

stakeholders to overcome barriers to wind energy implementation. EERE's principal research vehicle to accomplish this goal is the NWTC.

NREL's Distributed Energy Resources (DER) Center and Distributed Power Program supports the development of technologies and policies that enable distributed generation (e.g., photovoltaic, wind, fuel cells, and microturbines), storage, and direct load control technologies to be integrated into the electric system. Through a collaboration of the national laboratories and industry partners, DOE's Distributed Power Program is pursuing activities in the following three areas: 1) strategic research, 2) system integration, and 3) mitigation of regulatory and institutional barriers.

Distributed power is modular electric generation or storage located near the point of use. Distributed systems include biomass-based generators, combustion turbines, concentrating solar power and photovoltaic systems, fuel cells, wind turbines, microturbines, engines/generator sets, and storage and control technologies. Distributed resources can either be grid-connected or operate independently of the grid. Those connected to the grid are typically interfaced at the distribution system. In contrast to large, central-station power plants, distributed power systems typically range from less than a kilowatt (kW) to tens of megawatts (MW) in size.

A prime and unique function of NWTC is its interaction with and use by the American wind industry clients/partners in the Industrial User Facility and other test sites. As a part of the fulfillment of the Wind Program's mission to promote and facilitate commercialization of wind energy technologies, joint projects are conducted with various industrial partners and groups.

The Proposed Action would provide and maintain enhanced facilities and infrastructure that would adequately support the site purpose of state-of-the-art alternative energy research. Specific purposes and needs for key improvements are summarized as follows:

- New or enhanced Structural Blade Testing Facility, Dynamometer Test Facility and test pad facilities are needed for research involving larger, state-of-the-art turbines (a dynamometer is an instrument used to measure mechanical power).
- New or enhanced hybrid power and independent power facilities that are designed for a full range of DER research are needed to allow testing of advanced technologies. These technologies include photovoltaic, wind, fuel cell, micro-turbine, concentrated solar power, storage, combined heat and power, modular biomass, and others.
- New or upgraded office facilities, utilities, security improvements, and other necessary infrastructure are needed to allow for greater flexibility and efficiency of research configurations, alternatives, and testing possibilities.

1.2 SITE DESCRIPTION

1.2.1 Site Background and History

The 305-acre NWTC is located in northwest Jefferson County, Colorado, approximately 16 miles northwest of Denver. The site is south of Highway 128 and directly east of aggregate mining and processing facilities on the east side of Highway 93 between Golden and Boulder, Colorado. The Boulder/Jefferson County line is the site's northern boundary line. A regional location map is presented in Figure 1-1. A local setting map is presented in Figure 1-2. A site map is presented in Figure 1-3.

Since the mid-1970's, DOE has conducted wind research and development activities at the NWTC, formerly the Wind Energy Test Center, which is located within the legal boundaries of the buffer zone of the RFETS. Although the entire RFETS, including the buffer zone, is currently designated under CERCLA, the buffer zone was managed as a "no activity zone" during the production years of The Rocky Flats Nuclear Weapons Plant. The mission of the NWTC is different than the mission at RFETS. Since 1993, DOE's Golden Field Office has managed the NWTC for wind, alternative, and renewable energy research, while the remainder of the RFETS continues to be managed by DOE's Rocky Flats Field Office as an environmental closure site. DOE/NREL will continue to manage the NWTC as an energy efficiency and renewable energy, research, development and testing site after RFETS is closed.

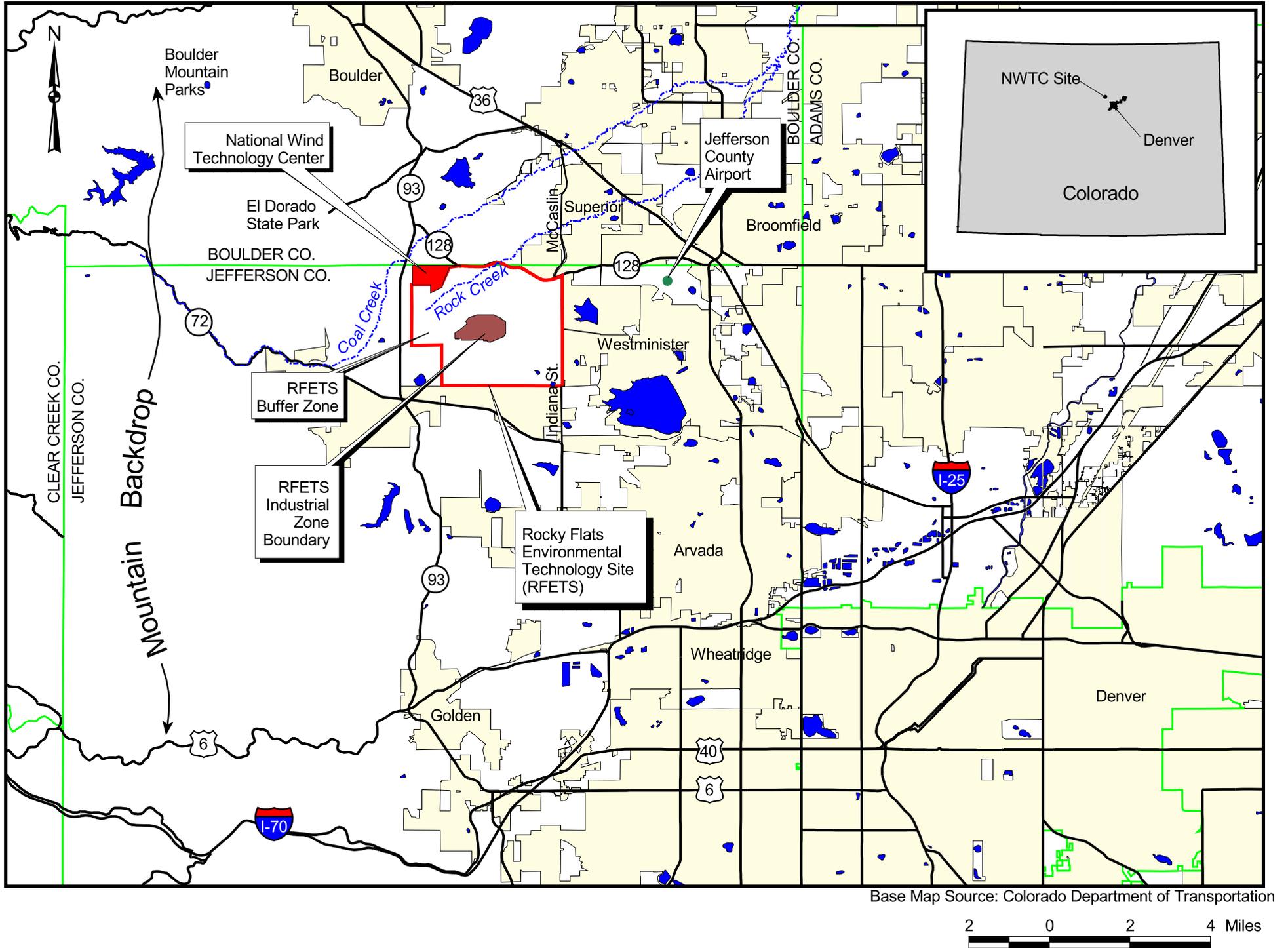
In Fiscal Year 1994 (FY94), NREL renovated Building 251 and installed a site-wide electrical grid. At that time, there were turbines on the site that continued to operate for specific research purposes. The Industrial User Facility (IUF) building was completed in FY96, providing 11,000 square feet of space that is used by the wind program and industry to assemble and test wind turbines and components. FY97 brought the installation of the Advanced Research Turbine (ART) and the Hybrid Power Test Bed (HPTB). Several NWTC facilities and infrastructure upgrades were made in FY98, including an emergency power generator, water system enhancements, access road safety improvements, and the site's main electrical switchgear. In FY99 the 2.5 MW dynamometer facilities and lab were completed. The Controls Advanced Wind Turbine (CART) was installed in FY00.

A piece of land of about 25 acres, located in the southeast corner of the NWTC, was recently designated for inclusion within the NWTC by the National Defense Authorization Act for Fiscal Year 2002 (see Figure 1-3). This property was previously part of the NWTC. Two test sites and unimproved roads are located on this land.

NWTC is primarily used for wind energy research, development and testing, and is the only facility of its type in the United States. The NWTC's unique facilities support wind turbine design, development, testing and certification. Fundamental research is also conducted on turbine aerodynamic and mechanical behavior, as well as turbine interaction with atmospheric conditions.

In addition, the site supports NREL's research in the areas of hybrid power technologies and distributed energy resources. NWTC supports the development and validation of information, data, and testing standards associated with distributed generation equipment and its interconnections with the public utility grid. Hybrid and distributed energy systems that combine various traditional and renewable energy technologies also are tested, as are various distributed energy devices and systems.

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Base Map Source: Colorado Department of Transportation

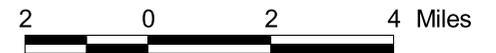


Figure 1-1 Regional Location Map

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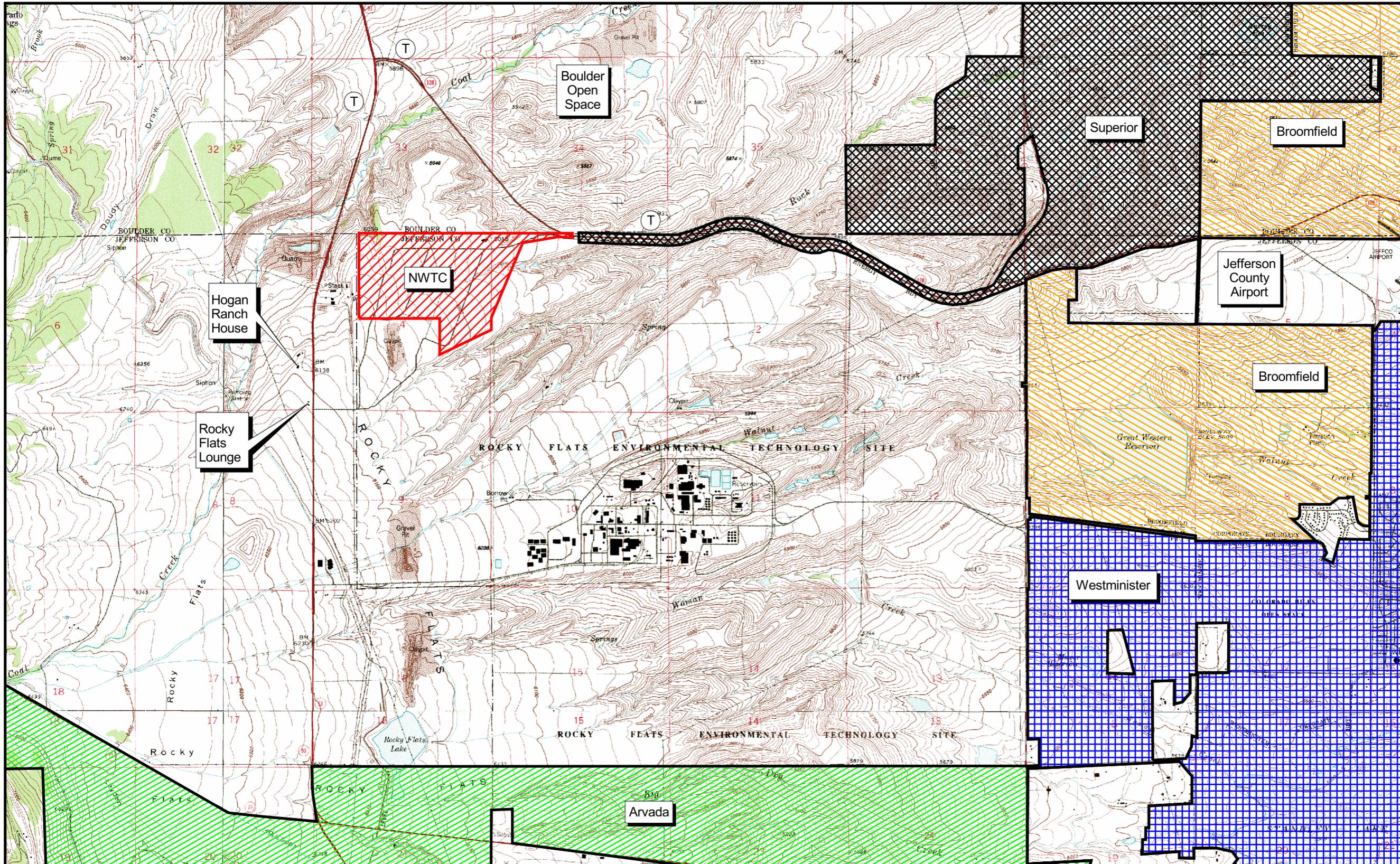
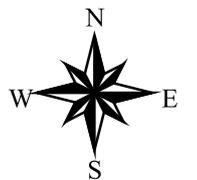


Figure 1-2
Local Setting Map

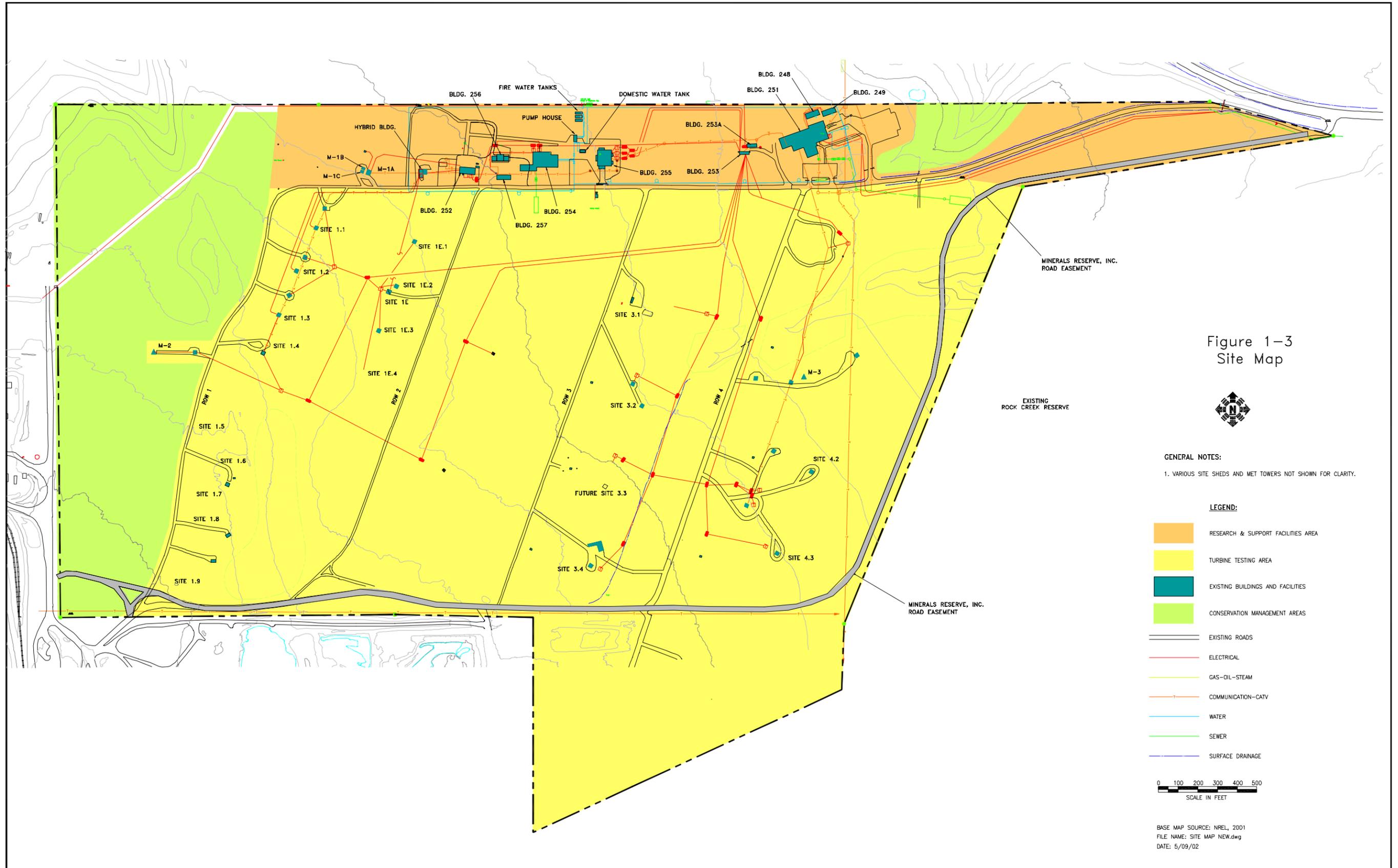
LEGEND

- City Limits
- Arvada
- Broomfield
- Enclave
- Superior
- Westminister
- National Wind Technology Center
- Trailhead



Base Map Source: USGS 1:24,000
Topographic Maps - Eldorado Springs,
Golden, Louisville, Ralston Buttes,
Colorado, 1994
City Limits Source: Colorado
Department of Transportation, 2000

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Wind turbines and other energy generating facilities at the NWTC have and will continue to contribute power to the local electrical distribution system as a natural byproduct of the research and testing activities on-site. The amount of power produced varies depending upon research activity and hardware type. As larger machines in the multi-megawatt class are tested, these power contributions may be substantial. Currently, DOE has no power purchase agreement in place to receive credit for this energy production, but a power purchase agreement with the local utility company may be negotiated in the future.

The site, at the mouth of Eldorado Canyon, was selected because of intermittent, extreme high-wind characteristics that are favorable to research. These characteristics do not support the objective of full-time wind power generation because of the periods of calm winds between high wind events. The NWTC is not a wind farm or a dedicated renewable energy generation facility, and no short-term or long-term plans exist to convert the site to serve this purpose.

1.2.2 Description of the Existing Facilities

The following discussion summarizes key aspects of the site, facilities and operations. Figure 1-3 presents existing site conditions.

Buildings: There are currently six buildings and numerous smaller support and testing facilities located on the NWTC site. The six primary buildings are located in the facility development area on the northern portion of the site between the site boundary and the primary access road (West 119th Avenue).

Turbines and Test Sites: There are currently 21 turbine test sites available. Of those 21 sites, between 12 and 15 generally contain operational turbines or other test equipment; five of the turbines are larger than 100 kW. Turbine test sites are described in Chapter 2.

Conservation Area and Open Space: Conservation management areas have been designated within site boundaries to protect the site's natural resources and prevent development within critical wind corridors. Approximately 60 acres have been set aside for this purpose.

Infrastructure: A site-wide electric network provides power to buildings and a majority of the test sites. Natural gas lines follow Highway 93, but do not serve the site. There is no potable water line to the NWTC. Treated domestic water is trucked to the site, stored in tanks, then distributed to the two primary site buildings (IUF and Building 251) via underground piping. Sanitary wastewater disposal is provided by on-site septic and leach field systems. Water for fire protection is trucked to the site and stored in tanks separate from the domestic water tanks. Water for fire protection is piped underground through an independent system within the Research and Support Facilities area. Standard hydrants are located so as to provide sufficient fire protection. The existing utility infrastructure and road system on the site is presented in Figure 1-3.

In 1995, DOE and Western Aggregates, Inc. signed a Memorandum of Understanding (MOU) that granted a road easement to Western Aggregates, Inc. across the southern and eastern portions of the NWTC. LaFarge now owns and operates the aggregate mining plant. A LaFarge subsidiary, Minerals Reserve, Inc., holds the access road easement. LaFarge is one of two adjacent aggregate mining and processing facilities located south and west of NWTC. Access to the road easement would provide LaFarge with an alternate route for industrial traffic from its plant to Highway 128. DOE granted this easement in exchange for a 20-year