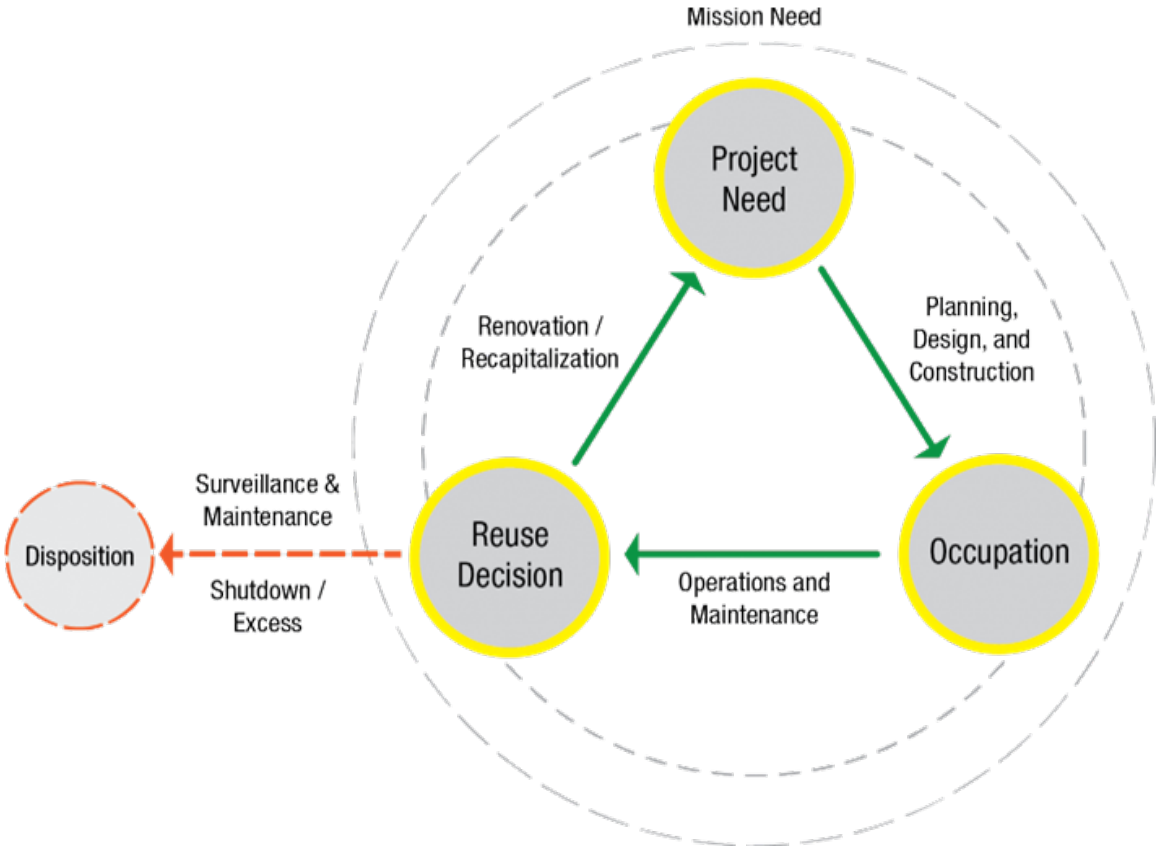

Figure 4-C: Individual Facility Planning Process Overview

5 PLANNING CONSIDERATIONS

5.1 Planning Principles

Key planning principles outlined in this section are specific to the Laboratory's unique history, mission, operations, and site conditions. These principles come together to inspire and inform the Laboratory's future growth as presented in the CMP; they were used to develop the CMP and will be used to guide future implementation of the plan.

The CMP establishes an ongoing, collaborative process that enables it to be responsive to current needs while evolving as necessary over time. Changes in mission, operational requirements, and site conditions are inevitable. The CMP is designed to be responsive to these changes through a robust and resilient planning process that builds meaningful partnerships with stakeholders key to mission execution and site operations. The overall process is rooted in key planning principles that serve to focus and guide the purpose and function of the CMP.

The following key planning principles have been used for CMP development:

- Aspire to excellence in implementing the CMP vision
- Ensure that near-term actions are consistent with long-term institutional goals and objectives
- Balance the needs and interests of individual organizations with the best interests of the institution as a whole
- Collaborate with stakeholders through effective communication that ensures the use of multiple, expert perspectives to inform planning decisions
- Enhance the quality of work environments—indoors and out
- Enable change through flexibility, transparency, and resilience
- Commit to planning that appropriately considers environmental stewardship, sustainability, and resilience.

5.2 Planning Process

A new planning process was required to develop the Laboratory's CMP. Key to development of the CMP was establishing an integrated, transparent, and repeatable process to collect and analyze infrastructure data and needs, evaluate opportunities and constraints, and iterate planning solutions to accomplish the following:

- Address current and future DOE, NNSA, and NA-LA mission needs and requirements
- Enable effective and efficient execution of the Laboratory's near-, mid-, and long-term mission, operational requirements, and site stewardship responsibilities
- Provide a well-communicated, integrated, efficient, and sustainable comprehensive site planning capability
- Integrate the site planning process with other institutional site-management and operations processes and systems,
- Generate high-quality, robust, flexible, and easily accessible planning products (e.g., area plans, databases, planning tools)
- Integrate, as appropriate, with key planning efforts of other regional entities (e.g., counties, Native American Pueblos, municipalities, and federal agencies)

This process is a multi-faceted and repeatable capability that integrates the site land-use planning framework, stakeholder engagement, considerations for operational and regulatory processes, and application of advanced technologies. The following sections provide a summary of the key elements of this process.

Figure 5-A: LANL planning principles

Land-Use Planning Framework

infrastructure to ensure reliable and efficient alignment with operational security and safety requirements. Finally, land use must be appropriately aligned with the specific opportunities and constraints (e.g., topography, environmental, and utilities) that define the site conditions that establish requirements for land use in a particular area.

Repeatable Process

Planning is a dynamic process and must be repeatable and revisited regularly as mission and planning needs change. The CMP process anticipates ongoing interface at the executive level and with operational and regulatory SMEs at least one or two times per year to validate assumptions and needs and to review the plan. The review will occur at regularly scheduled intervals to align with other processes such as annual programming and budgeting, NNSA infrastructure planning, project calls, and other contract deliverables.

Executive Level Input

The most important goal of the CMP is to develop a facilities and infrastructure plan that supports the needs of the Laboratory's missions. To ensure that mission infrastructure needs are well understood, the planning process engages all levels of Laboratory senior management, starting at the division level and working upward. Leadership strategic reviews/planning sessions are used to gather critical site-development and infrastructure requirements from the institutional organizations responsible for executing mission work. These reviews also provide a venue for using the comprehensive site planning process to resolve site and infrastructure investment issues through the development of the plan. As the information is collected and analyzed for inclusion in the plan, contributing organizations provide concurrence that the information as presented in the CMP is accurate and representative and addresses their organizational requirements and needs. This approach involves multiple internal stakeholder groups, including associate laboratory directors, chief operating officers, program and office directors, and designated division leaders.

Operational and Regulatory Integration

Another part of the planning process is considering functional and operational infrastructure needs and how those support mission execution. Functional and operational reviews/planning sessions are used to gather and evaluate organizational planning and infrastructure information and to help integrate land-use, utilities and transportation, and space-management planning across the site. Other functional and operational reviews involve SMEs and target regulatory compliance to ensure that applicable requirements and site stewardship responsibilities have been appropriately considered' however, the CMP and associated planning process are not intended to provide the operational and regulatory due diligence required for actual program and project execution.

By using the new integrated planning process, the Laboratory is able to easily maintain and update the CMP. This updated CMP will ensure that plans for facilities and infrastructure needed to support missions are thoroughly evaluated, organized, and communicated in a manner that enables timely decisions, prioritization, funding, and execution.

Figure 5-B: View of Pajarito Corridor looking southeast

The Laboratory site consists of nearly 40 square miles. The size alone presents certain opportunities for development; however, many operations and functions are necessarily land-consuming. Constraints to development are both man-made and natural and are a key consideration in making decisions regarding the location (siting) and timing of future development. Man- made constraints include programmatic priorities; funding and schedule constraints; existing buildings, roads, and utilities; natural, historical, and archaeological resources; Consent Order PRSs; unexploded ordnance; buffer requirements for experiments and testing; and competing needs for space. Policy constraints—including security needs—are also critical and may be overriding. Some of the key environmental constraints to development include topography, fault lines and seismic sensitivity, wetlands and watercourses, and endangered species habitats.

Some of these constraints are fixed and unalterable, precluding development or redevelopment at a specific location. These constraints may be policy-based, legally restrained, cost prohibitive, or simply impractical. Elsewhere, further exploration might be needed to assess possible changes in circumstances, whether new information has become available or if sufficient mitigation can be achieved for consideration of development at a specific site.

As previously cited, within the land-use planning framework, numerous variables enter into all siting decisions. The CMP functions as a tool for high-level analysis and initial siting implemented through the Laboratory's site

planning procedure (P941, *Site Planning*). P941 is the institutional procedure for implementing comprehensive site planning, not program or project execution, and the governing policy for developing and implementing the CMP (see Section 9.2). The purpose of P941 is to formalize the integration and definition of requirements and processes that, when implemented, enable and ensure that LANL programs, projects, and operations are effectively planned to achieve successful, compliant, productive, safe, secure, and efficient land, infrastructure, and facility use. Through P941, the Laboratory uses a site-configuration management process (AP-941-100, *Site Selection*) to identify specific locations or relocations for new or existing/expanded facilities. This process engages SMEs across multiple disciplines and facilitates an integrated approach to considering requirements, opportunities, and constraints. The siting process implements the CMP by

- facilitating an integrated institutional planning framework;
- evaluating alternatives;
- ensuring appropriate and consistent land use;
- protecting against unauthorized encroachments, and
- appropriately considering requirements for complying with federal, state, and contractual legal obligations.

The CMP provides layered levels of information across various areas of expertise and interest at the Laboratory, and in so doing, emphasizes organizational learning and improved integrated planning across mission activities and infrastructure.

5.4 Sustainability & Resilience

5.4.1 *Sustainability*

Sustainability is an institutional initiative and is not intended to be directly managed or implemented through the CMP. Pursuant to NNSA's SD 430.1, *Real Property Asset Management Supplemental Directive* (1-18-17) site planning and budgeting requirements, Section 6.a(4), the CMP has been developed while considering other existing site organizations, programs, policies, and processes such as sustainability planning and management for the Laboratory.

The Laboratory's sustainability efforts and goals align with Executive Order (EO) 13834, *Efficient Federal Operations*, which requires agencies to prioritize actions that enable them to more effectively accomplish their missions, cut costs, reduce waste, and enhance the resilience of federal infrastructure and operations. The Laboratory's primary goals for sustainability are conserving natural resources; minimizing energy use, especially for heating, cooling, and lighting; and ensuring that built systems provide efficient maintenance and operations performance capabilities. Sustainable building design has been shown to correlate with increased employee productivity and creativity as well as improved mental and physical health.

In response to national goals and policies and DOE directives pertaining to climate change, the Laboratory is developing a broad approach to sustainability. In 2021, the Biden-Harris Administration's EO 14008, *Tackling the Climate Crisis at Home and Abroad*, established climate considerations as an essential element of national security and initiated multiple sustainability goals that will be addressed across the site. The CMP highlights upgrades already in development to meet this EO. Key initiatives include the following:

Photovoltaic Array

This photovoltaic (PV) array will come online in 2023/2024 and will provide 10 MW of solar energy to the campus. NNSA will contract with the Western Area Power Administration using a power purchase agreement so that the Laboratory can purchase the solar energy. The array will be located on a brownfield site in TA-16.

Steam Plant

The combination of the heat recovery steam generator (HRSG) and the organic rankine carbon system (ORC) at the Steam Plant (TA-03-0022) will allow LANL to capture waste heat (0.5 trillion BTUs/year) and heat the TA-03 area instead of using steam.When heat is not needed, the ORC will turn unused heat energy into electric energy for use.

Sustainable Transportation

The Laboratory is working on several different parking/commuting alternatives to meet mission growth of the Pajarito Corridor in a sustainable way. These initiatives include traffic analysis based on real-time monitoring to allow data-driven evaluation of initiatives and commuter incentive programs that encourage carpooling, mass-transit, remote-parking, bicycling, and pedestrian modes of transportation. In addition, the Laboratory is a key stakeholder in new regional transportation partnerships to increase mass-transit and alternative-transit options. These initiatives include conversion to an all-electric fleet with multiple charging-station locations, a larger transit center that includes more bus routes, and pedestrian and bicycle paths around campus.

Sustainable Buildings

The Laboratory plans to continue its efforts to evaluate existing buildings, implement water and energy-savings measures,install utility meters, and certify buildings as Sustainable Federal Buildings. This endeavor is challenging because of the age of the existing buildings and construction impacts to tenants and ongoing work in the facilities. There is a renewed focus on sustainable design for new construction, and updated design standards are in place to meet 2020 Guiding Principles for Sustainable Buildings. Additionally, new processes, policies, and resources are being developed to ensure that the new facilities are sustainably built, with an emphasis on life-cycle cost, resilience, and adaptability.

As the Laboratory works to eliminate or significantly reduce carbon emissions to achieve net-zero emissions and 100 percent renewable energy by 2050, it will be important to consider total life cycle for carbon emissions—from embodied carbon, which is emitted during extraction, manufacture, transportation, and construction of buildings; to operational carbon, which is emitted during daily use of facilities through energy consumption; to end-of-life carbon, which is emitted during demolition, transport, and processing—typically in landfills.

Along with the initiatives previously mentioned, other strategies for consideration include the following:

- Participation in the market for goods and services, such as power purchasing for PV/wind
- Modernization of existing facilities heat generation formed by non-carbon sources
- Additional onsite PV power generation
- Technological integration with transportation planning
- Employee incentive programs to lower carbon commuting alternatives
- Reduction of onsite travel through land-use planning strategies and techniques
- Support of transit options and associated infrastructure
- Long-term conversion to all-electric heat utilization
- Grid harmonization
- Consideration of total life cycle carbon emissions in carbon calculations
- Increased awareness of materials used in construction
- Design for reuse
- Rehabilitation of existing facilities for carbon reduction
- Decision-making approach that balances environmental values with cost- saving goals

The Laboratory publishes an annual Site Sustainability Plan (SSP) to document and describe programs and projects planned or underway to facilitate mission execution while maintaining the highest standards of environmental and economic sustainability. The SSP also provides transparent tracking of progress through various metrics.

In addition, pursuant to the requirements of DOE Order 436.1, *Departmental Sustainability*, the Laboratory uses an environmental management system (EMS), certified under International Organization for Standardization (ISO) 14001:2004, to establish objectives to improve compliance, reduce environmental impacts, increase operational capacities, and meet long-term sustainability goals. The CMP development process closely coordinates with the SSP and EMS processes to ensure that sustainability principles are integrated into the Laboratory's outyear plans.

5.4.2 *Climate Adaptation & Resilience Planning*

Climate adaptation and resilience planning is an institutional initiative and is not intended to be directly managed or implemented through the CMP. Pursuant to NNSA's SD 430.1, *Real Property Asset Management Supplemental Directive* (1-18-17) site planning and budgeting requirements, Section 6.a(4), the CMP has been developed while considering other existing site organizations, programs, policies, and processes such as climate adaptation and resilience planning.

The Laboratory has made improvements toward energy and water conservation, utility metering, water system leak detection, and building controls to ensure enduring benefits. The sitewide EMS guides operational practices in environmental and sustainability compliance, emergency preparedness and response, and wildland fire mitigation.

In compliance with DOE Order 150.1, *Continuity Programs*, the Laboratory's Continuity of Operations Program guides planning and investment in the following topic areas:

- Protecting special nuclear material
- Ensuring the Response Team's capability
- Ensuring that asset teams have the ability to provide rapid response for the national intelligence community, Homeland Security, and national emergency response organizations—both nationally and internationally
- Ensuring the availability of communications capabilities/systems
- Ensuring uninterrupted utilities
- Ensuring Emergency Operations (first responders)

In partnership with LAC, the U.S. Forest Service (USFS), and adjacent wholesale utilities providers, the Laboratory has provisions for

- mutual aid,
- a diversified portfolio of power-supply sources and onsite generation,
- dual-fuel heating for the TA-03 campus,
- multiple transmission and distribution pathways,
- networked water and gas distribution systems,
- extensive elevated water storage and local groundwater supply,
- extensive provision for emergency generator backup power for essential utility functions and critical facilities, and
- installed wastewater equalization storage.

Furthermore, the Laboratory is designated as a Defense Critical Electrical Infrastructure site.

In 2017, the Laboratory developed a conceptual model of climate change impacts, which established specific indices of climate change in Los Alamos and provided a framework to determine climate change vulnerabilities and assess risk. The model did not consider the effects of climate stressors on all critical assets and infrastructure or propose resilience actions; however, the Laboratory is now developing a sitewide climate change vulnerability assessment and resilience plan in response to the *2021 DOE Climate Adaptation and Resilience Plan*, as outlined in EO 14008, *Tackling the Climate Crisis at Home and Abroad*.

For the purpose of this assessment, resilience is defined as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions through adaptable and holistic planning and technical solutions." The associated resilience plan will determine possible actions for identified climate hazards and the associated activities to mitigate the impacts of unplanned disruptions associated with the Laboratory's critical assets and infrastructure, including the known barriers to implementation.

The Laboratory will engage SMEs who have broad expertise in operations and overall mission to develop the proposed assessment and resilience plan. Through the assessment, the Laboratory will complete the following:

- Identify critical assets and critical infrastructure
- Identify and characterize the likelihood of projected climate impacts
- Characterize current and projected impacts of climate hazards on critical assets and infrastructure
- Characterize site vulnerabilities using a risk matrix
- Identify, assess, and build a portfolio of resilience actions

Once complete, the assessment and resilience plan will be updated on a 4-year rotation, as specified by DOE. Projects identified through this process will be incorporated into the CMP as applicable. In the immediate term, the Laboratory is already pursuing resilience measures associated with its utility assets, such as the electrical system. The new PV array at TA-16 (Section 5.4.1) is designed to ensure electrical availability and provide onsite renewable energy production. The PV array will address potential hazards to the electrical system such as heat, drought, and wildfires.

5.5 Design Principles

5.5.1 *Site Design & Low Impact Development*

A well-designed site is cost effective, resource conserving, and safe and creates a visually appealing environment. A well-designed site starts with site selection (see Sections 5.2 and 5.3), which is a function of availability, adjacency to functional uses, and relation to natural and man-made site conditions. These features include topography and drainage, existing and proposed circulation, and existing and proposed utilities infrastructure. The CMP supports clarification, enhancement, and streamlining of the existing site-approval process, which nonetheless relies on established principles and goals.

The following principles are the foundation for Site Design Guidelines:

- Implement the Laboratory's desire to create a true campus core and an attractive cohesive site
- Establish clear and attractive entrances and effective way-finding systems
- Enhance functional relationships among users through informed land-use and siting decisions
- Incorporate security, safety, and environmental needs early in project planning
- Incorporate Low Impact Development (LID)/Green Infrastructure (GI) standards for storm water management to the greatest extent possible

- Promote a Complete Streets approach to circulation and mobility
- Establish a Laboratory-wide approach to environmental planning, including documentation and remediation
- Incorporate environmental, historical, and cultural resources protection considerations and processes at the beginning of all site planning
- processes
- Establish and use consistent design palettes for buildings, landscapes, site furnishings, and lighting
- Develop a transit system and related facilities that improve circulation
- within the Laboratory and link with LAC and other regional transit systems
- Adopt effective development standards that will be consistently applied to all construction and redevelopment at LANL

Physical and environmental considerations for site design include the following:

- Topography
- Circulation
- Solar orientation
- Seismic potential and fault lines
- Floodplains and wetlands/storm water best management practices (BMPs)
- Wildlife habitat and buffer areas
- Other culturally or environmentally sensitive areas
- Consent Order PRSs

Operational and programmatic considerations for site design include the following:

- Safety needs
- Security needs
- Hazardous operations and safety buffer zones
- Proximity needs for functional relationships
- Transport of nuclear waste concerns
- Regional interests coordination

Additionally, the CMP supports the establishment of clear points of arrival and effective way-finding systems for the Laboratory, including creation of a new and iconic gateway.

5.5.2 *Architectural Design*

The CMP promotes principles of unified architectural design to establish a cohesive and attractive appearance throughout the Laboratory. A visually coordinated complex of structures also contributes to enhanced way-finding and safety and security goals.

Unifying architectural design elements include the following:

- An adopted base and accent color palette
- A combination of durable natural materials such as stone, with industrialized materials such as steel, glass, and aluminum
- Metallic material used as architectural accents

- A consistent palette of outdoor lighting fixtures
- Clearly defined entrances
- Demonstrated leadership in the use of low-carbon construction materials and methods
- Re-examined cost/benefit of Leadership in Energy and Environmental Design (LEED) implementation processes and certification.

Because of the unique nature of certain Laboratory facilities, a single set of standards is neither appropriate nor desirable. The principles provided in the CMP are guiding and general in nature and should be applied as appropriate and to the extent possible. The CMP establishes architectural design standards to be adopted by the Laboratory in the near future; these standards will govern the construction and remodeling of Laboratory facilities and infrastructure.

Architectural design must also incorporate sustainability principles. Sustainability guidelines at the Laboratory focus on reducing operational emissions, including the energy/carbon implications of the whole life cycle of constructing, managing, and demolishing buildings and other infrastructure.

The following principles are the foundation for the Architectural Design Guidelines:

- Building design should reflect the science and technology environment of the Laboratory while relating to the climate and aesthetics of the Southwest and New Mexico.
- Buildings should incorporate energy and resource conservation materials and systems.
- Architectural design controls should be used to promote visual clarity and cohesiveness within each planning area and for the entire site.
- Building design should incorporate low-maintenance, fire-resistant materials.
- Buildings should be designed to have flexible space to accommodate changes in use or function.
- Building massing should be consistent with established and regional architectural models with strong primary massing, a predominance of wall over windows.

5.5.3 *Landscape Design*

The principles of landscape design are closely tied to those of site design. Similar to a unifying approach for architectural design, landscape development should create an attractive and cohesive appearance throughout the Laboratory and contribute to way finding and safety and security goals. Recognizing that the Laboratory covers nearly 40 square miles of area—with a variety of functions, development intensity, and environmental conditions— the plan does not advocate for any one type or approach to landscape design. Multiple different styles and degrees of formality will be appropriate across the site. TA-03 will be the most formally developed area as appropriate to the most urban conditions. At the other end of the design spectrum, some areas will and should remain primarily rural in character while adhering to good storm water and other environmental practices and attention to all primary modes of circulation. The CMP anticipates that landscape design standards will be adopted by LANL in the near future and will apply to all development throughout the Laboratory.

The following principles are the foundation for the Landscape Design Guidelines:

- Landscape development should create attractive and practical outdoor environments that promote way finding and provide usable and enjoyable outdoor space.
- Landscape elements should be selected based on the rural or urban development character of the project site.
- Landscape design should integrate sites with adjacent environments and create appropriate transitions to natural environments.

- Landscape design should support sustainability principles through improved water quality, erosion control, and energy conservation.
- Landscape development should integrate the principles of LID/GI to the greatest extent possible:
  - Conserve natural areas wherever possible (e.g., reserve paving for parking areas and walkways)
  - Minimize the development impact on hydrology
  - Maintain runoff rate and duration from the site
  - Scatter LID/GI practices throughout the site; LID/GI practices are decentralized, microscale controls that infiltrate, store, evaporate, and/ or detain runoff close to the source
  - Implement pollution prevention, proper maintenance, and education/ training programs
- Landscape design should enhance the natural landscape and promote the use of native, drought-tolerant, and low-maintenance plants
- Landscape design should accommodate security needs
- Landscape elements should provide shade as needed to mitigate heat
- island effects, to provide cooling for buildings, and to create comfortable and attractive outdoor environments for pedestrians
- Landscape design should protect and support wildlife and pollinator habitats and corridors to the extent practical
- Landscape design and site development should adhere to a consistent site furnishings palette for style, color, and materials
- Landscape design should follow the accepted principles of Xeriscape:
  - Plan and design for water conservation
  - Improve the soil
  - Limit turf area
  - Irrigate efficiently
  - Select appropriate plants by hydro-zone
  - Mulch to reduce evaporation
  - Perform routine maintenance

5.5.4 *Modular & Prefabricated Construction*

Modular design and offsite prefabrication methodologies can help mitigate risk associated with complex logistics and the relatively high costs of onsite construction at the Laboratory. These methodologies can also represent increased efficiencies in procurement, approvals, and construction time to help reduce overall planning, design, and construction durations and costs of a project. This CMP combines lessons learned from recent modular building projects with additional research into modular vendors and prefabricated construction materials to establish a set of principles and goals.

The following principles are the foundation for incorporating modular and prefabricated construction methods into facility planning and design activities:

- Bolster the design principles and guidelines stated in other portions of this CMP
- Integrate planning between LANL Engineering, the design team, and modular vendors to simplify production and installation activities

- Provide modular component arrangements that offer scalability (scope upsizing/downsizing) to address funding availability and limitations
- Integrate utility distribution systems in modular planning to optimize performance, reduce energy consumption, and meet specific end-user functional requirements
- Create modular planning solutions and standardized kit-of-parts design elements that can be deployed across multiple site locations
- Prioritize offsite prefabrication wherever possible to
  - control construction costs;
  - limit onsite construction activities;
  - allow for repetition of modular components to help accelerate construction durations;
  - lessen onsite safety risks, traffic, and disruptions;
  - reduce negative impacts from inclement weather;
  - reduce construction waste; and
  - improve quality in factory-controlled environments.
- Standardize the planning of modules to support future facility re-use, reconfiguration, and expandability

6 TRANSPORTATION

6.1 Transportation Overview

As the CMP continues to evolve over time, the Laboratory will develop a comprehensive transportation plan with both onsite and regional perspectives (see Section 11 Campus Master Plan Implementation). The transportation plan—executed in collaboration with internal, local, and regional partners—will assess and analyze the full range of transportation issues and consider multiple perspectives, alternative solutions, and implementation strategies.

Some of the challenges to transportation planning are unique to the Laboratory. The original site was chosen in large part for its remoteness, which has contributed to many of the transportation difficulties to date. The complexity of transportation requirements is compounded by the geography at LANL. Long, often-narrow mesas separated by deep, steep-sided canyons present a serious difficulty to forming a network of travel options. In addition, approximately 60 percent of Laboratory employees live outside the immediate area, and the majority drive private vehicles to the site. Recent accelerated hiring has increased congestion both onsite and offsite, especially at peak travel times.

The COVID-19 pandemic of 2020 elicited a range of adaptive responses by the Laboratory, some of which have had a direct impact on transportation issues, including

- a telework pilot program that shifted 1,400 employees to a hybrid work mode,
- reconfiguration of three major office buildings to collaboration and hoteling space for teleworkers, and
- a significant increase in offsite lease space.

These efforts, which may be expanded in the future, have reduced onsite traffic and parking demands, particularly in the Core Area. Federal policy changes are also anticipated to have a significant impact on the Laboratory's transportation planning, including directives to implement clean-energy technologies and electric vehicles. It remains to be seen how these and other changes will impact Laboratory operations and future transportation planning.

The CMP has identified issues specific to the Laboratory that the transportation plan will need to address, including the following:

- Safe and efficient accommodation of large numbers of craft and construction workers needed to build the facilities and infrastructure anticipated in the CMP
- A long-term solution to structural issues of the Los Alamos Canyon (Omega) bridge
- A new Gateway to the Laboratory and improved arrival experience as a reflection of LANL's history, landscape, culture, and role on the national security stage
- Balance of security needs/access (public and private) and assurance that all security needs are fully met
- The role of transit (typically buses) and related opportunities both onsite and offsite
- Design and viability of a new transit center
- Feasibility and desirability of locating certain facilities offsite; these could include the Badge Office, the Bradbury Museum, training centers, and the wellness facility and the implications for transportation
- Travel demand and parking-management strategies geared to Laboratory demographics
- Sustainability regarding many aspects of transportation, especially the role of transportation in reducing greenhouse gas emissions (see also Section 5.4.1)
- Funding options and opportunities

The CMP's aggregation of land uses—in combination with other facility and technological improvements—seeks to reduce the need for onsite travel. Transportation planning emphasizes the direct relation between onsite land-use planning and the role of transportation. To that end, the CMP will study and propose incentives to reduce single-occupant vehicle trips, improve mode- to-mode transfers, and look at alternatives for onsite travel, including bicycle (and electric bicycle) sharing programs, remote parking, an improved pedestrian experience, and full accessibility.

6.2 Vision & Themes

The Laboratory's vision for the future of its campus is focused on five overarching transportation themes. As with all aspects of the CMP, the ultimate goal of transportation is to enable and support the Laboratory mission. In that regard, key themes are as follows:

Safety

Emergency response capability and traveler safety will be the Laboratory's highest transportation priorities and starting points for all planning and design decision-making.

Multimodal Transportation

The Laboratory will employ a strategic approach to transportation that balances capacity and convenient routing across all modes of travel—pedestrian; bicycle, including scooters and e-bikes; cars; and various modes of transit, including vans and buses. The Laboratory will work to reduce dependency on single-occupant (drive-alone) vehicle travel to facilitate the best use of land area and to constrain infrastructure costs.

Sustainability and Resilience

Transportation decision-making will consider sustainability and resilience, with particular emphasis on reducing greenhouse gas emissions from mobile sources traveling around, to, and from the campus. The Laboratory will apply a resilient approach in promoting design decisions in anticipation of the need and the means of travel, including both long-term conditions and emergencies.

Appealing Work Environment

The Laboratory's continued mission success depends on the ability to attract the best, most talented, and committed scientists and other professionals. Strategic transportation planning and design will play a key role in improving the quality, convenience, and safety of the Laboratory's work environment in support of recruitment, retention, and productivity of the workforce.

Demand Management

The Laboratory's campus transportation system cannot rely solely on continual increases in transportation capacity. LANL will rely on strategic management of travel demand to limit the need for growth in vehicular parking supply, to limit growth in traffic, to balance travel demand across modes, and to constrain capital and operating costs.

Elements of transportation planning of the CMP include the following:

- Pedestrian environment
- Convenient transit
- Safe, low-speed streets

- Parking management
- Bike and roll network

6.3 Pedestrian Environment

The CMP presents the Laboratory campus as a highly walkable, pedestrian-oriented place where workers will find routine walking for access, exercise, and refreshment to be safe, convenient, and appealing. A high-quality pedestrian environment is a function of street and walkway design that includes a variety of outdoor spaces, safe and easy access to destinations, and integrated intersections designed for safe and comfortable crossings. Planning for the pedestrian environment will lead to the following intended outcomes:

- Universal accessibility for persons of all abilities, including full compliance with design requirements of the Americans with Disabilities Act (ADA)
- Improved pedestrian safety
- Reduced percentage of short trips made by driving
- Increased reliance on transit for longer trips
- Improved productivity and personal health of workers
- Increased attractiveness of the LANL campus to a talented workforce
- Increased vitality of the campus landscape by increasing the number of people moving about

6.4 Transit

Commuting issues have their own complexities and will require coordinated strategies with onsite issues. Currently, nearly 60 percent of Laboratory employees live outside the immediate area. Only 42 percent of employees live in Los Alamos or White Rock; 26 percent live in Santa Fe, 18 percent live in Española, 7 percent live in the Albuquerque area, and 2 percent live in Taos. As new employment continues to grow, the Laboratory anticipates that residence distribution will closely mimic that of the current condition. Transportation planning will identify strategies to increase the utilization of transit services for travel to and from the Laboratory's campus (commuter transit) and utilization of on-campus circulation. The Laboratory will partner with local and regional transit providers to promote efficient and optimal transit services to and from the site. Transit facility and service development—both regionally and onsite—will lead to the following intended outcomes:

- Significantly increased commuter transit ridership, slowing the rate of growth in parking demand and traffic
- Implementation of campus circulator transit, reducing short, on-campus driving trips and accelerating walking trips between campus locations
- Reduction in traffic on LANL streets, preserving capacity for growth

6.5 Streets

The Laboratory will work to improve the street network on its campus so that the streets accommodate reasonably unimpeded traffic flow but also ensure safe, low-speed travel. The Laboratory will implement a Complete Streets approach to the greatest degree practical, such that streets are designed for safe, convenient, and comfortable travel for all modes and for all abilities—pedestrian, bike, other rolling modes,* cars, and larger motor vehicles such as buses. Street planning will be coordinated with planning and integrated with storm water–management techniques and applications for enhanced environmental outcomes and improved aesthetics. Street design and improvement efforts will lead to the following intended outcomes:

- Reduced rate of traffic crashes between vehicles, between vehicles and pedestrians, and between vehicles and persons using rolling modes[1]
- Reduced rate of crashes that result in injuries and fatalities
- Reliable traffic circulation and flow, measured in terms of average vehicular delay during peak travel periods
- Direct access to all buildings and areas of campus by emergency services
- A street network that can support expeditious evacuation of the campus if needed in response to natural or man-made disasters
- Responsible stewardship of the Laboratory's environmental resources
- A more attractive campus

6.6 Parking Management

Parking shortages in the most heavily developed areas of the Laboratory have been a perennial issue. The Laboratory recognizes that this problem is not isolated and that no single solution exists; therefore, the Laboratory will manage the issue on multiple fronts. A new transportation plan will examine ways to increase transit use and reduce single-occupant vehicle commuting. Institutional policies will explore the future of telework and expanded opportunities for offsite space accommodations. Onsite, the development and utilization of vehicle parking systems will lead to the following intended outcomes:

- Minimized parking construction, operations, and maintenance costs
- Reduction in onsite parking demand, reducing land area requirements for parking
- Efficient utilization of campus land area
- Reduced peak-hour traffic congestion and delay
- Improved employee satisfaction

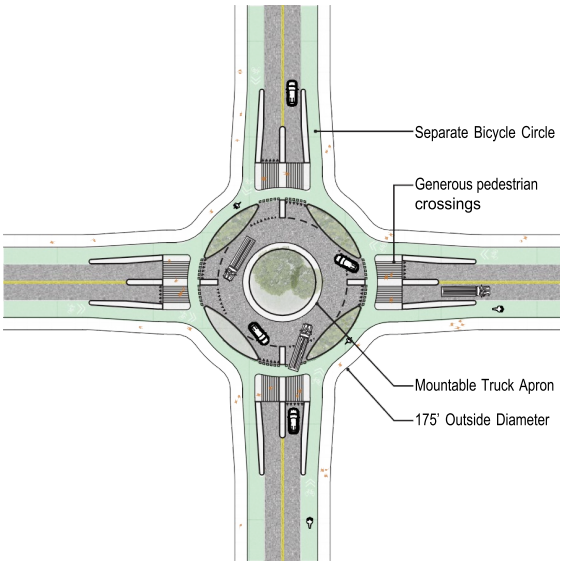

Figure 6-A: Proposed single lane roundabout

[1] Rolling modes: A human-powered category that encompasses bicycles, scooters, skates, boards, and other means of human-powered movement, including motorized personal vehicles such as electric bikes and scooters.

Figure 6-B: Road section diagram—campus arterial road.

The Laboratory will support various rolling modes as alternatives to single-occupancy vehicles. This form of transportation includes human-powered modes such as bicycles, scooters, skates, boards, and other devices with electric support. This mode of travel can be most convenient for trips that might be too long or time-consuming for walking and short enough so that driving would present its own inconveniences, such as accessing a vehicle, parking at the destination, and parking upon return. Advantages of a rolling mode could include easier access to the bike or other mobile device, easier parking, and the enjoyment of an outdoor excursion. As more people become accustomed to this alternative means of transport, the use of this mode will increase. The Laboratory will work to improve the bike-and-roll network on its campus to achieve the following intended outcomes:

- Reduced percentage of short trips made by driving
- Improved productivity and personal health of workers
- Increased attractiveness of the campus to a talented workforce
- Visible increase in the number of people biking and rolling about on the campus landscape

6.8 Looking Forward

Transportation planning continues to be integrated with the institutional processes that enable implementation of the CMP. As transportation planning proceeds, it is important to recognize the wide range of development models at LANL and their implications for transportation. These models vary, from the unique security environment at TA-55 and dense urban core at TA-3 to more remote employment and activity centers such as LANSCE at TA-53 and the West Pajarito Corridor; to mini-campuses within the highly developed areas and at more outlying locations such as TA-16, -46, and -33; and to the rural and undeveloped areas within the NEEWC. Each of these areas has its own needs for access, security, recreation, and travel needs within itself and to and from other locations.

Figure 6-C: Road section diagram—LANL engineering standard.

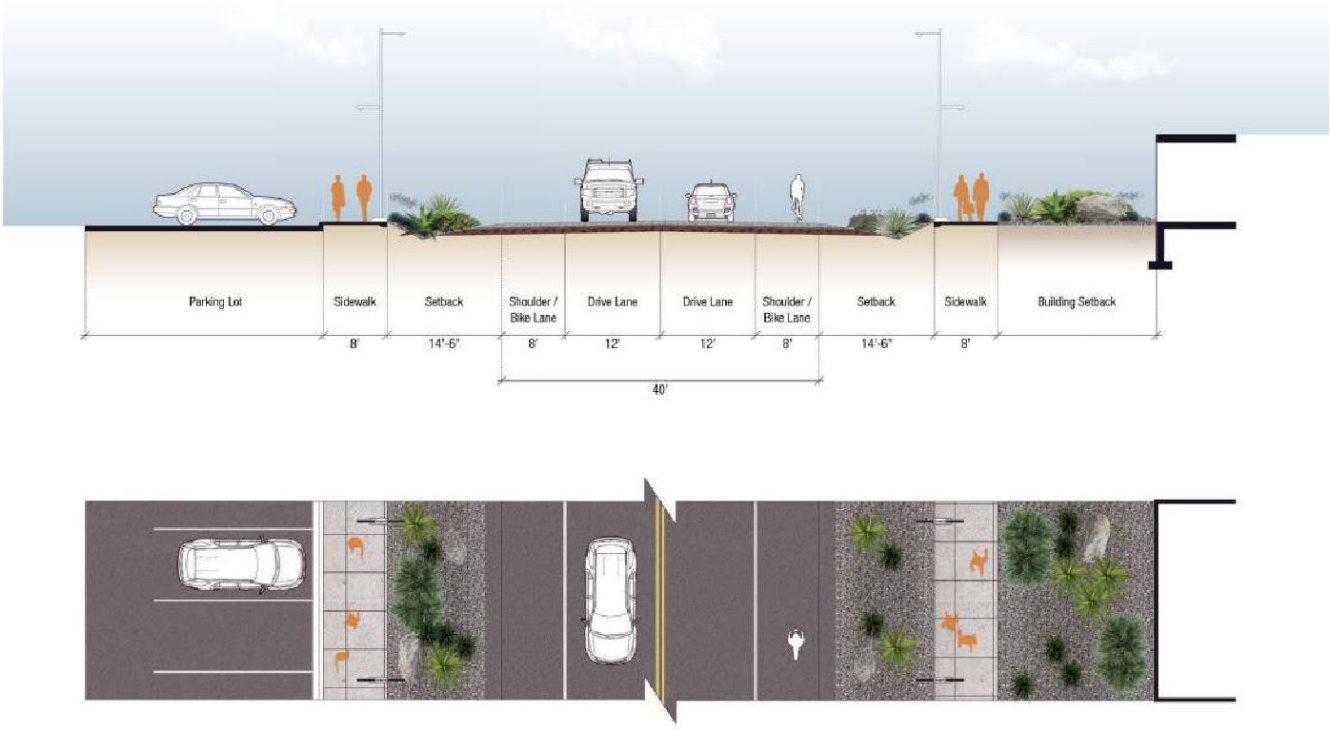

Figure 6-D: Road section diagram—campus collector road.

7 UTILITIES

7.1 Utilities Overview

LANL manages all utility systems that serve programmatic mission needs. These systems include water, wastewater, natural gas, electric power, heating steam, telecommunications, and radioactive liquid waste.

7.2 Water

The water production/transmission system for all of LAC, including the Laboratory, is owned and operated by the county LAC supplies water from wells to primary storage tanks for distribution to the Laboratory, and LANL operates and maintains the Laboratory water-distribution system. In general, the LANL distribution-system lines start at the primary storage tanks maintained by LAC. The hydrants and underground distribution piping system are maintained by LANL utilities.

LANL's sitewide water distribution system supplies both domestic and fire-protection requirements, and the system uses approximately 270 million gallons of water per year. The Laboratory has 16 distribution water tanks that provide storage of water at the high points and also at intermediate storage points within the system.

Distribution of the water is achieved through approximately 112 miles of underground piping. The distribution piping has two general categories: main lines and service lines. Main lines are usually 6, 8, 10, or 12 inches in diameter and generally form a grid or network to increase service reliability, although several dead-end lines exist in less-developed areas.

The majority of the Laboratory's water is supplied from two LAC storage tanks: one at TA-62 (with a capacity of 1.5 million gallons) and one at TA-69 (with a capacity of 4 million gallons). These tanks are interconnected, and the water surface levels in the tanks float to provide a combined storage of 5.5 million gallons. The tanks supply water to six LANL distribution water tanks located at TA-16 and TA-53 (two tanks each), TA-59, TA-64. The LANL water distribution system is gravity fed. LAC operates pumps to move water from their tanks to the TA-16 tanks.

Major Water System Projects

Water Line Upgrade from TA-16 to TA-33

The existing 6-inch, cast-iron water line from TA-16 to TA-33 along West Jemez Road and NM 4 was installed in 1962 and is currently undersized to meet future growth requirements at TA-33. Also, because of the current line size, fire-flow requirements cannot be met in areas of TA-49. The line also provides water to the Bandelier National Monument water tank. Further east a LANL-owned and -operated fire water tank provides fire-protection water to TA-33 and TA-39.

The project will be split into two phases; a new 12-inch, high-density polyethylene line will be installed for each phase. The first phase will include extending the water line from TA-16 to TA-49, which is approximately 3.3 miles. The second phase will extend the line from TA-49 to TA-33, which is approximately 4.6 miles.

7.3 Wastewater

LANL operates an extensive wastewater collection system that conveys flow to the Sanitary Wastewater System (SWWS) plant located in TA-46. Wastewater from across the campus flows to SWWS, a biological, return-activated sludge treatment plant that removes organic contents in domestic wastewater. SWWS produces dried sludge and treated effluent. The sludge can be turned into compost and used to fertilize open or disturbed areas at the Laboratory.

The majority of the reuse water is sent to a holding tank at the Sanitary Effluent Reclamation Facility (SERF) in TA-03. The water is further processed at SERF by means of a filtration treatment operation that is capable of producing water that meets the Laboratory's stringent polychlorinated biphenyl National Pollutant Discharge Elimination System (NPDES) permit requirements. Depending on need, the treated effluent is then conveyed to the Metropolis Center high-performance computing facility cooling towers or discharged to Sandia Canyon. SWWS and SERF rely on each other to meet demands and water quality standards.

Recent process improvements at SERF have increased the quality and availability of the nonpotable water used for supercomputing cooling. SERF provides almost 100 percent of the Metropolis Center cooling tower water, nearly eliminating the need for potable water for cooling the supercomputers and allowing cooling tower reuse of an average of 3 million gallons of water each month.

Other than unique high-demand facilities, the more typical demand on wastewater systems is based on population or number of occupants. Availability of gravity-flow access is an important consideration when siting facilities.

Major Wastewater System Projects SWWS Plant Upgrades

Numerous individual upgrade and rehabilitation projects are planned at the SWWS plant in the near term. In the long term, a replacement plant could be needed, which will probably be constructed adjacent to the existing facilities at TA-46.

System Expansion

Other major wastewater projects include a new gravity lift station and force main at Two Mile Mesa to serve new office buildings at TA-06 and TA-22. An extension of the force main will serve the planned Energetic Materials Characterization Facility.

7.4 Primary Electric Power

The Public Service Company of New Mexico (PNM) is the neighboring bulk transmission operator that serves Los Alamos. The Laboratory has two points of connection to the PNM transmission system, with plans for a third point of connection underway. The Laboratory operates and maintains transmission and distribution resources that serve all onsite facilities.

The transmission system operates at 115 kV and conveys power to substations. Substations transform power from high voltage (115 kV) to medium voltage (13.8 kV). Switchgear, along with other safeguards, provide system protection and distribute medium voltage to downstream facilities on feeder circuits. Distribution transformers further reduce the system voltage from medium (13.8 kV) to low voltage (480 V and below), which is typically the primary service point for mission facilities.

The Laboratory participates in the electric coordination agreement with LAC to supply power to the Laboratory and to LAC. Electric power is currently supplied to the site by two 115 kV import transmission lines—the Norton Line that terminates at the Eastern Technical Area (ETA) substation in TA-05 and the Reeves Line that terminates

at the Southern Technical Area (STA) substation in TA-71. A third import transmission line will connect the PNM Norton substation to the STA substation to provide added capacity, redundancy, and reliability to the system.

LANL also operates a combustion gas turbine generator (CGTG) on the 13.8 kV distribution system to generate power onsite from natural gas and several emergency combustion engine generators that use diesel fuel. Multiple energy sources combine to provide the power required to carry out the mission, and the diversity of sources provides the ability to improve the Laboratory's energy security. In support of its commitment to a sustainable future, LANL plans to move toward a more diverse energy portfolio that includes more carbon-free and renewable sources.

A comprehensive approach to energy sourcing includes some onsite renewable generation. Reducing greenhouse gases attributed to electric power cannot be achieved through onsite generation alone, thereby requiring the import of electric power. Contemporary electrical transmission and distribution equipment and systems will improve power quality and reliability to meet the demand as the nuclear deterrent mission grows and develops.

7.5 Natural Gas

The Laboratory operates a system of natural gas–distribution pipelines, pressure-regulating stations, and meters. A high- pressure transmission line operated by New Mexico Gas Company (NMGCO) runs adjacent to the LANL site and has three connection points to the Laboratory. One new point of connection is under development and will serve the CGTG in TA-03.

Natural gas—rather than electric power or steam—has been the preferred source of heating for the Laboratory based on a life cycle cost analysis as compared with available alternatives in the past. Access or proximity to natural gas–distribution piping and maintenance of adequate system pressure were important planning considerations for siting new facilities. However, in an effort to migrate toward more renewable sources of energy and reduce carbon emissions, the Laboratory continues to examine the feasibility of expanded use of electric power as the preferred source of heating and cooling for future energy needs.

Major Natural Gas System Projects

Natural Gas Bare Steel Line Upgrade from TA-16 to TA-03

The Laboratory has a multiyear project to replace the 70-plus-year-old, bare steel, natural gas pipeline from TA-61 through TA-03 to TA-16. The 12-inch bare steel line is the main trunk line for all of the Laboratory. This header line connects to the NMGCO transmission line at two locations in TA-03 and TA-61. This line has been identified for replacement due to corrosion and an issue with cathodic protection current requirements for bare steel lines. The Laboratory has also made a commitment to replace the bare steel line as part of its distribution integrity management plan.

New Natural Gas Pipelines

Multiple new lines will be installed across the site to support planned new facilities and improve redundancy. A new loop will be constructed in anticipation of growth at TA-16, and a new line will also be constructed on Two Mile Mesa to serve facilities planned at TA-22 and TA-40. Another new 4-inch gas line is planned to serve facilities in the Core Area. A second 6-inch proposed loop from TA-50 to TA-46 will add redundancy in the Pajarito Corridor. Major upgrades to existing natural gas systems in the Core Area are also in construction.

7.6 Steam & Condensate

The TA-03 steam and condensate distribution system is the largest steam and condensate distribution system at the Laboratory. The Core Area is provided steam service from a centralized boiler plant located at TA-03-0022. The main steam plant houses three boilers and three decommissioned steam turbines; originally the steam plant served electrical generation and heating-steam production. All of the boilers were built in the early 1950s, and currently only two of the boilers are actively providing heating steam to the TA-03 area. An ongoing project is adding two additional auxiliary boilers to this system. Once installed, the auxiliary boilers will satisfy the heating demand, leaving the existing third boiler to serve as an active backup. An additional near-term project will add an HRSG that captures exhaust heat from the CGTG to generate heating steam for the TA-03 area in addition to the two auxiliary boilers, allowing all boilers within the main steam plant to be retired.

The distribution system begins at the main steam plant and spans the majority of the TA-03 area. An estimated 21,000 feet of condensate and 23,000 feet of steam lines are still active and serve at least 35 buildings in the TA-03 area. Condensate is then returned to the steam plant from individual buildings. The majority of this distribution piping is still original, with installation dates beginning in the 1950s.

In addition to the main steam plant at TA-03, eight satellite boiler houses and steam systems at TA-09 and TA-16 provide steam to various buildings within their respective areas. These boiler houses and systems were installed in 1995. Planning is ongoing to determine the future near- and mid-term need for heating service in these TAs and the most efficient method to provide carbon-free heat in high-explosives (HE) areas.

7.7 Telecommunications

LANL uses a combination of direct-buried, aerial, and underground duct bank systems to provide communications services across the Laboratory. Communications infrastructure and cabling continues to expand to meet mission requirements for new and existing facilities. As new fiber is extended into existing buildings, older fiber cables are removed, recovering additional duct space for future cable placements.

Telecommunications has evolved rapidly over the past 40 years, moving from a primarily copper cable system that provided voice services to expanding into digital subscriber line data lines. Fiber became the main transport between central and remote offices. When fiber met the demands for bandwidth and the cost of manufacturing went down, it became the primary source of data transfers. Copper has also evolved and is still in use, extending the capabilities of fiber-provided bandwidth but in a more limited arena.

Current telecommunications services include connectivity to multiple network configurations, teleconferencing, analog and digital voice services, security, paging, data acquisition, and more. These services are provided with a combination of telecommunications copper and fiber-optic cabling. The demand for faster data transfers has placed emphasis on maitaining and upgrading the existing fiber infrastructure. The Laboratory contains more than 13 miles of copper cabling in the Core Area alone. Fiber-optic cabling measures more than 1 million miles to serve multiple TAs across the Laboratory.

In addition to the extensive duct bank systems used for communications within the Laboratory, the construction of three new cell towers has improved LANL's cellular and radio communications capabilities. The new towers provide a dedicated LANL cellular service through upgrades to existing infrastructure and expansion of the LANL two-way radio system, as well as enhance existing distribution antenna system sites. One new tower is located at TA-15, and two additional towers are located at TA-53. Leased space on a San Ildefonso Pueblo cellular tower located off NM 502 will support LANL's expansion of the two- way radio system.

Major communications upgrade and extension projects associated with the CMP include expanded services needed at Two Mile Mesa and along the Pajarito Corridor.

The extension of communications services to all new and upgraded facilities in conjunction with the construction of those facilities is encouraged. For planning purposes and cost effectiveness, it is assumed that every new building on the LANL site will need communications services, at a minimum, for access and asset protection in the near term. Extension of underground duct bank systems—with the capability to provide additional cabling as needed for future growth—will also serve future mission expansion.

7.8 Looking Forward

Institutional utilities infrastructure planning continues to be integrated with the institutional processes that enable implementation of the CMP. More detailed utilities infrastructure planning will be executed through an associated but separate planning process. Utilities infrastructure planning considerations are anchored in CMP implementation and can be initiated as needed and that more-detailed utilities planning required to define and establish specific projects can proceed in parallel as appropriate. These related but semi-autonomous processes will be implemented on an annual cycle to enable further analysis and development of well-informed, phased utilities infrastructure investment strategies.

8 NEPA CONSIDERATIONS

8.1 Overview

This section of the CMP ensures that the NEPA process, context, and other closely related regulatory requirements are considered early and appropriately in the comprehensive site planning process at LANL.

The DOE NEPA analysis and compliance process for LANL projects and activities is not intended to be implemented through the CMP. Pursuant to NNSA's SD 430.1, *Real Property Asset Management* Supplemental Directive SD 430.1 (1-18-17) site planning and budgeting requirements, Section 6.a.(4), the CMP has been developed while considering other existing site organizations, programs, policies, and processes such as the NEPA Compliance Program for the Laboratory site.

In accordance with the M&O Prime Contract clauses H-19, Strategic Planning, and H-26, Asset Management Requirements, Triad has been directed to establish a comprehensive site planning process for the Laboratory. This process is expected to result in a comprehensive plan (the CMP) that communicates project justification and prioritization, informs future NEPA regulatory due diligence efforts, and provides a baseline for infrastructure needs over near-, mid-, and long-term planning horizons. At a minimum, the process is expected to lead to informed decision-making based on NEPA and other environmental analyses and contribute to the baseline vision to inform the next SWEIS for the Laboratory.

This section is not intended to provide NEPA or other related regulatory analyses for the near-, mid-, and long-term infrastructure scope presented in the CMP. The actual NEPA analysis process is part of site operations and the regulatory due diligence that will be required as CMP infrastructure planning scope transitions into actual projects and project execution. Other related regulatory due diligence addresses but is not limited to compliance with the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and the Resource Conservation and Recovery Act (RCRA).

As the infrastructure scope presented in this CMP develops into specific projects that are ripe for analysis and execution, the Laboratory will initiate Procedure 351 (P351) *Integrated Review Tool (IRT) and Permits and Requirements Identification (PRID)*. This procedure is considered an operational process (versus CMP planning process) designed to facilitate the appropriate review and regulatory due diligence as projects advance toward execution.

The primary purpose and intent of including NEPA considerations in the CMP planning process is to enable effective communication between site planners and NEPA SMEs to

- maintain a robust and efficient network of institutional planners and regulatory compliance SMEs to better integrate site planning considerations before implementing NEPA regulatory due diligence;
- provide early access to infrastructure planning information for developing near-, mid-, and long-term NEPA and other related compliance strategies; and
- facilitate informed infrastructure planning decisions (e.g., siting and timing) to avoid or mitigate potential future impacts associated with infrastructure development or demolition.

Figure 8-A: Mexican Spotted Owl.

Although a wide range of constraints are often considered in the NEPA analysis (and related regulatory processes), the scope of the CMP NEPA considerations is limited to those NEPA-related potential constraints that have most directly informed the siting and timing of the infrastructure construction and demolition presented in the CMP. In the process of developing the CMP, the NEPA-related potential constraints considered include the following:

- NEPA compliance implications
- Geology and topography
- Cultural resources and historical properties
- Ecological resources
- Water resources
- Waste management and environmental restoration

As the CMP planning process has been implemented, these potential constraints have been considered part of the infrastructure-related information in each planning area or carried forward at this time only if determined to be significant regarding infrastructure planning (particularly siting and timing). Otherwise, detailed planning analysis for these potential constraints has been deferred to future NEPA analyses and related regulatory due diligence as part of the infrastructure project execution processes. Consequently, the NEPA considerations presented in the planning areas section of the CMP are primarily limited to the following:

- NEPA compliance
- Ecological resources
- Cultural and historical resources
- Water resources (storm water management)
- Environmental restoration (Consent Order PRSs)

The following sections provide an overview of the regulatory and process context for the NEPA Considerations sections in each of the CMP planning areas.

8.2 NEPA Compliance

In accordance with the Council on Environmental Quality regulations at Title 40 Code of Federal Regulations (CFR) Parts 1500–1508 and DOE NEPA implementing procedures within 10 CFR Part 1021 (DOE, 2011; Rev. 2021), NNSA has the responsibility to analyze potential impacts to the human and natural environment attributed to LANL mission activities. Potential impacts attributed to mission activities, as currently constituted, are analyzed in the SWEIS and other associated NEPA documents. The current SWEIS was issued in 2008, and the need and schedule for developing an updated SWEIS is currently under consideration..

When new mission activities (infrastructure construction or demolition) are proposed and determined to be ripe for NEPA analysis, an internal NNSA evaluation is conducted to determine if the activity has been analyzed in a NEPA document (otherwise known as “bounded” by an existing NEPA analysis). The internal evaluation includes an assessment of how the new mission activity could affect environmental resource areas and how the new mission activity compares with existing NEPA documents. If it is determined that a proposed mission activity cannot be bounded by an existing NEPA analysis, then NNSA typically prepares a new NEPA document. For the most part, NEPA is a process that analyzes potential impacts attributed to proposed federal actions to help guide decision-makers in choosing actions that complement the human and natural environment and ensure compliance to environmental, health, and safety laws and regulations.

The CMP does not determine whether proposed infrastructure scope is appropriate for NEPA analysis. Including NEPA SMEs and considerations in the CMP planning process aid future LANL development through streamlining the siting process, reducing risk of statutory noncompliance, and facilitating early development of NEPA compliance strategies that may be helpful in development of a new SWEIS. This effort is accomplished by ensuring that NEPA and other regulatory SMEs considerations are well-integrated into the CMP planning and development process.

To determine if proposed Laboratory activities are bounded by an existing NEPA document, the LANL NEPA program evaluates the project scope for “ripeness,” known potential impacts for the activity location and function, and existing NEPA analysis similar in nature to that being proposed. Project scope ripeness is a term used to describe the timetable for the proposed activity implementation. Typically, the NEPA process is enacted for nearer-term projects or projects that have an execution timetable within the next 5 to 10 years, are nearing a Critical Decision in the planning process, or have adequate scope to determine potential impacts to the human and natural environment. Longer-term projects or projects that do not yet have adequate scope are considered unripe. The LANL NEPA program works with project proponents to identify scoping requirements and timeframes for unripe projects.

If it is determined that an existing NEPA document does not provide a bounding analysis and a new NEPA document is necessary, LANL NEPA program SMEs work with NNSA and the project proponents in the development of a new document. NEPA documents are prepared and owned by NNSA.

Pursuing a NEPA determination for the overall CMP is considered premature because most of the CMP scope is not developed enough to complete an appropriate analysis. To help guide decision-makers in long-term planning strategies, a NEPA "strategy" was developed to complement the overall CMP effort. The NEPA strategy considers the anticipated timeframe for project development and implementation, existing NEPA documents that provide the bounding analysis for LANL mission activities, and the NEPA topic areas that may be affected by the proposed infrastructure scope. The NEPA due diligence process will need to be followed appropriately when infrastructure scope is considered developed enough to complete an appropriate analysis and NEPA determination.

8.3 Ecological Resources

Ecological resources include terrestrial resources, wetlands, aquatic resources, protected and sensitive species, and special wildlife habitat. The primary regulatory drivers for protecting ecological resources at the Laboratory include the ESA and the Migratory Bird Treaty Act of 1918 (MBTA). Both species listed as threatened and endangered in the ESA and those identified in the MBTA are located within the LANL boundary. To fulfill NNSA and LANL's commitment to compliance with the ESA and MBTA and the preservation of these species, resource management plans have been developed by NNSA, the U.S. Fish and Wildlife Service (USFWS), and the Laboratory's Biological Resource program.

The *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory* (HMP) contains management guidelines for compliance with ESA and site plans for areas of environmental interest (AEIs) for federally listed species. Federally listed species that could occur within the LANL boundary are the Jemez Mountains salamander (*Plethodon neomexicanus*), the Mexican spotted owl (*Strix occidentalis lucida*), and the Southwestern willow flycatcher (*Empidonax traillii extimus*).

AEIs are geographical units at the Laboratory that are managed for the protection of the federally listed species. The AEIs consist of core habitat areas (areas of most-likely occurrence) and buffer areas. Buffer areas are designed to protect core areas. Restrictions on activities within an AEI include day-to-day activities that cause disturbance, such as loud noises and construction activities, and long-term impacts, such as long-term habitat alteration.

The HMP distinguishes between developed and undeveloped areas and does not restrict activities or habitat alteration in developed areas unless the activities could cause disturbance or alteration to core habitat areas. The HMP establishes review thresholds and protocols that establish requirements and mitigations that must be met for activities that could result in habitat disturbance.

As part of Laboratory operations, when a new project sited near an identified core habitat area or buffer area is ripe for analysis, LANL's P351 process is initiated, and the Biological Resource program reviews anticipated construction and operational activities to determine the potential impact to federally listed species and their habitat. Often the review will require the preparation of a biological assessment (BA). The purpose of a BA is to analyze proposed actions to determine if those actions could or could not adversely affect those sensitive species or their habitat. The BA will contain project descriptions, potential impacts, and descriptions of the mitigations to offset those impacts. Once prepared, the BA is reviewed by the USFWS for concurrence with the conclusions.

Adherence to the HMP not only ensures compliance with the ESA but also ensures that federally listed species that occur within the Laboratory boundary are protected. Through the use of NEPA considerations, the CMP identifies where infrastructure projects could conflict with identified core habitat or buffer areas. This effort

reduces future risk for noncompliance with the HMP and the ESA. Core habitat or buffer can be avoided during the planning effort or, given the projected development timetables, a BA can be prepared to determine if the federally listed species could or could not be adversely affected by the proposed development.

The *Migratory Bird Best Management Practices for LANL* ensures compliance to the restrictions dictated by the MBTA to protect migratory birds. A migratory bird is a bird that has a seasonal and somewhat predictable pattern of movement. Migratory birds occur within the LANL boundary at different points throughout the year. As such, Migratory Bird Best Management Practices are employed to reduce

- habitat loss, alteration, or fragmentation;
- the potential to disturb nests during breeding season; and
- exposure of birds to contaminants.

Compliance to the MBTA is mostly accomplished through limiting disturbance activities during the breeding/nesting season, monitoring during project execution, and incorporating mitigations into project designs. Regarding the CMP effort, constraints associated from the MBTA are not applicable until both project planning and design are executed and the action is considered ripe for analysis.

Other aspects of ecological resources considered in the development of the CMP include special wildlife habitats such as large game migration corridors. These areas have been avoided to the extent possible. The HMP and ESA compliance due diligence will need to be followed appropriately when the project scope is developed enough for an appropriate analysis.

8.4 Cultural & Historical Resources

Cultural resources include archaeological sites and historical buildings, including those identified as part of the Manhattan Project National Historical Park (MPNHP; see Section 9 Land Use Management) within the Laboratory boundary that are the responsibility of NNSA as defined in the NHPA and overseen by the New Mexico State Historic Preservation Officer (SHPO). Within the LANL boundary are more than 2,000 known cultural properties that are subject to the NHPA and the SHPO. Management requirements of these resources are defined in the *Programmatic Agreement among the U.S. Department of Energy, National Nuclear Security Administration, Los Alamos Field Office, the New Mexico State Historic Preservation Office and the Advisory Council on Historic Preservation Concerning Management of the Historic Properties of Los Alamos National Laboratory, Los Alamos, New Mexico* (PA; LA- UR-17-22581). The Cultural Resources Management Plan (CRMP; *A Plan for the Management of the Cultural Heritage at Los Alamos National Laboratory, New Mexico*, LA-UR-19-21590) ensures compliance to the PA requirements and thus compliance to the statutory requirements for the protection of the Laboratory's cultural properties.

The Cultural Resource program at LANL has the primary responsibility for ensuring that actions outlined in the CRMP are executed. Current and future projects are reviewed by the Cultural Resource program via implementation of P351 to ensure compliance to the PA and that known cultural properties are not adversely affected. The primary tool available to the Cultural Resource program and project planners is a GIS-based map of all known cultural and historical properties. Use of this tool can help project planners avoid known cultural properties. If a cultural property cannot be avoided, the Cultural Resource program can consult with the SHPO to determine the appropriate mitigation. Additionally, unknown cultural properties could exist in areas that have not been properly surveyed. Efforts are taken by project planners to work with the Cultural Resource program to avoid areas that have not been surveyed or to begin the survey process.

The CRMP and PA compliance will need to be followed appropriately when project scope is developed enough for an appropriate analysis and compliance determination.

8.5 Water Resources

Water resources vary in type and location within the LANL boundary and are subject to various regulatory requirements, including those identified in the Clean Water Act (Federal Water Pollution Control Act, 1977) and as regulated by the Environmental Protection Agency (EPA). To ensure compliance to regulatory statutes, the Laboratory is subject to multiple water quality permits and requirements that ensure proper storm water management and limit potential impacts from storm water runoff and stream sediment.

Activities that could discharge surface water—as storm water runoff or part of function—for existing and future development are regulated by the NPDES Construction General Permit and the *Energy Independence and Security Act of 2007*. In addition to implementation of P351, the LANL Engineering Standards Manual is used to guide infrastructure construction at the Laboratory and to facilitate compliance with these requirements. As such, these requirements are typically incorporated into the engineering design during the infrastructure and other project-planning phases. Through implementation of P351, the Laboratory's Storm Water Program reviews projects that are ripe for analysis to ensure that LANL meets these requirements.

Many of these requirements have been considered in the development of the infrastructure scope presented in the CMP. Storm water management and compliance SMEs directly participated in planning and siting infrastructure (including utilities and transportation) within the planning areas. In some cases, these SMEs assisted planners in identifying LID/GI opportunity features within planning areas.

To further guide the ongoing CMP effort, the following paragraphs summarize institutional storm water management requirements for new infrastructure development. The LANL Storm Water Program will review specific projects when the scope is developed enough to initiate the P351 process and identify specific storm water compliance requirements.

Key regulatory requirements applicable to execution of specific project scope include development and use of project-specific storm water pollution- prevention plans and temporary or permanent post-construction controls for storm water management. In addition, storm water management controls must be incorporated into project designs, discharges during and after construction must be managed to predevelopment (greenfield site) rates, and all disturbed areas must be properly stabilized. Site planning, design, construction, and maintenance strategies at each project site should maintain or restore (to the maximum extent technically feasible) the predevelopment hydrology of the project site regarding the temperature, rate, volume, and duration of storm water flow. Storm water management requirements also include the use of LID/GI features that mimic natural hydrology conditions and promote infiltration, evapotranspiration, or reuse and could additionally provide water- quality treatment as appropriate. Appropriate storm water management can also be achieved using features located onsite or nearby or by retrofitting existing storm water management features to meet future needs.

In January 2020, EPA Region 6 made a final determination that storm water discharges from LANL property are contributing to violations of New Mexico water quality standards and require NPDES permit coverage under the Clean Water Act. A new NPDES Municipal Separate Storm Sewer System (MS4) Permit is expected to be issued by the EPA in calendar year 2022, and new requirements for storm water management will be implemented in LANL urbanized areas. The definition of LANL urbanized areas will be negotiated in the permitting process but typically includes developed areas with storm drain systems. NPDES permits are issued for a 5-year period. The potential exists for issuance of new permits and changes in regulations during design or construction of some projects. Existing projects, regardless of the stage of project execution, are not grandfathered in to existing permits and would be subject to new requirements. Storm water compliance SMEs at LANL anticipate that having a CMP will help satisfy the new permit requirements by providing a long-term infrastructure/development plan that enables construction of new or retrofitted storm water control systems as necessary. The storm water compliance due diligence will need to be designed and executed after the project scope is developed enough for an appropriate analysis.

8.6 Environmental Restoration

Generation of hazardous waste has been, and continues to be, part of LANL operations. As such, hazardous waste management and environmental restoration are important considerations when evaluating potential environmental impacts to the human and natural environment. For the purposes of the CMP, ongoing generation and management of hazardous and radioactive wastes are considered to be more relevant to operating the site and not included as a CMP NEPA consideration. It is assumed that waste management operations will be analyzed as part of future NEPA analyses.

The nature and location of legacy contamination from prior operations can significantly influence land-use, future development, and infrastructure siting. Legacy- contaminated areas are known as Consent Order PRSs and include solid waste management units (SWMUs), areas of concern (AOCs), and material disposal areas (MDAs). More than 3,200 PRSs are located throughout the Laboratory in various stages of investigation, remediation, and administrative/regulatory closure. This key environmental constraint is generally referred to as environmental restoration and is included as a NEPA consideration.

Legacy-contaminated geographical areas at LANL are known as Consent Order sites. The *Order on Consent* (Consent Order) was issued by the New Mexico Environment Department (NMED) to the Department of Energy-Environmental Management (DOE-EM) under RCRA requirements. The Consent Order specifies actions that must be taken to appropriately mitigate potential human health and environmental risk associated with legacy contamination through investigation (sampling), remediation (cleanup), analysis (reporting), and administrative/regulatory closure. Collectively, these actions are known as RCRA corrective actions. The corrective actions or regulatory due diligence is specific to each PRS and typically involves some combination of these actions.

At the Laboratory, the primary responsibility for the management of the Consent Order sites belongs to DOE Environmental Management Los Alamos (EM-LA) and their EM-LA cleanup contractor, Newport News Nuclear BWXT (N3B). N3B is tasked with implementing the corrective action for each PRS and is currently executing a wide variety of sampling, analysis, cleanup, and reporting activities for PRSs throughout the site. LANL's Waste Management program has the responsibility to evaluate work (planned or unplanned) within or near a Consent Order site using P351 to facilitate site planning and operations. The Laboratory has also established regulatory and technical working groups with representatives from NA-LA, EM-LA, and N3B. These working groups develop and implement strategies to minimize impacts to PRSs while effectively planning and executing LANL's current and future mission.

In the CMP planning process, every attempt has been made to site planned infrastructure in locations that avoid potential impacts on Consent Order sites. However, the proximity of some of the planned infrastructure to Consent Order sites could trigger the need for special or accelerated corrective actions (e.g., sampling and cleanup) and regulatory due diligence with potentially long lead times. Otherwise, the LANL Waste Management program will need to review each project when the scope is developed enough to identify and implement infrastructure project-specific requirements.

9 LAND USE MANAGEMENT

9.1 Overview

The purpose and intent of including a land-use management section in the CMP are to ensure that the entire landscape of the Laboratory is appropriately considered in the CMP planning process and that site infrastructure planning appropriately considers land use and natural/cultural/historical resources stewardship responsibilities at the Laboratory.

Land-use management at LANL is not intended to be implemented through the CMP. Pursuant to NNSA's *Real Property Asset Management* Supplemental Directive SD 430.1 (1-18-17) site planning and budgeting requirements, Section 6.a.(4), the CMP has been developed while considering other existing site organizations, programs, policies, and processes that govern land- use management and resources stewardship at the LANL site. Although the Laboratory is not a land management entity like the National Park Service (NPS) or the USFS, LANL's mission must be executed in a manner that ensures compliance with all applicable regulatory requirements and provides appropriate management and stewardship of site landscape and resources.

For purposes of the CMP, the key aspects of land-use management and resources stewardship at LANL include operational requirements and processes and long-term site resources stewardship requirements and responsibilities. In practice, these two aspects are implemented together and provide an integrated system that addresses regulatory due diligence requirements for mission/program/project execution and a mechanism for implementing long-term site and resources stewardship.

The information in this section is intended to provide context that has been used to develop the CMP. Much of this context is also provided in Section 8 NEPA Considerations. This Section 9 includes an overview of key operational land-use requirements and processes, implementation of long-term stewardship, and future planning integration.

9.2 Implementation of Operational Requirements

LANL uses several key processes, plans, diverse set of permits (e.g., RCRA, air quality, and water quality), and federal stakeholder agreements to implement operational requirements applicable to site land use and resources management. These processes and documents are designed to ensure that planning and execution of operational activities comply with all applicable regulatory requirements and facilitate long-term stewardship of natural and cultural/historical resources at the LANL site.

In addition to operational procedures and permits, LANL implements P351 *Integrated Review Tool (IRT) and Permits and Requirements Identification (PRID)* to plan and initiate new operations and projects that could affect land use and natural and cultural/historical resources (see Section 8.1). Land-use and resources management SMEs use the P351 process to review actions and identify requirements that must be addressed before or as part of execution. The majority of the requirements are addressed through the implementation of several key institutional plans, policies, and regulatory documents, including the following:

- *Environmental Management System* (SD400)
- *Site Planning* (P941)
- *Site Selection* (AP-941-100)
- *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory*
- Cultural Resources Management Plan

- *Wildland Fire Mitigation and Forest Health Plan*
- *Los Alamos National Laboratory Storm Water BMP Manual*
- *Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory Mitigation Action Plan*

For purposes of the CMP, these key documents collectively guide efficient regulatory compliance; enable the institution to make informed land-use decisions that minimize near-, mid-, and long-term impacts to resources; and facilitate effective long-term stewardship of the LANL landscape and resources. The CMP has been developed and will be implemented in a manner consistent with the purpose and intent of these documents. The following sections provide a brief summary of each of these key documents regarding the development and anticipated implementation of the CMP.

Key Institutional Policies & Plans

Environmental Management System (SD400) provides the institutional and operational framework for implementing the Laboratory's EMS to achieve environmental compliance, responsible environmental stewardship, and environmental communication. SD400 is closely integrated with and supported by *Implementing Environmental Requirements* (EPC-ES- FSD-001). The purpose of EPC-ES-FSD-001 is to describe the M&O contractor (Triad National Security, LLC) processes for identifying, communicating, and implementing environmental requirements at the Laboratory. LANL's EMS is implemented to comply with *Departmental Sustainability* (DOE O 436.1), which requires sites like LANL to implement an ISO 14001–certified EMS that appropriately considers and mitigates potential impacts to the environment and seeks to improve site environmental compliance and performance. This requirement is addressed annually through the development and implementation of institutional EMS goals, targets, and actions. The CMP and associated planning process has been incorporated in LANL's EMS. Actions specific to CMP implementation have been included in the fiscal year (FY) 2022 EMS Action Plan.

Site Planning (P941) is the institutional procedure for implementing comprehensive site planning—the governing policy for developing and implementing the CMP. The purpose of P941 is to integrate and define requirements and processes that, when implemented, enable and ensure that LANL programs, projects, and operations are effectively planned to achieve successful, productive, safe, secure, and efficient land, infrastructure, and facility use. The following aspects of implementing comprehensive site planning are most relevant to facilitating compliance with all applicable regulatory requirements and providing appropriate management and stewardship of the site landscape and resources:

- Implementing the requirements and intent of the LANL Environmental Management System
- Integrating with NEPA planning principles and spatial and temporal site planning methods
- Minimizing environmental impacts and the disturbance of undeveloped land
- Planning new development that considers and protects the natural environment and placing a priority on redevelopment and infill
- Minimizing the use of power, water, consumable goods, and other natural resources (consolidation of facilities and operations) and preventing or minimizing pollution
- Collaborating with neighboring landowners and land management agencies to address regional natural and cultural resource issues
- Complying with all environmental laws and regulations that apply to the proposed site and its future use
- Ensuring early identification of and response to potential environmental impacts when required, including preoperational characterization, assessment, remediation, mitigation, and effluent/surveillance monitoring
- Evaluating existing and anticipated Consent Order deferred site requirements and developing strategies and processes for minimizing the associated long-term regulatory liabilities

- Fully considering the complete life cycle of the project, including the ability to decontaminate and decommission (D&D) the facility after the mission is complete, and considering the potential environmental impacts of D&D on future land use

These environmental compliance and stewardship aspects of P941 have been used to develop the CMP and as a means of ensuring that site infrastructure planning appropriately considers land use and natural/cultural/historical resources stewardship responsibilities at LANL.

The HMP contains management guidelines for compliance with the ESA and site plans for AEIs for federally listed species (see Section 8.3). Federally listed species that could occur within the LANL boundary are the Jemez Mountains salamander, the Mexican spotted owl, and the Southwestern willow flycatcher. Based on habitat nature and quality criteria, the HMP designates geographical units at LANL that define core and buffer habitat that must be managed in a manner that protects these species from near-, mid-, and long-term impacts. The HMP establishes regulatory review thresholds and protocols that determine requirements and mitigations that must be met for operational activities that could result in habitat disturbance. SMEs within the LANL Biological Resource program have been directly engaged in the development of the CMP and have used the HMP to avoid or minimize potential impacts on these species and their habitats related to the near-, mid-, and long-term CMP infrastructure investments.

The Cultural Resources Management Plan is used to execute regulatory requirements for managing archaeological sites and historical buildings, including those identified as part of the MPNHP, within the LANL boundary that are the responsibility of NNSA as defined in the NHPA and overseen by the SHPO. These resources are defined in a PA among the DOE/NNSA/NA-LA, the SHPO, and the Advisory Council on Historic Preservation concerning management of the historical properties of LANL (LA-UR-17-22581; see Section 8.4). The CRMP ensures compliance with the PA requirements and thus compliance to the statutory requirements for the protection of the Laboratory's cultural properties. SMEs within LANL's Cultural Resource program have been directly engaged in the development of the CMP and have used the CRMP to avoid or minimize potential impacts associated with the near-, mid-, and long-term CMP infrastructure investments.

The *Wildland Fire Mitigation and Forest Health Plan* (EMD-PLAN-200) is an Emergency Management Division plan that establishes wildland fire mitigation and forest health strategies for LANL. This plan strategically identifies forest treatments that align with the Laboratory's mission for wildland fire mitigation and the protection of forest health. Through its robust application and sitewide integration, LANL provides for a resilient landscape; a fire-adapted community; and a quick, safe, and effective wildland fire response. These treatments include descriptions of desired conditions for fire roads, firebreaks, defensible space, and open space. For each treatment, this plan identifies a responsible LANL organization, a strategy for implementation, and an implementation and assessment schedule. This plan also provides additional background information to support the decisions and activities that are included in the LANL wildland fire mitigation and forest health annual operating plans. Although execution of this plan is largely an operational responsibility, the CMP near-, mid-, and long-term infrastructure implementation plans have been developed with appropriate consideration for the function of this plan in implementing land use and natural/cultural/historical resources stewardship responsibilities at the Laboratory.

The *Los Alamos National Laboratory Storm Water BMP Manual* is an operational guidance document that provides information on the selection, function, installation, inspection, and maintenance of BMPs for storm water management, sediment and erosion control, and the management of other potential surface water pollutants at the Laboratory. It is used as an operational supplement to implementing the storm water regulatory compliance due diligence discussed in Section 8 NEPA Considerations. The purpose and intent of the manual are to provide a consistent approach in the selection and use of storm water management BMPs at LANL. The information provided in this document is not intended to replace an engineering design where such designs may be applicable but should be used in support of and in conjunction with the LANL Engineering Standards and specifications.

Planning for and implementing appropriate storm water BMPs contribute significantly to facilitating long-term stewardship of LANL's landscape and resources. SMEs within the LANL Storm Water program have been directly engaged in the development of the CMP and have used this manual to avoid or minimize potential impacts associated with the near-, mid- , and long-term CMP infrastructure investments.

A mitigation action plan was prepared for the *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (2008 SWEIS [DOE/EIS-0380]) in December 2008. The 2008 SWEIS Mitigation Action Plan (MAP) addresses institutional actions required to mitigate potential impacts from LANL operations as identified though environmental assessments, supplement analyses, and environmental impact statements. These actions are a condition of the NEPA coverage provided for LANL's operations. Because many mitigations are from other NEPA documents issued for LANL, the 2008 SWEIS MAP has been renamed the *Mitigation Action Plan for Los Alamos National Laboratory Operations*. This MAP, either directly or by reference, provides—and will continue to provide—an institutional driver/requirement for long-term implementation of the key policies and plans that ensure appropriate management and stewardship of the site landscape and resources. SMEs within the Laboratory's NEPA program have been directly engaged in the development of the CMP by assisting in the effort to avoid or minimize potential impacts associated with the near-, mid-, and long-term CMP infrastructure investments.

9.3 Implementation of Long-Term Stewardship

For the purposes of the CMP, effective implementation of long-term stewardship at the Laboratory requires an integrated and institutional approach that relies on operational policies and plans, site sustainability and resilience planning, proactive management and protection of infrastructure associated with environmental compliance and monitoring, and appropriate use of Designated Resource Management Areas (DRMAs). The operational policies and plans are described in Section 9.2, and site sustainability and resilience planning are described in Sections 5.4.1 and 5.4.2, respectively. The following sections provide brief summaries of the infrastructure critical to maintaining environmental compliance and monitoring and the scope, location, and use of DRMAs.

LANL operations rely on a complex and extensive network of environmental protection and monitoring infrastructure to ensure effective and defensible compliance with applicable federal and state regulations most relevant to implementing long-term stewardship. This infrastructure includes air, surface water, and groundwater sampling and monitoring equipment. It also includes infrastructure (e.g., weirs, check dams, and BMPs) used to manage storm water and sediments associated with site development and natural site conditions. The infrastructure is often sited in specific locations as "points of compliance" that are a condition of compliance with specific regulatory requirements. Disturbance of the location and function of these points of compliance can have significant institutional regulatory compliance and permitting implications. In addition, many of the sampling and monitoring locations provide data that are used to comply with DOE O 231.1B, Administrative Change 1, *Environment, Safety, and Health Reporting*, and DOE O 458.1, Administrative Change 3, *Radiation Protection of the Public and the Environment*. These DOE Orders require sites like LANL to provide a publicly available *Annual Site Environmental Report*. Maintaining the location and function of this sampling, monitoring, and environmental protection infrastructure is critical to ensuring compliance with all applicable regulatory and other requirements as part of LANL operations and long- term stewardship. SMEs with LANL's Environmental Protection and Compliance organization have been directly engaged in the development of the CMP by assisting in the effort to avoid or minimize potential impacts on this infrastructure.

A key component of facilitating long-term stewardship of the LANL landscape and associated natural/cultural/historical resources is managing certain areas in a manner that preserves the current purpose, function, and conditions. This stewardship has been accomplished through the use of DRMAs, which include areas of the LANL footprint that are already reserved for a specific purpose and function as established under existing regulatory requirements, DOE Orders, federal agreements, and institutional policies and plans. The CMP planning process has been used as an opportunity to acknowledge and consider the use of DRMAs to facilitate

effective near-, mid-, and long-term infrastructure planning. Establishment and management of DRMAs is an institutional—not a CMP—responsibility.

The DRMAs are primarily associated with natural/cultural/historical resources management areas currently reserved for protection and management of

- biological resources,
- cultural and historical resources,
- storm water resources,
- wildland fire and forest health management areas, and
- environmental research.

Although managing an area as a DRMA does not preclude future use of the area for mission-critical operations, it *does* formally reserve the area for its intended purpose. This formal designation provides assurances to DOE, NNSA, regulators, and other key stakeholders that the function of the area can be considered protected by a reliable mitigation or offset for potential impacts associated with future land use. This designation is particularly valuable in establishing and maintaining regulatory compliance decisions and agreements that are contingent on impact thresholds (e.g., NEPA, ESA, and NHPA) and also key to successfully implementing other federal and stakeholder agreements. In appropriate cases, DRMAs can be used as a site "mitigation bank" to facilitate execution of projects with potential impacts that cannot be mitigated onsite.

Biological Resources DRMAs

Biological resources DRMAs are found throughout LANL on undeveloped/semi-developed mesa tops, canyon slopes, and canyon bottoms. These areas consist of vital threatened and endangered species habitat, large game migration corridors, wetlands, and other undeveloped areas essential to migratory birds and other sensitive species. These areas are currently managed in a way that preserves the area for its intended use as a condition of compliance, formal agreement, or BMP. This category also includes the White Rock Canyon Reserve established by DOE in 1999 (see Figure 9-A). This reserve is located on the east-facing slopes of White Rock Canyon in the Rio Grande Corridor portion of the Balance of Site Planning Area. The White Rock Canyon Reserve functions as a reserve for natural/cultural resources conservation and research purposes.

Cultural & Historical Resources DRMAs

Cultural and historical resources DRMAs are found throughout LANL on developed, semi-developed, and undeveloped mesa tops and canyons. These areas consist of known archeological sites and other culturally sensitive areas that, for the most part, are located in areas that are not desirable for future development. Some of these areas contain regionally significant sites that must be preserved as a condition of formal federal compliance and other agreements (e.g., TA-74 cultural resources preservation easements). This category also includes the historical resources at LANL that are included in the MPNHP (see Figure 9-B). The MPNHP is managed by the NPS in collaboration with DOE and was established in 2015 as part of a DOE complex-wide network of historical facilities that had a key role in the Manhattan Project. The purpose of the MPNHP is to preserve, interpret, and facilitate access to key historical resources associated with the Manhattan Project, including five historical structures within LANL.

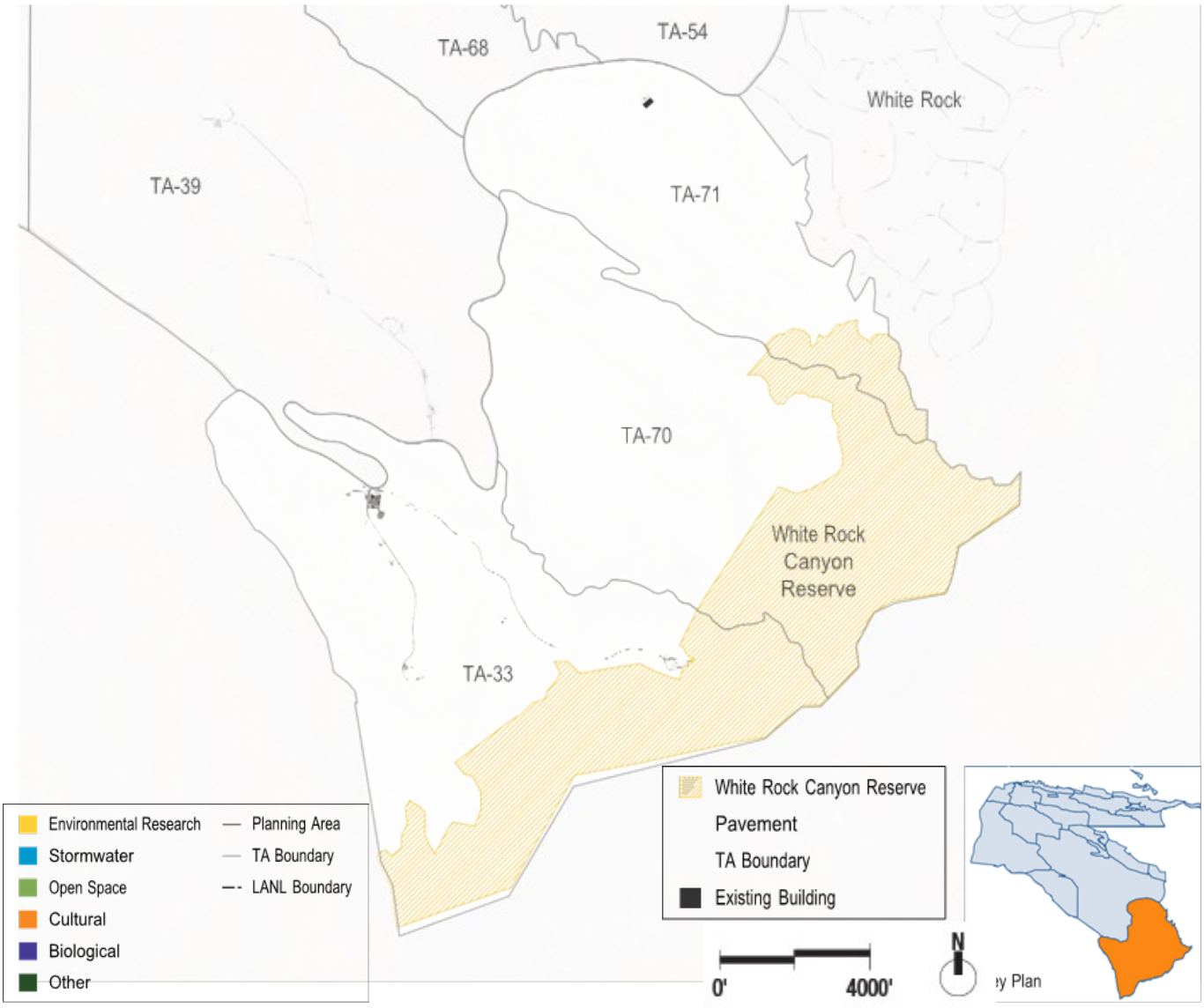

Figure 9-A: LANL White Rock Canyon Reserve.

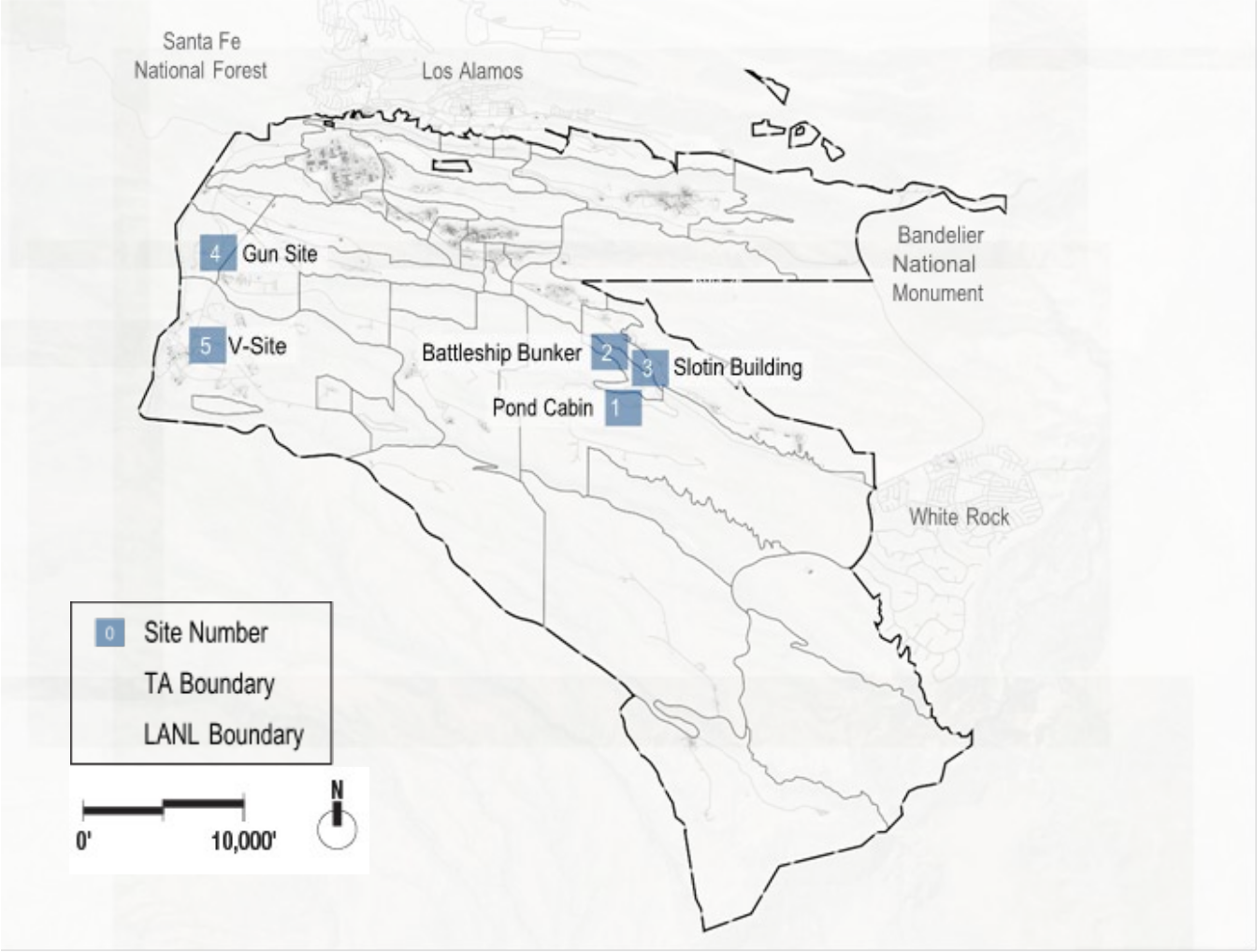

Figure 9-B: LANL historical properties included in the Manhattan Project National Historical Park.

Storm Water Resources DRMAs

Storm water resources DRMAs are found throughout LANL on developed, semi-developed, and undeveloped mesa tops and canyons. They include mesa top, canyon slope, and bottom areas that are actively managed for storm water control to mitigate erosion and potential migration of pollutants. Some of these areas are designated as a condition of regulatory compliance, whereas others are implemented as part of institutional BMPs (see Section 8.5). The appropriate management of storm water DRMAs, in conjunction with the long-term comprehensive site development plan provided by the CMP, is expected to benefit regulatory compliance negotiations with EPA for the new MS4 permit for the LANL site.

Wildland Fire & Forest Health Management DRMAs

Wildland fire and forest health management DRMAs are found throughout LANL on semi-developed and undeveloped mesa tops and canyons. These areas include fire roads, firebreaks, defensible space, and open-space forest treatment areas. Collectively, these areas enable safe and effective management of wildland fire risk and the protection of forest health. The areas are used to provide a resilient landscape; a fire-adapted community; and a quick, safe, and effective wildland fire response capability.

Other Related Designations

In the 1970s, DOE established National Environmental Research Parks (NERPs) within DOE land holdings to serve as field laboratories set aside for ecological research and the study of the environmental impact of energy developments and for informing the public of the environmental and land-use options open to them. The NERP at LANL was established in 1976 and includes the entire 40 square miles of the Laboratory. LANL also includes other more localized environmental research areas at TA-48, -49, and -51. Finally, under the LANL Trails Management Program, certain open spaces throughout the site (e.g., TA-70 and TA-71) include trails used for hiking and other recreational purposes.

9.4 Future Planning Integration

Beginning in FY22, the CMP planning process will transition from CMP development to implementation. Many of the planning processes used to develop the CMP will be refined for implementation. As part of CMP implementation, site planners will initiate an effort to refine the policy integration between P941 and other key LANL policies (e.g., SD400 and EPC-ES-FSD-001) to facilitate more effective and sustainable site planning, natural/cultural/historical resources management, and long-term stewardship.

10 PLANNING AREAS

10.1 Core Area

10.1.1 *Core Area – Overview*

The Core Area, primarily TA-03, is considered the heart of the Laboratory. It contains most of the key administrative functions and personnel from the three directorates: Science, Technology and Engineering; Operations, and Weapons. Other TAs included in the Core are portions of TA-43, -58, -59, 61, and -62. The CMP concentrates on TA-03, which contains the majority of the Laboratory's population, buildings, and infrastructure. This area is also the primary gateway into the site and represents the "public face" of the Laboratory.

The Core Area has a complex planning context. It contains major co-located missions and capabilities in a dense development setting with complex constraints, including hazardous materials operations. As one of the oldest developed areas of the Laboratory, the Core Area also contains some of the newest and most modern buildings and facilities. Its location at the edge of the Laboratory site places it next to non-LANL properties and land use, further complicating development constraints.

Historically, development in the Core Area began in the late 1940s and early 1950s with the relocation of activities that had been located in the Los Alamos townsite. At that time, there were minimal constraints to development. Significant growth in mission over the years has continued to drive the need for additional office and light laboratory space in the Core. Replacement of multiple major assets is overdue; large, outdated facilities such as Sigma and the Health Research Laboratory (HRL) consume large amounts of land area but are difficult and costly to replace.

Planning and consideration of the redevelopment of the Core Area has been ongoing for the past 20 years and has informed thinking about CMP planning for the next 20 years and beyond. Following an extensive engagement process with multiple stakeholders regarding infrastructure and planning needs, multiple fundamental strategies emerged specific to the Core. Some are long-standing, whereas others are more recent and resulted from shifting concerns related especially to security. The CMP has taken a strategic approach to growth and redevelopment in this area by controlling the pace of development relative to the need for coordinated demolition and new construction. Highlights of development strategies applied in the Core are summarized as follows:

- The Core Area will remain the Laboratory's administrative center and the location of its primary public interface.
- Support and service functions, which take up significant land area and/or whose employees often work at other locations (including maintenance craft and shipping and receiving) will be relocated outside the Core Area, freeing land area for new construction and helping to reduce congestion.
- Other functions that impact security, such as the Badge Office, will also be relocated outside the Core Area.
- New road construction and realignments will create improved circulation, provide opportunities for coordinated and efficient utility corridors, and enhance the pedestrian experience.
- Starting at the perimeter, which is less constrained by existing facilities, demolition of outdated facilities and infill with new facilities (including structured parking) will create more density and greater efficiency of land use and infrastructure.
- A pedestrian circulation network with integrated green spaces will create a quality campus environment within the Core Area.

- Security and emergency response goals will be coordinated with all design applications.
- A reconfigured entrance and new transit center will create an attractive new gateway to the Laboratory.
- Replacement of the Los Alamos Canyon (Omega) Bridge and its potential new location will be analyzed in the near future.
- The CMP will pursue design development of a new "mini-campus" model that enables collaborative, dedicated spaces that are capability specific.
- All development and redevelopment will be designed to achieve the highest standards of sustainability, including consistent application of the principles and techniques of LID/GI to the greatest extent practical.

10.1.2 *Core Area – Key Projects*

Health Research Laboratory

The 105,470-square-foot HRL building (TA-43-0001), which is located north of the main TA-03 campus and immediately west of the Los Alamos Medical Center, is aged and in poor condition. The facility is non-enduring and slated for disposition. Multiple options are being considered to relocate the capabilities housed in HRL, including leased space and new construction either in the Core Area or elsewhere onsite.

Los Alamos Research Park

Los Alamos Research Park (LARP) is a 44-acre tract located on West Jemez Road. Three parcels of land comprise the LARP. The largest, Parcel A (38.34 acres), is encompassed within TA-03; Parcel B (4.49 acres) and Parcel C (3.31 acres) are both part of TA-62. The property is leased to the Los Alamos Commerce & Development Corporation (LACDC), formerly the Los Alamos Economic Development Corporation, by the DOE through 2054. Terms and conditions of the lease include allowable and prohibited uses. In 1999, in accordance with the terms of the lease, LACDC prepared a Master Development Plan for the LARP, which ultimately allows for the construction of five buildings, with up to 450,000 square feet of space to accommodate 1,500 employees.

To date, only one building has been constructed. Building One, on Parcel A, was completed and occupied in 2001. It contains more than 83,000 square feet of specialty laboratory, office, and computing facilities. The building also includes the Synergy Center, which was designed to serve as incubation space for new and emerging technologies. Tenants include the Laboratory, the New Mexico Consortium, an education and research center of the University of California-San Diego Jacobs School of Engineering, and other private businesses. Currently, more than 200 employees work in the LARP in the fields of biotechnology, environmental technologies, education, advanced computing, technology training, telecommunications, nanotechnology, and energy efficiency.

Discussions are ongoing between LACDC and LANL/NNSA regarding potential public/private development options at the LARP that could provide future development in support of Laboratory expansion and mission growth.

Maintenance Shops, CMR, and Sigma

The Maintenance shops (TA-03-0038) comprise three aged facilities in the Core Area. This building has a large footprint and occupies valuable land resources. The CMP envisions that the Chemistry and Metallurgy Research (CMR) building (TA-03- 0029), Sigma (TA-03-0066), and the Maintenance shops will eventually be demolished from their present locations. Some of the functions and operations historically conducted in the CMR building will move to the Pajarito Corridor, whereas others will be relocated in new facilities—possibly within the Core Area. Sigma capabilities are expected to remain in the same relative location but will be replaced with modern facilities and new construction. The CMP shows a potential line item replacement of the shops building in TA-60,

which is a more appropriate location for its industrial-type use. This possibility will be further considered during the next phase of planning.

Los Alamos Canyon Bridge

The Los Alamos Canyon Bridge, sometimes referred to as the Omega Bridge, was built in 1951 for quicker and more efficient access to new facilities in what is now TA-03. Because of aging and normal wear, the deteriorated bridge will need to be replaced. Planning and engineering studies are ongoing, and actual replacement is anticipated for the early 2030s. The CMP shows one potential location for a new bridge that might align with a new entryway to the Laboratory. A modern, two-lane roundabout is envisioned to enable efficient, low-speed traffic flow, minimize congestion, and ensure capacity for emergency ingress and egress during a variety of weather, climate, disaster, and security scenarios.

Gateway

A new gateway to the Laboratory, designed in conjunction with bridge replacement and traffic flow measures, will create a pleasant and attractive arrival experience for both employees and visitors. Design will be appropriate to the functions, history, landscape, and cultural setting of the Laboratory's core campus. Navigation information will provide comprehensible, real-time information about campus routes, parking availability and other conditions relevant to access and circulation. All facilities will be designed for safety, convenience, and accessibility for all transportation modes and all abilities.

In addition to the gateway and incorporated access security facilities, the CMP includes a new Transit Center at the entry location. At the Transit Center, employees and visitors will be able to change modes of travel—most often from a motorized vehicle such as bus, car, or van to pedestrian, bicycle/or other single-person vehicle such as scooter, e-bike, shuttle, taxi, or other yet unimagined means of travel. The Transit Center will provide amenities, which could include locker storage and a café, and serve as a meeting place—especially at the start and end of the workday.

Other facilities that are contemplated in association with the gateway include the potential for a conference center. This location would have the opportunity to serve external visitors without the need for security clearances. These ideas and others are in the early stages of consideration and will be vetted and further developed over time.

10.1.3 *Core Area – Site Analysis*

The Core Area comprises TA-03 and portions of TA-43, -58, -59, -60, -61, -62, and Los Alamos Canyon and is the public face of the Laboratory. This area should be developed as a campus-style collection of facilities and site circulation. The following items summarize existing conditions and guide proposed development scenarios presented in this planning area:

- The non-descript gateway and entry sequence lack a sense of arrival.
- Traffic flow is concentrated on Diamond Drive, with morning and afternoon congestion at signaled intersections.
- Pedestrian circulation routes are limited.
- Bicycle circulation routes are limited.
- Parking is primarily concentrated on surface lots.
- New development is limited by topography and existing site utilities.
- No greenfield building sites are available.

10.2 Pajarito Corridor

The Pajarito Corridor Planning Area is the physical center of nuclear research and production at the Laboratory. Weapons production, testing, verification activities, and science functions are located in the Pajarito Corridor. At TA-55, the Plutonium Center of Excellence (PF-4) necessitates the presence of protective force personnel for security and mission support. Other functions in support of science research and development activities are located in the Pajarito Corridor, including radiological hot cells, high-energy laboratories, and fabrication. Large-scale warehousing, office space, and light laboratories also support the core missions in the Pajarito Corridor. In addition to TA-55, the Pajarito Corridor includes TA-35, -46, -48, -50, -51, -52, -63, -64, and -66.

The Pajarito Corridor supports the second largest population at the Laboratory, which is growing in response to increasing plutonium missions at LANL and expects to add several thousand new employees in the next 5 years. The increase in population necessitates additional office, light laboratory, and parking facilities. The combination of additional population and construction present a challenge for pedestrian circulation and traffic management. The Pajarito Corridor plan addresses the increased facility needs as well as creating safe walking experiences for the many employees who work at this location. Transportation planning is addressing access and parking planning/design and options for moving people throughout the Pajarito Corridor.

Although not likely to occur in the near- or mid-term planning horizons, the CMP acknowledges the eventual need for PF-4 upgrades or replacement. Near-term goals for the Pajarito Corridor are focused on maintaining and expanding core capabilities through the construction of new facilities and infrastructure as well as improving the everyday pedestrian experience for Laboratory personnel.

For purposes of the CMP, the Pajarito Corridor is divided into two focus areas:

- Pajarito Corridor-West: TA-35, -48, -50, -52, -55, -63, -64, and -66
- Pajarito Corridor-East: TA-46 and TA-51

The remainder of the Pajarito Corridor—east of TA-51 and comprising TA-18, a portion of TA-54, and a portion of TA-36—is discussed under Balance of Site (Section 10.5). The Pajarito Corridor west of TA-64 is considered part of the Core Area.

Because of the significantly increased population and the large amount of construction traffic that will be concentrated in the Pajarito Corridor, the Laboratory has initiated several transportation studies to address safety, security, traffic demand, parking issues, and storm water management. Traffic operations within the corridor are influenced primarily by vehicle interactions at intersections along the corridor. To reduce traffic congestion during the critical commuting hours, key intersection improvements on Pajarito Road are needed, at a minimum, at Pecos Drive, Puye Road, and Ivy Road. Additional improvements to keep traffic moving include signal synchronization at Gamma Ray, Pecos, Lubbock, and Puye, and a reduced speed limit of 35 miles per hour throughout the corridor.

Pajarito Corridor-West: TA-35, TA-48, TA-50, TA-52, TA-55, TA-63, TA-64 & TA-66

The Pajarito Corridor-West Planning Area has numerous mission drivers that guided plan development. The primary of these drivers is the plutonium mission in TA-55. Other major missions in Pajarito Corridor-West include chemistry, biology, Global Security, the National High Magnetic Field Laboratory, waste processing/staging, and physical security. This area is where the greatest increase in staff is both anticipated and already underway. Significant pressure exists to create sufficient work and support space for what is likely to be a doubling of the number of staff assigned to this mission-critical location. The majority of major new construction in the near-term will occur near TA-55 in the Pajarito Corridor-West sub-area. Key design concepts for the Pajarito Corridor-West plan are as follows:

- Increase overall occupant and parking capacities to support mission growth
- Coordinate placement of new facilities with existing site, utility, and infrastructure conditions to minimize development impacts
- Organize buildings around consolidated parking areas, especially parking structures
- Upgrade key intersections and provide limited vehicular access points from Pajarito Road to maintain peak traffic flow and provide safe access
- Migrate functions that do not require adjacency to TA-55 to alternate planning areas

Much of the proposed new construction in this area will need to occur in the immediate near-term to accommodate the rapidly increasing workforce needed to meet the expanded plutonium missions by 2026. Demolition, coupled with a robust and efficient construction plan, will enable more than 800,000 gross square feet of new construction and will accommodate more than 3,000 new staff in the near-term. Much of this construction will be focused in TA-48, -50, -52, and -63.

The CMP acknowledges near-term demolition of many aged facilities—especially at the perimeter of the Corridor—and relocation of trailers to make room for new construction. Mid-term demolition of end-of-life facilities is concentrated in TA-50 and TA-35—and to a lesser degree in TA-48—to allow for new construction to follow in the long-term and focus largely on building out a new campus in TA-35. Mid-term construction is focused on TA-48, with the potential for warehouse space, laboratories, and office buildings to replace TA-48-0001, the Radiochemistry Complex (RC-1). Other projected construction in the mid-term includes office buildings in TA-66 to support further consolidation of Global Security missions, a new office building in TA-35, and the Transuranic Liquid Waste Facility in TA-50.

Long-term plans in the Pajarito Corridor-West sub-area anticipate the demolition and replacement of RC-1 except for hot cells, which are expected to remain. Multiple execution strategies are being explored and may result in a line item replacement or several smaller replacement facilities as shown in the implementation plan. The CMP also allows for significant demolition of end-of-life facilities and buildout of a new campus at TA-35. The campus would include a variety of projects, including IGPPs or larger-scale line items, which would be focused on the functions and needs of the organizations that would be located there.

Pajarito Corridor-East: TA-46 & TA-51

Major missions in the Pajarito Corridor-East Planning Area include earth systems science and chemistry. This is an area in transition, with a long-term plan to serve the needs of expanding science missions. Key design concepts and drivers for Pajarito Corridor-East are as follows:

- Develop function-specific land-use areas to address long-term needs of the Laboratory's core functions
- Implement a robust disposition strategy to eliminate aged and poor-condition office and laboratory buildings
- Coordinate site placement of new facilities with existing site, utility, and infrastructure conditions to minimize development impacts
- Upgrade key intersections and provide limited vehicular access points from Pajarito Road to maintain peak traffic flow and provide safe access

TA-46 has long served as one of the Laboratory's basic research sites. This area is used for experimental work in materials science and chemistry. Multiple office and light laboratory facilities support these capabilities in TA-46. A new warehouse, completed in 2020, provides storage and assembly/cold testing in support of mission activities located in the Pajarito Corridor-West sub-area. The SWWS facility is located at the east end of the site. Long-term plans include replacement of the plant and interim upgrades to many of its existing components.

Facilities at TA-46 are generally old and inefficiently organized on the site. The CMP reimagines TA-46 as a small campus that targets science missions and some weapons support functions. This location has a robust base of infrastructure facilities and considerable potential for redevelopment on a larger scale and over time. Development at TA-46 could consolidate work from other areas of the Laboratory and help vacate additional aged and end-of-life facilities.

Two major projects anticipated in the near-term are a second warehouse and a new protective force facility. The latter could be developed in two phases at the western end of the TA over the near- and mid-term horizons. Structured parking that would serve the protective force and other users at the site would help address land shortage and topographic issues in that location. Other near-term buildings in TA-46 will include offices, light laboratories, a multi-use laboratory (MULAB), and a new Remote Communications Office that will be needed to serve the expanded facilities. Circulation will be reconfigured to create a more campus-like feel, and utilities will need to be extended to newly developed areas. Some functions currently in TA-48 facilities could also be relocated in TA-46. Development plans in this TA aim to reduce surface parking, allow wildlife migration corridors to remain undisturbed, and be sensitive to storm water management concerns.

Mid-term facilities will include Phase II of the protective force campus and additional laboratory/office buildings. Long-term demolition and buildout will occur at the east end of the site, with two additional laboratory/office buildings and two more office structures.

As part of the Pajarito Road improvements, the intersection with Ivy Road will be upgraded and the Ivy/Sunbeam intersection reconstructed to provide better circulation into and within the site.

TA-51 has the potential to evolve into a small campus for earth systems science and compatible organizational functions. Juggling existing infrastructure, new construction, a re-organization of the site, and removal of many transportables will be key to the redevelopment of TA-51.

In addition to a new office building planned for TA-51, three large new storage facilities are projected for the near term. Three more office/light laboratory buildings are anticipated in the mid-term, along with expanded and reorganized surface parking to accommodate planned growth.

10.3 National Energetic and Engineering Weapons Campus (NEEWC)

The NEEWC is the HE, engineering, and environmental testing site for the weapons programs at the Laboratory. It is central and critical to the success of the Laboratory's mission to ensure the safety, security, and reliability of the nuclear stockpile. LANL serves as both the design and production agency for nuclear weapons, relying on the integrated capabilities of scientific research, engineering, and testing—including unique properties associated with HE.

The NEEWC provides four primary capability sets:

- HE Research, Development, Test, and Evaluation and Shock Physics: Understanding of materials needed for weapon codes and weapon physics designers, both in HE and non-HE (inert) weapons
- Weapons Engineering and Inspection, Fabrication, and Testing: Design and fabrication of items for testing
- Detonator Research, Development, and Production: Production Agency for parts used in the stockpile
- Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) and Experimental Testing: Hydrodynamic tests and other explosives testing, including firing sites and testing facilities for vibration, shock, mechanical, thermal, and other experiments

The NEEWC is the largest of the planning areas, at approximately 17 square miles. The campus is a collection of aging facilities, with the majority of structures dating to the 1950s and some as old as the 1940s. For planning purposes, the area is divided into three primary sub-areas based on the scale and nature of operations that take place within each sub-area.

The plan for future growth in the NEEWC is focused on a strategy of consolidation, both geographically by capabilities and by scale of operations. Site planning goals include consolidation of functions for modernization and efficiency and development of a more campus-like setting, especially at TA-22 and TA-16. Most of the new and re-development activity is expected to take place in three smaller areas: Two Mile Mesa (primarily TA-22 and TA-40), TA-16, and TA-15. These areas align with and are incorporated within the sub-areas designated previously. The CMP also considers infrastructure reduction and opportunities for contracting operations geographically. Another consideration for the CMP is identifying enduring facilities, prioritizing line item construction projects, and determining key investments to ensure operational functionality well into the future. Planning is also influenced by the dispersed locations of two MPNHP sites—the Gun Site at TA-08 and V-Site at TA-16—and an effort to ensure accessibility to these sites in the future.

Small- to Mid-Scale Operations: TA-06, TA-14, TA-22, TA-40 & a Portion of TA-67

The Two Mile Mesa complex resides in TA-06, -22, and -40. The work performed in this location is central to LANL's national security mission of overseeing the nuclear weapons stockpile and supporting the development of new weapons for future applications. Small-scale HE operations will be consolidated in the TA-06/TA-22 area. Key projects for the Small- to Mid-Scale Operations Area include the following:

- The Energetics Materials Characterization Facility—the major facility planned for TA-06—will consolidate fundamental explosives capabilities (including analytic chemistry, sensitivity and safety testing, and energetic materials engineering and manufacturing) from 17 buildings in TA-09 and one building in TA-22 into this new facility.
- A new modular office building adjacent to the Energetic Materials Characterization Facility at TA-06 will allow programs to move personnel out of trailers and into permanent buildings. Renovation of existing facilities and construction of new office space and a new shipping/receiving and inspection facility are also planned for this sub-area.
- Medium-scale HE operations will be consolidated at TA-40, where renovation of existing facilities and construction of new office space are planned. Circulation and access improvements will aid security within and into this area. A proposed new roundabout may be part of a TA-03 connector to NEEWC without having to use public roads.

No major changes are anticipated at TA-14 or at that portion of TA-67 that falls within this planning sub-area.

Support & Fabrication Operations: TA-08, TA-09, TA-11, TA-16, TA-28, TA-37 & TA-69

TA-16 is a key and enduring part of the NEEWC complex. It is envisioned as a mini-campus of offices, laboratories, and shops, with a predominant focus on science and engineering and a secondary focus on HE operations. Over time, redevelopment in TA-16 will consolidate operations from various locations across the site. It will provide both classified and unclassified space as well as services and amenities such as meeting rooms, outdoor courtyards, and a cafeteria. It will also serve as a hub for Global Security missions and operational support activities.

The Weapons Engineering Tritium Facility (WETF; TA-16-0205) will continue to be an anchor at the site despite the move of some of the larger explosives activities to other locations. Continued investments will be made in enduring facilities, including the TA-16-0260 HE fabrication facility and burning ground operations.

Most of the investments planned in this sub-area are anticipated for the mid- to long-term planning horizon and will depend— in large part—on future mission scope. Key projects for the Support & Fabrication Operations Area include the following:

- The Cold Test Facility will consolidate and colocate functions and facilities that are currently dispersed at TA-46.
- A new Fire Station #5 will be constructed to replace the existing Fire Station #5 immediately to the north. The old Fire Station will be repurposed.
- Access and circulation improvements will provide improved site organization and support new utility corridors in anticipation of the need for expanded utility services for newly constructed facilities.

Large-Scale Dynamic Testing: TA-15, TA-36, TA-39 & TA-68

Large-scale HE testing operations will be consolidated at TA-15, -36, and -39, including large-charge HE storage. Outdoor firing will continue at these areas. Large-scale operations—such as system level and hydrodynamic tests and large-scale experimentation and engineering tests—will remain at TA-15 near large firing sites. Environmental testing will move from TA-16 to TA-15, and Radiography will move from TA-08 to TA-15 as part of the consolidation strategy. These moves, as well as upgrades to unique, mission-critical facilities including DARHT and remaining mission gaps (e.g., DARHT vessel repair), will be addressed through construction of facilities adjacent to the major experimental areas/facilities and will be staged over time. These areas/facilities include laboratories, offices, shops, and storage buildings. Key projects for the Large-Scale Dynamic Testing area include the following:

- The Radiography/Assembly Complex Replacement will consolidate and modernize existing TA-08-0023 radiography operations and TA-16-0410 assembly complex operations to TA-15 near major experimental facilities, resulting in significant operational efficiencies.
- The Environmental Testing Complex will be a new environmental testing mini-campus at TA-15 that consists of three facilities with identical footprints. The complex will be used for remote testing and consolidation operations currently conducted at TA-11 and TA-16.
- The Dual-Axis Radiographic Hydrodynamic Test Facility, also in TA-15, provides a critical enduring capability and requires upgrades and reinvestment. These upgrades/investments include a new optics room, an electrical upgrade, a vessel repair facility, and refurbishment of the Axis I accelerator. An all-weather enclosure was recently constructed at DARHT to allow for year-round operations regardless of environmental conditions.
- New office space and other facilities, including climate-controlled storage, are also planned in this sub-area to support continuing mission activities.
- A small office building and warehouse are planned at TA-39, Ancho Canyon, to support the large-scale outdoor firing points located there.
- A cross-country access road entirely on Laboratory property is under consideration to allow for the unrestricted movement of HE to and from TA-39 without having to ship over public roadways.

10.4 Los Alamos Neutron Science Center (LANSCE)

The LANSCE Planning Area at TA-53 comprises the Los Alamos Neutron Science Center, a National User Facility with one of the nation's most powerful linear proton accelerators (LINACs). LANSCE supports three of NNSA's core scientific capabilities: hydrodynamics, weapons nuclear science, and materials science. The material and nuclear data provided by LANSCE have been—and for the next several decades will be—critical to understanding nuclear weapons performance, reliability, and safety, as well as providing capability for basic and applied neutron science research to academia, national security, and industry.

Situated on South Mesa, LANSCE is entirely contained within TA-53. Physically separated from the main LANL site by East Jemez Road, TA-53 is accessed via its own guard station access control.

More than 600 personnel work at TA-53. The majority are scientists, engineers, and technical and support staff directly associated with accelerator programs and the scientific capabilities and programs of experimental physics. Additionally, TA- 53 hosts the Laboratory's contributions to the Advanced Sources and Detectors/Scorpius project that is designing a linear induction electron accelerator for the Nevada National Security Site. Personnel from other TAs have recently been consolidated at TA-53, which has led to a need for new office, laboratory, and storage space, as well as maintenance and refurbishment of existing aged facilities.

Maintenance needs are challenging because LANSCE was constructed in the 1960s and early 1970s, and significant investment is needed to modernize the equipment. Maintenance and repair projects must be scheduled during the portion of the year when the LANSCE beam is down—typically January through April. Storage needs are exacerbated by long procurement times for replacement parts for aged equipment and the numerous parts needed for equipment produced by different sources.

In the future, the Laboratory and NNSA must address the unmet scientific need to understand materials performance and production at the mesoscale—the goal of the Dynamic Mesoscale Material Science Capability. A possible solution to this need is an X-ray-free electron laser co-located with the LANSCE accelerator at TA-53. If approved, this potential project—known as the Matter and Radiation Interactions in Extremes (MaRIE)—would be built at TA-53 in the 2030s. MaRIE would provide a research capability that explores mesoscale dynamics to understand materials process-structure-performance relationships and the impact on stockpile systems.

Development of MaRIE would necessitate a major upgrade to onsite power utilities, construction of the new electron accelerator and experimental facilities, and a visitor center and training facility. Visitor housing and a second means of egress, primarily for construction and emergency access, are also under consideration but will require further evaluation.

The CMP allows for substantial investment in the LANSCE site. In the near term, investment will be directed toward addressing existing maintenance and staff consolidation needs. In the longer term and if MaRIE is approved, the project would bring significant expansion of the TA-53 site, including a mini-campus for the experimental physics staff.

The plan for future growth at LANSCE is focused on creating a more modern and pedestrian-friendly, campus-like setting. New facilities will be sited to better organize the campus and to more strategically co-locate functions. Because the site is on a long, narrow mesa top, future construction will maximize infill and use existing utilities to minimize development impacts and avoid environmental constraints such as cultural resources and threatened and endangered species. Transportation projects will improve parking and site circulation, including realigning internal streets and constructing new streets for easy access to future development. Areas east of the linear accelerator and south of the Weapons Neutron Research area will be held in "reserve" for future mission growth and expansion. Key projects for LANSCE include the following:

- New warehousing facilities (including climate controlled) will eliminate cluttered and dispersed storage sites, thus improving operational efficiency by siting storage adjacent to the operational areas where it is needed.
- Multiple office and light laboratory buildings will house growing mission staff and replace aged facilities.
- The MaRIE project will include large experimental facilities and multiple operational support structures such as office and light laboratory space, warehouses, a laser facility, and shipping and receiving.
- New administrative facilities, including a visitor welcome/training center and a guesthouse, will provide short-term housing for visiting facility users.

10.5 Balance of Site

10.5.1 *Balance of Site – Overview*

This section of the CMP provides an overview of the Balance of Site Planning Area, which includes the remaining TAs not specifically addressed in the four major planning areas (Core, Pajarito, NEEWC, and LANSCE) and leased space. It also ensures that the entire site footprint is addressed in the planning process. Twenty-one TAs and leased space are addressed in this planning area.

The general criteria used to distinguish Balance of Site TAs from TAs within specific planning areas include

- the anticipated scale, complexity, and significance of the associated near-, mid-, and long-term infrastructure investment;
- the size, remote location, and single mission;
- a capability primarily focused on sitewide industrial support or buffer/reserve area; and
- other unique context relative to sitewide capabilities and operations including leased space.

In some cases, TAs are divided between specific planning areas and the Balance of Site. In these instances, the capabilities and planning implications associated with a portion of the TA are more appropriately aligned with mission/capability and degree of infrastructure investment within a specific planning area.

A graded approach has been used to organize and present the Balance of Site footprint in the CMP. A couple of the Balance of Site TAs are focused on supporting a specific mission or capability and include plans for significant and/or relatively substantial near-term infrastructure investment (e.g., TA-33 and TA-72). These TAs, presented as “mini area plans,” are structured similarly to the larger area plans and include location, mission drivers, and capability overview; current operations/ capabilities; design concepts that drive the infrastructure investments; actual implementation plans and project lists; and NEPA strategy and considerations.

No substantial infrastructure investment beyond routine maintenance is anticipated for the remaining TAs, and they are presented in a manner that focuses on each TA's institutional context and function. The information specific to these TAs includes location/historical capability/operations, a current operations and infrastructure overview, and an overview of potential constraints pending analysis of future infrastructure investments.

The Balance of Site Area Plan also addresses key sitewide land or real estate ownership and leasing context that potentially influences future infrastructure investment planning (e.g., land conveyance/ transfer and acquisition). To facilitate effective planning and minimize the influence of emerging, undefined, or uncertain issues, the Balance of Site Area Plan has been developed using land ownership assumptions, including the following:

- The status quo defines the current conditions for planning purposes.
- NNSA will make final decisions regarding land ownership; Triad supports the decision-making as directed with planning and various analyses.
- The CMP is neutral, fact based, and does not establish any political position on what "should" occur regarding land ownership.
- Once future land ownership decisions are made by NNSA, the CMP will reflect the change and evaluate the planning implications as appropriate.

Within the Balance of Site planning footprint are several parcels of DOE land currently identified for eventual conveyance or transfer to a non-DOE entity. In the late 1990s, Congress passed Public Law 105-119, § 632 that directs the Secretary of Energy to identify and convey tracts of DOE/NNSA fee-owned land to LAC or its designee. For tracts to be considered eligible, they had to meet several criteria, including that they were no longer needed by DOE for the national security mission and that they could be restored or remediated for transfer by November 26, 2007 (subsequently extended to September 30, 2022). A robust and complex program for conveyance and transfer of associated lands has been implemented since the early 2000s. In accordance with 10 CFR 770, *Transfer of Real Property at Defense Nuclear Facilities for Economic Development*, DOE has recently determined that there are no additional properties that could be considered excess and recommended for conveyance and transfer at this time. The future decision regarding whether to retain or change the current land conveyance and transfer plan is the responsibility of DOE, NNSA, and NA-LA.

To facilitate an organized presentation of information, the domain of the Balance of Site is grouped into eight categories:

- Northeast (TA-21, -72, -73, and -74)
- Los Alamos Canyon (TA-02, -41, and -43)
- Industrial Support (TA-05, -60 [partial], and -61)
- Northwest (TA-58 and TA-62)
- Rio Grande Corridor (TA-33, -70, and -71)
- East Entry (TA-18, -36 [partial], and -54)
- Other (Rendija Canyon, TA-49, and TA-57 [Fenton Hill])
- Leased Space (e.g., TA-47 leased space in Santa Fe)

Future revisions of the CMP will continue to include a Balance of Site Planning Area to ensure that the entire LANL site continues to be considered. This planning area will continue to complement the specific area plans and be used as a mechanism to capture emerging or new infrastructure investments that could drive establishment of additional planning areas. It will also continue to provide sitewide context regarding land ownership and management.

10.5.2 *Balance of Site – Northeast – TA-21, TA-72, TA-73, & TA-74*

Northeast – TA-21

The TA-21 site comprises the eastern half of DP Mesa, south/southeast of Los Alamos townsite, and between DP Canyon on the north and Los Alamos Canyon on the south. This site formerly covered the majority of the mesa and served as a predecessor to the work that is currently performed at TA-55. TA-21 is physically separated from the main LANL campus and can be accessed only through Los Alamos townsite via DP Road.

The TA was historically divided into two primary research areas: DP West and DP East. DP West was the site of the former radioactive materials processing facility, where plutonium refining and plutonium metal production/recovery were performed from 1945 to 1978. DP East consisted of two tritium facilities that performed activities for energy, environmental, and weapons defense research. As part of a long-standing plan to close TA-21, some operations were discontinued beginning in 1993; tritium operations continued until approximately 2007. Some tritium operations were consolidated at WETF at TA-16, and others were relocated to Sandia National Laboratories. Administrative operations continued at TA-21 until the mid to late 2000s.

Because of decades of mission execution, the TA-21 site includes contaminated infrastructure and numerous SWMUs, AOCs, and MDAs (landfills). The appropriate infrastructure D&D and environmental cleanup at TA-21 have been an on-going effort since the late 1970s that continues today.

In 2009, the Laboratory received substantial funding under the American Recovery and Reinvestment Act (ARRA) to execute legacy infrastructure D&D and environmental cleanup. The TA-21 ARRA projects included surface demolition of all but one Cold War–era buildings and structures and cleanup of the site's original legacy-waste landfills. The primary objective of the TA-21 ARRA effort was executing D&D and environmental cleanup using residential land-use risk standards to facilitate the eventual transfer of TA-21 to LAC.

In terms of infrastructure, all that remains at the TA-21 site is a decommissioned radioactive liquid waste treatment facility (TA-21-0257), associated waste lines and storage tanks, and subsurface legacy structures including basements and utilities- related infrastructure. With the exception of a water line, no other active utility infrastructure remains on the site. Upon completion of clean-up activities, which include removal of contaminated sanitary sewer system piping and radioactive liquid waste lines, the old subsurface infrastructure—including potable water, fire-protection water, and natural gas lines—will remain in place with the option for removal by LAC upon transfer.

In 2018, the DOE-EM/NA-LA contracted with N3B to execute the legacy cleanup contract for the LANL site. Legacy infrastructure D&D/site cleanup is the predominant driver for future land use at TA-21. As such, the site is currently under N3B operational control for execution of an extensive legacy cleanup campaign. As this campaign is executed, DOE, NNSA, and DOE-EM will continue to evaluate the scope and timing of the TA-21 Land Conveyance and Transfer effort.

Northeast – TA-72 Mini Area Plan

The TA-72 Balance of Site footprint is presented as a TA-specific or "mini area plan" because, similar to TA-33, it has been identified as the location of some relatively significant infrastructure investments, as described in the following sections. As such, this section of the Balance of Site includes separate overview and implementation plan sections similar to other planning areas.

TA-72 is situated directly west and adjacent to NM 4 and extends westward to TA-53 and the approximate location of LANSCE. It encompasses the canyon bottoms of lower Sandia and Los Alamos Canyons and includes the transportation corridor for NM 502 (NM 502/East Jemez Road/Truck Route) and the intersection with NM 4.

Historically, TA-72 has been mostly undeveloped. It has served as the main transportation corridor for NM 502 and has included multiple aboveground and belowground utilities. It is currently the location of one of two main entry points onto LANL. In addition to the lower portion of East Jemez Road, TA-72 includes a temporary truck inspection station for commercial deliveries, LANL's protective force outdoor firearms shooting range, a variety of aboveground and belowground utilities infrastructure, and several groundwater monitoring wells. The shooting range is used for training on a routine basis, and the inspection station is staffed 24 hours per day, seven days per week. Otherwise, no employees are permanently located in TA- 72.

The primary mission drivers for the TA-72 mini area plan include support of institutional security goals, facilitation of moving warehousing operations out of TA-03 to a safer and more appropriate location, and construction of a more permanent infrastructure for truck inspection operations. Relocation of LANL's shipping and receiving operations out of TA-03 is also identified as a key component of the implementation plan for the Core Area. This relocation addresses site security and safety concerns and the need to repurpose industrial support space in TA-03 to facilitate construction of new office and light laboratory space for capabilities more aligned with the future use of the Core Area.

The CMP anticipates a relatively significant near-term investment in the construction of a new shipping and receiving complex on the east end of TA-72. This new facility would be located along East Jemez Road approximately 0.5 mile east of the intersection of NM 502 and NM 4. The new complex would be constructed to replace the shipping and receiving facility currently located in TA-03 (TA-03-0030). The activities currently conducted at the existing TA-72 temporary truck inspection station would be incorporated into the new complex, and the existing inspection station would likely be dispositioned. The primary design criteria for this infrastructure investment include the following:

- Modernizing operational efficiency for warehouse and distribution support functions
- Avoiding environmental and cultural resources constraints
- Minimizing warehouse and distribution support functions' impact on traffic flow

Although multiple potential sites were considered for construction of a new shipping and receiving complex, the location in TA-72 is the preferred site because it provides safe and secure access to NM 502 and NM 4, physical distance from LANL facilities, the ability to site and plan the complex with minimal site preparation and environment impacts, and sufficient developable site footprint to support current and potential future needs.

As indicated in the TA-72 mini area implementation plan, the new shipping and receiving complex will include the following elements:

- A 90,000-square-foot distribution warehouse
- A 22,000-square-foot office building
- A fleet vehicle parking area with approximately 200 spaces
- NM 502 traffic safety upgrades
- A substantial extension of utility services to support the complex

Current operations at the outdoor firearms shooting range will continue for the foreseeable future. Options for expansion in place or eventual relocation are currently being evaluated and will be presented as appropriate as CMP planning continues in the future.

Northeast – TA-73

TA-73 is located in the far north-central portion of LANL, north and east of LANSCE and adjacent to the Los Alamos Airport and NM 502. Historically, TA-73 provided industrial support functions, including site security access, equipment and materials storage, and most notably the former sanitary solid waste landfill.

The vast majority of the former TA-73 footprint has been transferred to LAC and encompasses the Los Alamos Airport, the former LAC landfill, and several adjoining tracts adjacent to NM 502. In 2018, an additional 19.5+ acres on the south side of NM 502 was transferred to LAC. A remaining parcel for transfer consists of approximately 70 acres and contains the historical East Gate Guard Tower, two water tanks, some utilities infrastructure, and several sheds. A portion of LAC's Canyon Rim Trail parallels the southern boundary of a portion of TA-73. The former LAC landfill is a Consent Order PRS that is currently managed by DOE-EM as a post-remedy site. The remedy for the landfill has been completed with the installation of an evapotranspiration cover and monitoring network.

Additional portions of TA-73 have been evaluated for transfer to LAC, but no specific dates for transfer have been established. No additional infrastructure investments are anticipated for the NNSA portion of TA-73.

Northeast – TA-74

TA-74 consists of four discrete outparcels located in the lower portion of Pueblo Canyon adjacent to the northeast region of LANL. These parcels were once part of a larger area owned by the DOE and transferred to LAC in the early 2000s under the Land Conveyance and Transfer Public Law 105-119.A fourth tract of land south of the preservation easements is still under consideration for potential transfer to LAC in the future. No known near-, mid-, or long-term infrastructure development plans exist for this Balance of Site footprint.

10.5.3 *Balance of Site – Los Alamos Canyon/TA-02, TA-41 & TA-43*

This section of the Balance of Site addresses a portion of Los Alamos Canyon that extends from the Omega Bridge eastward through TA-02, -41, and -43. This reach of the canyon borders LAC and private property to the north and DOE property to the south. It is addressed separately from the remaining reach of the canyon because of its proximity to the Core Area and somewhat unique considerations regarding infrastructure planning and constraints.

Although the Omega Bridge and the HRL building (TA-43-0001) fall within this physical footprint, they are addressed as part of the Core Area. Similarly, the reach of LAC that extends from the border of TA-02 eastward includes TA-53 and TA-72; the TA- 53 reach is part of the LANSCE Planning Area, and the TA-72 reach is addressed in a different section of the Balance of Site. Omega Road provides access to these TAs and runs the length of the canyon, from the LAC Ice Rink at the west to NM 4 at the east.

Historically, this portion of Los Alamos Canyon was directly adjacent to and south of the original early 1940s Manhattan Project site at former TA-01 and associated canyon slope outfalls and surface disposal sites. Throughout the next 60 years or so, the canyon bottom was used for a variety of remote experimental and materials storage functions. The historical infrastructure in this portion of the canyon included Omega Road, a secured materials storage complex (Ice House at TA- 41) and a unique research reactor (Omega West Reactor at TA-02). Since the 1950s, a significant portion the facilities and infrastructure in TA-41 and TA-02 have been or are scheduled to be removed. Because of the post-Cerro Grande Fire flood risk conditions and legacy-contamination issues, the Omega West reactor and its extensive support infrastructure were removed in the early 2000s. The core portion of the Ice House infrastructure remains at TA-41 and is currently scheduled for demolition in 2022.

This portion of the LANL footprint is considered no longer active for research and facility operations. However, Omega Road and multiple significant utilities (e.g., water, electrical, gas, and communications lines) are operational and are maintained accordingly. Omega Road has sustained significant damage since the early 2000s from post-wildfire flooding. Reduced to a single lane in many locations, it is considered suitable for only occasional access to utility infrastructure maintenance and environmental sampling and monitoring. Omega Road is also used by LAC personnel to access their groundwater wells and other utility infrastructure.

No significant new construction projects are planned for this area in the near-term. The CMP identifies a proposed new bridge in association with mid-term planning for the Core Area that, if executed, will require significant environmental permitting and regulatory compliance due diligence with potentially a long lead time.

10.5.4 *Balance of Site – Industrial Support – TA-05, TA-60 (Partial) & TA-61*

Industrial Support – TA-05

TA-05 is located in the north-central area of the LANL site and is accessed via a paved road from Pajarito Road at the western end through TA-63 and TA-52. The TA-05 footprint includes both mesa tops and a large, open area in the bottom of Mortandad Canyon and is north and adjacent to lands owned by the Pueblo de San Ildefonso. Historically, TA-05 was established in 1944 as a research-scale test-firing site but has remained largely undeveloped over time.

Currently TA-05 is largely undeveloped, and the only substantial NNSA physical assets within the TA are the ETA Substation Complex and a variety of other utility infrastructure. Multiple fire roads cross the site, generally running west to east with the topography.

The central portion of TA-05 largely occupies the bottom of Mortandad Canyon, which is the location of an extensive DOE-EM Consent Order legacy groundwater contamination project currently managed by N3B. This interim remediation and monitoring project is designed to address a chromium groundwater contamination plume that originated from legacy discharges of chromium-treated cooling water from the former power plant at TA-03. The project includes an extensive network of groundwater wells, overhead electrical lines, water lines, water treatment and equipment storage buildings, and roads. Although the project infrastructure currently belongs to DOE-EM, the surrounding land is owned by NNSA. The project is still in the remedy investigation phase, so it is unclear how long current operations will continue. The scope of the long-term infrastructure will not be known until the regulator (NMED) has selected a final remedy. Once a final remedy is selected, the long-term implementation of the project and associated infrastructure will likely become the responsibility of NNSA or the DOE Office of Legacy Management.

Industrial Support – TA-60 (Sigma Mesa)

The western portion of TA-60 is addressed as part of the Core Area. The remaining Balance of Site portion, known as Sigma Mesa, is located in the central portion of LANL between Sandia Canyon to the north and Mortandad Canyon to the south.

The most significant historical operations in this portion of TA-60 provided key infrastructure to support equipment (e.g., cables and diagnostic components) assembly and testing for underground testing conducted at the Nevada Test Site. The most prominent infrastructure included Buildings TA-60-0017, -0019, and -0045; the Historic Test Fabrication, the Rack Assembly, and the High Frequency Radio facilities, respectively. Support operations at these facilities were discontinued in the early 1990s. Over the years, this portion of TA-60 was also developed into an industrial and site operations support area. All three buildings date to the Cold War era and have been declared eligible for inclusion in the National Register of Historic Places under the NHPA.

The remainder of TA-60 is essentially an industrial support area, with warehouse buildings, extensive outdoor storage areas, facilities for waste management and recycling, fueling stations, and equipment storage. Grounds maintenance facilities include a new asphalt batch plant mixer that has the capability to recycle road millings into raw material. A group of five evaporation basins at the center of this portion of TA-36 serves to further remove silica particulates from the SERF facility and cooling tower waters located in TA-03. A 115 kV electric transmission line intersects this portion of TA-60 and connects with the TA- 03 substation complex and LANSCE.

As part of the primary electrical infrastructure upgrade at the TA-05 ETA substation, a new overhead transmission line and distribution lines will be constructed through this portion of TA-60. Other future infrastructure investment plans for this portion of TA-60 include the conversion of TA-60-0017 to a treatment and storage facility. Otherwise, this portion of TA-60 will continue to function as an industrial support area.

Industrial Support – TA-61

TA-61 is located on South Mesa in the north-central portion of the Laboratory, south of and adjacent to Los Alamos Canyon. It is bounded by the top of the ridgeline on the north and the bottom of Sandia Canyon to the south. Historically, TA-61 was primarily used for operational and industrial support purposes and included a variety of material supply and equipment maintenance facilities, the former LANL sanitary solid waste landfill, and the transportation corridor for East Jemez Road.

Current LANL operations within the TA-61 footprint include the main eastern VAP for the site, the transportation corridor for the western portion of East Jemez Road, key underground utilities, and a borrow pit. For the purposes of the CMP, future development within and around the footprint of the VAP is addressed as part of the Core Planning Area.

The western end of TA-61 contains a 15-acre parcel of land located on the site of the former landfill that is leased by DOE to LAC for operation of a waste transfer station and a 2.5 MW PV array. In the same general area, DOE also leases a 10- acre parcel of land to Los Alamos Transit Mix for concrete and aggregate processing and delivery. TA-61 also encompasses a 25-acre, privately owned mobile home park. The Elk Ridge Mobile Home Park contains 180 residential rental sites, ten recreational vehicle pads, and related amenities.

There are no immediate plans for infrastructure development within TA-61.

10.5.5 *Balance of Site – Northwest – TA-58 & TA-62*

Northwest – TA-58

TA-58 is situated in the northwest portion of LANL, west of TA-03, and immediately south of TA-62. Most of TA-58 can be characterized as relatively flat and undeveloped/forested open space. Historically, TA-58 has remained primarily undeveloped. TA-58 contains some Mexican spotted owl core and buffer habitat along the north edge of the site.

Currently, TA-58 contains an outdoor running track and some pedestrian trails used for exercise and recreation by Laboratory staff. It also includes a western portion of Mercury Road that connects the track to TA-03 and a portion of Anchor Ranch Road across the west end of the site that terminates at a guard station on NM 501 (West Jemez Road). Otherwise, the site includes an underground water main line, a communications line, and an underground electric distribution line that follows the existing road around the track and continues south to adjacent TA-06, -69, and -22. An overhead electric distribution line transects the site from the northeast to the southwest and into adjacent TAs to the south.

Some long-term infrastructure development is under consideration within TA-58. This development is addressed as part of the Core Planning Area, which identifies TA-58 as the site of three new office buildings and one multifunction research laboratory. It also proposes long-term construction of an internal connector road between the Core Area and NEEWC, traversing TA-58, and tying Anchor Ranch Road to Mercury Road at the center of TA- 03. This new road would allow internal transport of hazardous materials and would provide improved access among three significant population centers on the LANL site, including the Weapons facilities on Pajarito Road.

Northwest – TA-62

TA-62 is situated in the far northwestern portion of LANL, adjacent to USFS and LAC properties. It includes a portion of Los Alamos Canyon and publicly accessible portions of NM 501 and West Road. Historically, the majority of TA-62 has remained undeveloped except for serving as a transportation corridor for portions of NM 501 and West Road. The Los Alamos Canyon portion of TA-62 includes Jemez Mountains salamander habitat, and the bottom of the canyon in this portion of the TA is considered a sensitive floodplain. Multiple cultural resources sites are present near the boundary of TA-62.

In addition to serving as a transportation corridor, TA-62 includes various aboveground and belowground utilities, including electrical power transmission lines, communications lines, water tanks, and underground water lines. The eastern portion of TA-62 is included in the LARP lease between LACDC and the DOE. Other than road maintenance and improvements planned for West Road, no near-, mid-, or long-term infrastructure investments are currently planned for TA-62.

10.5.6 *Balance of Site – Rio Grande Corridor – TA-33, TA-70 & TA-71*

Rio Grande Corridor – TA-33

The TA-33 Balance of Site footprint is presented as a TA-specific or “mini area plan” because it has a single mission and has been identified as the location of significant near-term infrastructure demolition and new construction investment. As such, this section of the Balance of Site has been organized to include separate overview and implementation plan sections similar to other planning areas.

TA-33 (Hot Point Site) is situated in a remote southeastern portion of LANL west of and directly adjacent to the western bank of the Rio Grande in White Rock Canyon. TA-33 also borders NM 4 and Bandelier National Monument property managed by the NPS. It extends northward to TA-70 and westward to TA-39.

Historically, TA-33 was originally developed in 1947 as a substitute test site for implosion-type initiator experiments being conducted at the Trinity Site in southern New Mexico. Over the years, weapon component tests have been performed at various locations within TA-33 and have included underground and surface experiments, many using large guns that fire experimental projectiles into bermed areas. Firing tests were discontinued at TA-33 in 1973 and resumed in the 1990s. Other significant facilities at TA-33 include the former high-pressure tritium facility—operated at TA-33 from the mid-1950s until late 1990— and an antenna of the National Radio Astronomy Observatory (NRAO) Very Long Baseline Array radio telescope, which was sited at TA-33 in 1985 and is still in operation. The tritium facility was decontaminated in 2002 and demolished in 2003.

The TA-33 site is currently operated by LANL Global Security and is used for a wide range of programmatic, experimental, and training operations. The remote location and unique infrastructure provides ideal security conditions for conducting specialized mechanical and electrical component fabrication and testing, small-scale open-air testing, and special radiofrequency testing and experiments. A large portion of the TA-33 footprint and associated infrastructure is managed as a Limited Area. The portion of TA-33 that encompasses the east-facing slopes of White Rock Canyon has been designated as the White Rock Canyon Reserve (see Section 9 Land Use Management).

TA-33 comprises several discrete operational areas. The main site is directly adjacent to NM 4 and is the central administrative area. This area includes offices, conference rooms, break rooms, machine shops, an anechoic chamber, and light laboratory/shop secured space. Adjacent to the main site is a historical guard station and water tower and two office/equipment storage buildings. Additional specialized storage and warehouse facilities are located along South Site Road within the adjacent South and Tower sites. The NRAO Very Large Array telescope

area is located southeast of the TA-33 entrance on Hot Point Road. This area includes several bunkers, equipment and support facilities, and multiple former and potentially future open-air firing sites.

The primary mission driver for TA-33 is to ensure that the site continues to provide unique programmatic and experimental capabilities that cannot be relocated to another LANL location, which recognizes that the current and future capabilities at TA-33 require remote field conditions and isolated infrastructure. The customer base for the TA-33 capabilities has increased nearly 50 percent in the last 2 fiscal years, and the associated Global Security mission growth is necessitating near-term infrastructure reinvestment. Much of the infrastructure and facilities within TA-33 are aging, are in poor condition/constant need of maintenance, and require upgrades or replacement. The aging and poor condition of existing infrastructure are constraining the site's ability to respond effectively to the near- and mid-term needs and opportunities associated with this mission growth. In addition, new security requirements indicate that existing secured space at TA-33 is in urgent need of replacement. Finally, under the current operational configuration, the developable footprint of the site is extremely limited, which means that new construction will require demolition of existing site infrastructure.

The CMP allows for significant near- and mid-term investment in demolition and new construction at TA-33. The scope and phasing of the investment are illustrated in the TA-33 implementation plan. The new construction will be closely coordinated with infrastructure demolition to ensure efficient use of the limited developable site footprint. The design concepts for the TA- 33 infrastructure investment focus on the main campus site entrance and include dispositioning existing aged or noncompliant facilities, constructing modern classified offices/warehouses/machine shops, and maintaining current operations/capabilities throughout the rest of the site.

Near-term demolition plans include removal of approximately 45,000 square feet of failing or aging machine shops, office/light laboratory space, storage buildings, and temporary transportables. Mid-term demolition will include removal of approximately 11,000 square feet of old laboratory, test facility, and transportable space. Key construction (mostly in the near term) will create approximately 76,000 square feet of new space, including

- 6,000 square feet of multi-use office and secured space,
- a new 5,000-square-foot machine shop,
- 14,200 square feet of training and materials testing facility space,
- 4,000 square feet of warehouse space, and
- 16,500 square feet of classified office space (mid and long term).

Rio Grande Corridor – TA-70 and TA-71

TA-70 and TA-71 are located in the southeast corner of LANL, bordering the western side of the Rio Grande in White Rock Canyon. The town of White Rock is situated to the northeast. The main Ancho Canyon drainage and floodplain mark the boundary between TA-70 and TA-33.

Historical operations within the TA-70 and TA-71 footprint are believed to have been associated with remote and dispersed explosives testing and operations. Otherwise, the area has remained undeveloped.

Currently, the combined TA-70 and TA-71 area functions as undeveloped buffer adjacent to HE experimental operations and Global Security program areas to the west and south, respectively. In terms of infrastructure, electric power and a colocated overhead communications line are the only utilities located within the two TAs. TA-71 includes the STA Electric Substation Complex, which receives power from the 115 kV PNM–owned Reeves Line. As one of two main site transmission lines, the STA Electric Substation Complex then transfers power to the LANL electric grid.

Together, TA-70 and TA-71 contain the largest number of publicly accessible recreational trails on the LANL site. Triad provides trails management and site stewardship, with overarching considerations for safety, LANL

operations and liability, and national security. Based on historical land use, TA-70 and TA-71 are assumed to potentially contain abandoned unexploded ordnance. Triad posts c0lear warnings and instructions for all trail users regarding how to safely avoid or report unexploded ordnance if encountered. A large portion of TA-70 and a portion of TA-71 are included in the White Rock Canyon Reserve. No infrastructure development is anticipated for this area in the near, mid, or long term.

10.5.7 *Balance of Site – East Entry – TA-18, TA-36 (Partial) & TA-54*

East Entry – TA-18

TA-18 is situated in the central portion of the Laboratory, located in the bottom of the middle reach of Pajarito Canyon at the confluence of Pajarito and Three Mile Canyons.

Historically, TA-18 was one of the first TAs built within what is now LANL. TA-18 was established in the mid-1940s to support relocation of nuclear materials experiments conducted at the original site of the Manhattan Project near what is now Ashley Pond in the Los Alamos townsite. From the late 1940s through the late 1990s, TA-18 was the site of the Los Alamos Critical Experiments Facility and was used to support a wide variety of experimental activities for special nuclear materials stockpile management, stockpile stewardship, emergency response, nonproliferation, safeguards, and training. In 1998, the majority of operations at the site was suspended and gradually either terminated or relocated to other locations at LANL and throughout the DOE Complex. All remaining facilities and infrastructure at TA-18 were eventually decommissioned by the mid-2000s. Between 2010 and 2016, the vast majority of the experimental and industrial infrastructure within TA-18 was demolished.

Currently, no operations are being conducted in TA-18; however, a developed road provides access to large-scale dynamic testing facilities within the NEEWC Planning Area. The remaining structures at TA-18 have been declared historically significant and have been preserved as part of the MPNHP. Any future development of TA-18 will require considerable planning regarding evaluation of the constraints identified in this section.

East Entry – TA-36 (Partial)

The majority of TA-36 is addressed in the NEEWC Planning Area. This small Balance of Site portion (approximately 20 acres) is located on the eastern end of TA-36 and includes a VAP that controls all vehicles that enter Pajarito Road and the Pajarito Corridor from NM 4 in White Rock. This portion of TA-36 is addressed in the Balance of Site section because of the unique site security function provided by the associated infrastructure.

Historically, this portion of TA-36 was primarily used as the Pajarito Road transportation corridor and did not include a VAP. Before 2002, Pajarito Road was publicly accessible and was used as one of three travel routes between White Rock and Los Alamos. In 2002, DOE identified the need to permanently increase security entering the LANL site and restricted vehicular access to the Pajarito Corridor. Subsequently, the VAP was constructed, and in 2013, access to the Pajarito Corridor was restricted to badge holders. The VAP site consists of four security checkpoints and a 200-square-foot security building with limited utility connections.

No current near-, mid-, or long-term plans exist for infrastructure in this portion of TA-36.

East Entry – TA-54

TA-54 is located in the east-central portion of the Laboratory south of and directly adjacent to San Ildefonso Pueblo lands. The majority of TA-54 is situated on top of heavily developed Mesita del Buey. Since the 1960s, TA-54 has been used for institutional solid waste and liquid waste characterization, management, storage, and disposition. Consequently, the majority of the footprint includes an extensive array of subsurface MDAs including landfills, trenches, pits, and shafts. The aboveground infrastructure includes a multitude of utilities, roads, fences,

buildings (temporary and permanent), and other structures required to safely execute the associated waste characterization, storage, management, and disposition operations.

The TA-54 footprint is unique because ownership is divided between NNSA and DOE-EM. Consequently, the management of infrastructure and operations is divided between Triad and N3B. The footprint was divided in 2018 when DOE effectively transitioned the execution of the legacy site cleanup mission from the NNSA M&O to the DOE-EM contractor (N3B) under a the Los Alamos Legacy Cleanup Contract.

As part of this transition, the majority of the TA-54 footprint and infrastructure was transferred from NNSA to DOE-EM through a Transfer Memorandum of Understanding (TMOU). The western and eastern ends of TA-54 were retained by NNSA to support ongoing institutional waste management operations and protection of sensitive cultural resources. The western portion includes TA-54-0038, the Radioassay and Nondestructive Testing Facility, and a variety of other buildings, utilities, and infrastructure. The eastern portion includes a regionally significant and historically protected cultural resources site called Tsirege.

The TMOU includes specific agreements that establish the NNSA/DOE-EM and Triad/N3B interface within the DOE-EM portion of the TA-54 footprint. These agreements are most relevant to managing operations but include some specifics with implications for managing infrastructure. Under the TMOU, NNSA agrees to continue to own, operate, and maintain all air quality–monitoring infrastructure and all utility assets (e.g., electrical, water, gas, sewer) up to transition points specified in the TMOU. Utility assets do not include fiber-optics copper telecommunications lines.

Regarding the CMP, no significant infrastructure development or demolition plans or projects have been identified for TA-54 (NNSA and DOE-EM portions) in the near, mid or long term. Triad will continue to conduct routine infrastructure maintenance activities within the NNSA portion of TA-54. Routine infrastructure maintenance activities within the DOE-EM portion of TA-54 will be implemented consistent with the TMOU.

10.5.8 *Balance of Site – Other – TA-49, TA-57 (Fenton Hill), and Rendija Canyon*

Other – TA-49

TA-49 is a remote and mostly undeveloped site located along the southern border of LANL adjacent to NM 4 and NPS lands (Bandelier National Monument). Historically, TA-49 was used for a variety of aboveground and belowground research initiatives that required a remote setting with limited and controlled access.

A small complex of buildings, located at the gated entrance off NM 4, provide backup and support for the main Emergency Operations Center at TA-69. Three helipads and a dip tank for the Santa Fe Interagency Helitack firefighting team are also sited in this location.

TA-49 serves as an established training ground for handling various hazardous devices and explosives. Much of the site contains diverse equipment and training props used for scenario exercises and instruction.

A 115 kV overhead electric line traverses the site from east to west, between the WTA electric substation in TA-06 and the STA substation in TA-71, providing needed redundancy. A 13.2 kV overhead power line and a water pressure main parallel NM 4 along the TA's southern boundary. The complex is served by a small septic system. Water, electric, and communications services extend to the training area at the center of the site.

TA-49 is expected to continue to serve as a valuable training asset to both LANL and partner organizations, including the USFS and the Department of the Interior, with no significant development anticipated in the near, mid, or long term.

Other – TA-57 (Fenton Hill)

TA-57, otherwise known as Fenton Hill, is a remote site located approximately 35 miles west of LANL. The site is located on property owned by the USFS and historically used by DOE under an Interagency Agreement. This agreement has expired and is currently being evaluated for renewal. The site occupies approximately 20 acres and is located on Lake Fork Mesa, which is bordered to the south by Lake Fork Canyon and to the north by Barley Canyon and Rio Cebolla.

LANL research operations have been conducted at TA-57 since 1974. It was originally established as a research site to support an experimental geothermal energy program, known as Hot Dry Rock (HDR)—designed to test the feasibility of extracting heat from deep geologic units near the Valles Caldera.

When the HDR project ended in the early 1990s, the 5 million–gallon covered pond originally constructed for the HDR program was converted to a gamma-ray observatory. The gamma-ray observatory began operating in 1996, was decommissioned in 2008, and was removed in 2019.

TA-57 is currently used to operate a fully automated observatory in support of Global Security missions. The area is well- situated for the observatory use because of its 8,700-foot elevation and its lack of light pollution due to its remote location. Although no LANL personnel are stationed at TA-57, some onsite work takes place periodically.

Due to recent programmatic growth within the Global Security mission, a 3-year investment plan for the repair, maintenance, and upgrade of infrastructure and equipment was implemented at the site. Upgrades included the purchase and installation of surge protection for electrical infrastructure, new cameras, optical network repairs, and telescope assemblies—all of which sustain and grow the capabilities at this location. A perimeter-monitoring system is being installed so that collected data can be securely streamlined and delivered to the main LANL site. The current operations at TA-57 are critical to the Global Security mission and programs, which are expected to continue and expand at the Fenton Hill site.

Aging LANL facilities at TA-57 are in need of replacement to maintain the capabilities and infrastructure needed to support current and future mission. Anticipated infrastructure replacements would include a small, temperature-controlled structure with a conference room, a light laboratory/shop, and a storage building for communications and computing equipment.

Rendija Canyon

Rendija Canyon is a unique area of DOE-owned property located north of the Los Alamos townsite and separated from the LANL site. Before World War II, the U.S. issued an emergency proclamation that resulted in federal acquisition of lands throughout what is now LAC. The area of land regarded as Rendija Canyon was withdrawn from public holding in 1944 and granted to the Secretary of War for “the duration of military necessity.” The land, identified as the “Project Y and Los Alamos Demolition Range,” was used during the war primarily for direct and indirect fires training and qualification of garrison personnel using mortar system anti-tank guns.

Under Public Law 105-119, most of the land within Rendija Canyon owned by the federal government was deemed eligible for conveyance. All regulatory due diligence has been completed (e.g., NEPA) for transferring Rendija Canyon. The real estate transaction is pending; it is currently scheduled to be transferred to LAC in 2023.

The majority of the 830-acre Rendija Canyon site is accessible to the public and is used for recreational purposes. Because of the historical land use, several areas within the canyon are associated with the former use of ordnance but not hazardous or radioactive materials. The majority of the sites have been successfully mitigated, but some still require periodic surveys. Safety precautions, such as signage that warns of the possible presence of unexploded ordnance, continue to be implemented. Also, a parcel of land within the Rendija Canyon footprint is leased to

the Sportsman's Club for use as a small arms firing range. Otherwise, federally owned infrastructure within Rendija Canyon is generally limited to roads and fencing. LAC maintains an overhead 13.8 kV power line and a 16-inch water main that traverse the site along Rendija Road, which runs east/west through the center of the site.

Pending transfer of this large parcel of land, Triad is assisting NA-LA in developing and executing an operations management plan for Rendija Canyon as a secondary facility to the LANL site. The management plan will ensure that all applicable operational and regulatory requirements are appropriately executed while the property is under DOE ownership. Currently, no near-, mid-, or long-term development plans exist for Rendija Canyon.

10.5.9 *Balance of Site – Real Estate Program/Leased Space*

The Laboratory currently manages 42 leases totaling 405,104 gross square feet. These leases are primarily used to provide office and office support space. An overwhelming majority of these leases are located in LAC, with most in the townsite and several in the nearby White Rock community. Additionally, the Laboratory manages two leases in Carlsbad, New Mexico, that support the Waste Isolation Pilot Plant and the National Transuranic Program established by DOE-EM. Most of these facilities have been leased by the Laboratory for some time. Space needs have continued to increase with the steady mission growth over the last 5 years, and additional office facilities are needed. Furthermore, the Laboratory has not been able to effectively modernize or repurpose onsite office facilities over the past two decades. Much of the existing office space is aged, in poor condition, or configured inadequately to support the needs of current Laboratory staff.

Based on the forecast for continued growth, the Laboratory recently examined opportunities to lease existing office space within 50 miles of the campus. Consequently, the Laboratory was able to add more than 112,000 gross square feet of office space in Santa Fe during 2021. Because of the success of the office space leases, the Laboratory is now pursuing existing light laboratory space for lease within 50 miles of the campus. Light laboratory space is another critical need as missions expand and existing light laboratories continue to age. The Laboratory will also pursue existing warehouse space for lease in the same 50-mile radius. Warehousing and storage space are needed to support near-term needs for the infrastructure upgrades, equipment installations, and new facility construction to enable the expanding plutonium missions.

The Laboratory's Real Estate Program continually analyzes office space utilization on and off campus and strives to improve space utilization through appropriate space-management practices. For example, the Real Estate and Space Management programs, working collectively, have developed strategies to support telework at LANL. Several leased office buildings have been converted to enable use in a variety of telework modalities, which has significantly improved space utilization and established future standards for onsite office facilities.

These programs also collaborate on the assignment of space to determine the best-suited occupants—both on and off campus. The overall strategy is to manage the use of offsite leased and onsite office space for the most appropriate occupants. Generally, offsite leased space is assigned to operations and support staff, whereas onsite space is for mission-focused staff. This approach enables the Laboratory to relocate support staff off campus and provide existing onsite space for mission-centric staff.

The Laboratory will continue to make improvements in leased office space utilization. This effort will be realized through improvements in space management, use of telework, and proper alignment of occupants and function. As utilization increases, existing leased spaces will be evaluated for possible exit. The overarching goal is to utilize leased space for the most appropriate purpose and exit leased spaces as new facilities are constructed on campus. The Real Estate Program has developed data-centric dashboards to allow for real-time analysis and feedback on facility condition, occupants, and utilization. These data will be crucial as the program continually strives to utilize space in the most cost-effective manner moving forward. This program coordinates with the CMP effort by monitoring future and current projects and their impacts on current occupancy and future leased space exit strategies.

11 CAMPUS MASTER PLAN IMPLEMENTATION

11.1 Implementation Overview

A new comprehensive site planning capability has been developed for the Laboratory. This planning capability provides an institutional, integrated, transparent, and repeatable process to collect and analyze mission/programmatic/ organizational priorities, needs, and planning issues. It also provides a mechanism for developing and iterating planning solutions that enable informed decisions about near-, mid-, and long-term infrastructure investments for the site (see Section 5 Planning Considerations).

To date, this effort has been focused on putting the process, analytical/production tools, and customer and stakeholder communications network in place to develop this CMP. Beginning in FY22, this capability will transition from CMP development to CMP implementation. As this transition occurs, many of the key elements of the capability will be retained and refined to meet the ongoing needs, challenges, and opportunities associated with effectively implementing comprehensive site planning at the Laboratory. The capability elements that will be retained and refined include the following:

- The CMP planning process will ensure that the infrastructure investment and implementation scope is developed effectively in a manner that is fully integrated with LANL's mission/program/organizational function/needs and important site conditions (e.g., requirements, constraints, and opportunities).
- The CMP product framework will ensure that the infrastructure investment and implementation scope are developed and communicated systematically, effectively, and efficiently.
- The robust CMP tools will enable advanced, efficient, and flexible data gathering and analysis and generation of high-quality planning products.

The CMP implementation process will be revised as appropriate to be responsive to new institutional planning needs, challenges, and opportunities. The following section provides an overview of the CMP implementation approach and scope that will be initiated and implemented in FY22.

11.2 Implementation Approach & Scope

The CMP planning process and product effectively position the Laboratory to transition the comprehensive site planning capability from development into implementation. As this process occurs, the Laboratory will refine site planning goals and priorities initiated in FY21, further integrate with key NNSA planning and budgeting processes, expand existing CMP planning processes and tools, and pursue new planning initiatives.

11.2.1 *FY21 Site Planning Refinement*

The infrastructure planning within the Pajarito Corridor-West Planning Area continues to be a dynamic and rapidly changing process as new programmatic and tactical decisions are made regarding the plutonium missions in the Pajarito Corridor. The current CMP planning process will continue to be used to facilitate and inform strategic/tactical decisions regarding the siting and sequence of infrastructure investments within this planning area. The CMP planning process and product will be used to both inform and communicate the decisions regarding the near-, mid-, and long-term infrastructure investments. The CMP is not intended to provide the equivalent of the operational and regulatory due diligence that will be required to execute the infrastructure improvements proposed for the Pajarito Corridor-West Planning Area.

The infrastructure planning initiated for the Core Area in FY21 successfully identified the key LANL missions, capabilities, and stakeholders that occupy the planning area. It also provided a robust understanding of the complex drivers, planning issues, and constraints most relevant to executing future infrastructure disposition and investments. These planning efforts enabled the development of a conceptual near-, mid-, and long-term vision and implementation plan that provides a robust and flexible basis for further planning. In FY22, the CMP planning process will continue to engage key stakeholders in this planning area to refine programmatic strategies that better enable execution of mission requirements and capabilities through creative and innovative infrastructure investments and space utilization. The CMP Core Area plan will be revised as this planning effort continues.

A more comprehensive and detailed utilities infrastructure plan is needed to support the planned development shown in the CMP. This plan will develop and evaluate detailed utilities infrastructure investment and implementation strategies that would otherwise not necessarily be addressed during the CMP planning process. The FY22 CMP implementation effort will be integrated with this separate planning process, and the resulting utilities infrastructure implementation priorities, strategies, and projects will be used to revise the CMP as appropriate.

In the process of developing the transportation-planning portion of the CMP, the focus has been on identifying and evaluating critical immediate and near-term transportation priorities and issues. Key transportation infrastructure projects have been identified that must proceed in the near term to address critical transportation issues. However, it is evident that defining and implementing a more robust, efficient, and sustainable transportation strategy (locally and regionally) for the site require further analysis and planning before execution.

In addition, the dynamic nature of current planning within the Pajarito Corridor-West and core planning areas continues to generate new local and regional transportation issues that will require new transportation infrastructure investment plans, strategies, and projects. Transportation planning (local and regional) is anticipated to be a key effort as CMP planning continues in FY22.

11.2.2 *Budgeting Processes Integration*

As the CMP planning process transitions into implementation, the CMP will further coordinate with key NNSA planning, prioritization, and budgeting processes and deliverables that facilitate complex-wide infrastructure investments. NNSA has clearly communicated the expectation that NNSA sites prepare and use a comprehensive site plan to identify, prioritize, and request funding for new infrastructure projects. The CMP will be used for this purpose, and refining the integration process will ensure that the scope and status of infrastructure planning are communicated in an efficient, accurate, and timely manner to better support these NNSA processes.

The CMP implementation process will also be used to improve the processes for planning, prioritizing, funding, initiating, and executing institutional indirect-funded projects. The CMP planning process provides an institutional—not just organizational—planning capability that enables organizations to better define and prioritize institutional infrastructure projects that require indirect funding. This integration will also facilitate the processes required to communicate and secure NNSA funding and authorization for proposed infrastructure projects.

11.2.3 *Planning Tools Expansion*

CMP implementation is expected to be a dynamic and iterative process that reflects ongoing changes in mission requirements and execution, capabilities, needs and priorities, planning issues, infrastructure, and site conditions. As this planning process proceeds, there is a need to implement, track, and communicate changes in a systematic, timely, and defensible manner regarding all aspects of the CMP (e.g., narratives, graphics, and data). This effort will be a key component of managing the implementation of the CMP.

The CMP planning process and product is now considered a valuable source of Laboratory site infrastructure planning information and data, which are expected to be key to improving the Laboratory's capacity to support the NNSA programming and budgeting processes described previously. Data gathering, analysis, and communication tools will be improved to enhance the fidelity and utility of requested planning products. The CMP implementation process will also continue to invest in innovative technologies and applications that enhance the CMP GIS and data management capabilities.

11.2.4 *Other Planning Initiatives Support*

One of the key requirements for developing and implementing the CMP is appropriate integration with the NEPA process under 10 CFR 1021 (DOE, 2011; Rev. 2021). A key component of the CMP planning process has been to ensure that the CMP and NEPA planning processes are closely integrated. The CMP planning process provides information and context that may enable NA-LA and the Laboratory's NEPA Program to directly access the scope and context of currently proposed near-, mid-, and long-term site infrastructure investments and related actions. This integration has facilitated better planning and provided an opportunity to proactively evaluate NEPA compliance considerations in advance of regulatory due diligence, project initiation, and execution. The CMP implementation plans define much of the proposed physical infrastructure scope (nature, purpose, and timing) that may be used in developing the purpose and need, proposed actions, and alternatives required in NEPA analyses. They also provide access to the network of key managers and stakeholders who will be required to complete ongoing and future NEPA analyses. As the CMP is implemented, this planning integration will continue to be a priority, and the CMP infrastructure scope, data, and associated context will be available for the development of future NEPA analyses, including a new SWEIS for the LANL site.