3.0 AFFECTED ENVIRONMENT

Each section of this chapter addresses one of the 15 environmental resources or issues for which impacts are assessed in this environmental impact statement (EIS):

- Aesthetics
- Air quality
- Cultural resources and historic properties
- Geology and soils
- Hydrology and water quality
- Wildlife and habitat
- Noise
- Land use
- Floodplains and wetlands
- Socioeconomics
- Community services
- Solid waste and hazardous materials
- Transportation and parking
- Utilities
- Environmental justice

The regulatory and policy framework relevant to each resource is summarized, and the existing conditions are described; these discussions provide a current baseline for analyzing potential impacts. The last subsection of this chapter lists the projects and activities ongoing or proposed in the Rapid City and Hot Springs areas, regardless of who is implementing them, that could contribute to cumulative impacts with VA's proposal.

3.1 Aesthetics

Aesthetics include the physical (natural and manmade) and biological features of the landscape that contribute to the visual character or scenic quality of an area. Scenic quality is a measure of the visual appeal of the landscape, which is subjective and varies among observers. A viewshed is the area that is visible from a specified location.

3.1.1 Regulatory and Policy Framework

There are no federal standards relating to aesthetics or visual resources that apply to Department of Veterans Affairs (VA) actions. In carrying out its federal functions, VA is not subject to state or local regulations absent a clear statutory waiver to the contrary. This concept is based upon the Supremacy Clause (Article VI) of the U.S. Constitution. Although local governments cannot regulate activities of the federal government on federally owned land, federal agencies must consider local requirements for aesthetic qualities of new building construction (40 United States Code 619(b)). VA actions on non-federal land are subject to the regulatory jurisdiction of the landowner, including local plans or codes pertaining to aesthetics.

A viewshed, as it pertains to the setting of a historic property, is evaluated in accordance with regulations implementing Section 106 of the *National Historic Preservation Act* (NHPA) (see Section 3.3).

3.1.2 Current Conditions

3.1.2.1 VA Hot Springs Campus

3.1.2.1.1 Setting and Landscape

The VA Hot Springs campus occupies approximately 68 acres atop a bluff overlooking the Fall River to the north, west, and south; and the Hot Springs business district and the historic River Street to the southwest. The red-hued bluffs and canyon walls of the Fall River are visible to the north and west. Large stately houses built by prominent Hot Springs residents during the late nineteenth and early twentieth century are visible on the wooded bluff opposite the campus to the west. An aerial view of the campus is shown in Figure 3.1-1.

Figure 3.1-1. Aerial View of VA Hot Springs Campus and Landmarks.

The Battle Mountain landform, for which the early-day sanitarium was named, rises to about 4,400 feet in elevation to the east of the campus. At approximately 3,560 feet in elevation, the campus sits about 100 feet above the Fall River channel and about 840 feet lower than the Battle Mountain peak.

The original hospital, wards, administration building, quarters, and some of the support buildings were constructed on the bluff plateau, with the original hospital complex and the governor's quarters occupying the highest and most prominent locations. The site slopes down toward the northeast at the rear of the original hospital complex, which reduced the visibility of the support buildings (conservatory, stable, carriage house, power plant, and root cellar) from the hospital and wards.

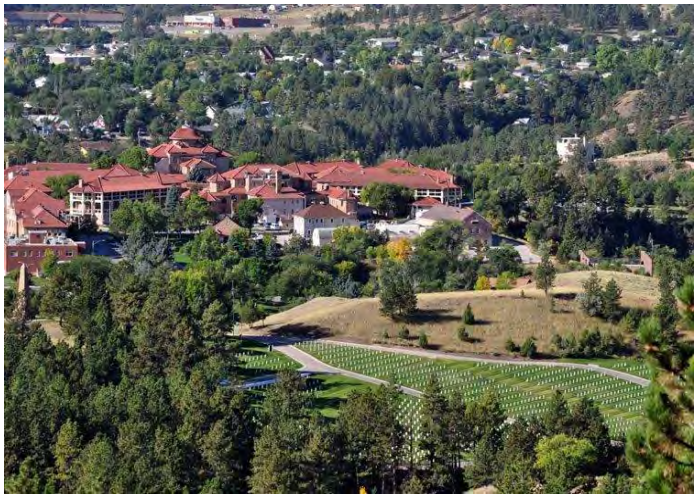
Hot Springs National Cemetery covers approximately nine acres on the campus at the foot of Battle Mountain. The north sloping site provides an open view to the hills to the northeast. Located about a quarter mile northeast of the Administration Building, the cemetery location is largely out of view from the occupied buildings on the campus.

Very little vegetation screened the campus from the community below when the sanitarium buildings were constructed, but today mature vegetation on the slopes of the bluff and on the campus blocks many views to and from the campus.

Sources of nighttime light on the campus include street lights and security lights around buildings and hospital parking lot.

Figure 3.1-2 shows representative photos of the VA Hot Springs campus setting.

View to east of Battle Mountain; Battle Mountain Monument in Hot Springs National Cemetery visible at picture center.



View to west of VA Hot Springs campus and national cemetery.

Figure 3.1-2. Representative Photos of the Setting and Landscape

3.1.2.1.2 Buildings and Architecture

The picturesque road layout reflects the era's appreciation for naturalistic settings (NPS 2010). Curving roads encircle the original hospital complex and the residential area.

The original hospital complex was designed around a circular courtyard with a prominent administration center (Building 1) and service buildings (Buildings 2, 9, and 10), and six hospital wards (Buildings 3 through 8) connecting as rectangular spokes. The architecture is a Mission/Spanish Colonial style that incorporated elements of the Romanesque architecture that was visible in the town of Hot Springs at the time of construction (NPS 2010). The buildings were constructed from local sandstone, and featured massive walls, bands of arched and deeply recessed windows, and arched entries. The combination of the different architectural styles with the use of

local sandstone and red tile roofs created a particularly attractive facility in a striking location at the top of the bluff.

The hospital annex (Building 12) was constructed later, completed in 1926, and a number of additions to the building have been constructed over the years. The original structure, with a design similar to Buildings 1 through 10, had eight bays of varying heights. It was built of sandstone with a red tile roof, but the additions have been constructed with different materials. The later additions to the hospital are south and east of the original structure, and because of elevation are not very visible from the original hospital complex.

The stairway linking the historic business district of Hot Springs to the grounds of the campus, referred to as the Grand Staircase, was constructed in 1915 of pink sandstone and concrete with lampposts and black iron railings. The ornamental staircase splits into two stairways about half-way to curve around an area with a fountain (no longer functioning) and landscaping. The stairways rejoin at the next landing to continue to the top.

The staff quarters and the governor's quarters that were constructed in 1907 were laid out in a loop along the southwest edge of the bluff. The quarters have a Colonial/Tudor architectural mix and are wood construction on sandstone foundations. The duplex quarters constructed in the 1920s have Neoclassical/Classical architecture and are wood frame construction on sandstone foundations. Landscaping of trees and shrubs surround the quarters.

The main entrance road to the campus from North 5th Street has views of Battle Mountain to the east and is lined with mature trees on the west.

Figure 3.1-3 shows representative photos of the buildings on the VA Hot Springs campus.

View to east of Administration Building 1.

View to west of Domiciliary Building 8.

Figure 3.1-3. Representative Photos of VA Hot Springs Campus Buildings.

View to west of rear of Hospital Building 12.

View to east of Grand Staircase from National Avenue.

Figure 3.1-3. Representative Photos of VA Hot Springs Campus Buildings (continued).

3.1.2.2 City of Hot Springs

The City of Hot Springs sits in the canyon of Fall River at the base of Battle Mountain to the east, Seven Sisters Range to the south, and Hot Brook and Cold Brook canyons to the north-northwest. The visual appeal of the city is the surrounding sandstone cliffs and evergreen forests. Most of the oldest part of the city is designated as a historic district and maintains many of the original buildings constructed to support the city's early days as a resort destination for the therapeutic warm waters in the area. The historic River Street business area is characterized by Richardsonian Romanesque buildings constructed of pink sandstone from Fall River County quarries. The newer areas of Hot Springs are typical of more modern buildings and houses.

Sources of nighttime light throughout the city include street lights and security lights for buildings and parking lots.

3.1.2.3 City of Rapid City

Rapid City, called the gateway to the intermountain west, is set against the eastern slope of the Black Hills. The city was initially established along Rapid Creek and has expanded to a larger area that is divided by a mountain range into eastern and western parts. The visual appeal of the city is the mountain range to the west, the plains to the east, parkland along Rapid Creek, and the redevelopment and preservation of the city's historic core. Rapid City includes business and housing areas that are typical of an urban community with surrounding suburban and rural neighborhoods.

Sources of nighttime light throughout the city include street lights and security lights for buildings and parking lots.

3.2 Air Quality

This section describes the air quality regulations applicable to the proposed action and the regional air quality in the VA Black Hills Health Care System (BHHCS) catchment area.

3.2.1 Regulatory and Policy Framework

3.2.1.1 National Ambient Air Quality Standards

As required by the *Clean Air Act*, the U.S. Environmental Protection Agency (EPA) set National Ambient Air Quality Standards (NAAQS) for selected criteria pollutants considered harmful to public health and the environment: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (PM), and lead (40 Code of Federal Regulations [CFR] Part 50), with an averaging time and data form for determining compliance specific to each standard. Primary NAAQS are limits set to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary NAAQS protect public welfare, including protection against visibility impairment and damage to animals, crops, vegetation, and buildings.

Based upon ambient air quality monitoring data, U.S. EPA designates areas within each state as:

- in ***attainment*** for those NAAQS that are being met;
- in ***non-attainment*** for any NAAQS that are being exceeded;
- in ***maintenance*** if the area was reclassified from non-attainment to attainment and is therefore subject to an EPA-approved maintenance plan; or
- ***unclassified*** if no determination has been made.

For areas of non-attainment, a federally enforceable state implementation plan is implemented with the goal of achieving attainment.

"General conformity" requirements apply to all federal actions (EPA 2014a). The purpose of the General Conformity Rule is to ensure that:

- Federal activities do not cause or contribute to a new violation of a NAAQS
- Actions do not cause additional or worsen existing violations of or contribute to new violations of the NAAQS
- Attainment of the NAAQSs is not delayed

The general conformity regulations (40 CFR 93 Subpart B) establish *de minimis* thresholds for criteria pollutants and precursors. A "conformity determination" is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a federal action would equal or exceed any of the *de minimis* thresholds (40 CFR 93.153(b)).

3.2.1.2 Clean Air Act Title V Operating Permit Requirements

Title V of the *Clean Air Act* regulates emissions of 188 specific hazardous air pollutants (HAPs) (40 CFR Part 70). Sources that meet the definition of a "major source" of either the criteria pollutants (regulated by the NAAQS) or HAPs must apply for and obtain a Title V operating permit. For HAPs a major source is one that has the potential to emit more than 10 tons per year of any individual HAP, or 25 tons per year of any combination of HAPs. For criteria pollutants, the definition of a major source depends on the region's attainment status: in an attainment area, a major source is one that has a potential to emit more than 100 tons per year of any criteria pollutant, with more restricted levels at various classifications of non-attainment for some criteria pollutants (40 CFR 70.2).

The South Dakota Department of Environment and Natural Resources (SDDENR) issued the Title V permit for the Hot Springs VA Medical Center (VAMC), Permit #28.0102-27 (SDDENR 2013), effective from March 4, 2014 until SDDENR takes final action on the current application for renewal. Units covered by the Title V permit are described in Table 3.2-1.

Table 3.2-1. Description of Title V Permitted Units

Unit	Description	Maximum Operating Rate
3	Boiler #3 – 1974 Nebraska boiler, water tube model, fired with distillate oil	20.4 million BTU per hour heat input
4	Boiler #4 – 2004 Hurst boiler fired with distillate oil	7.5 million BTU per hour heat input
5	Boiler #1 – 2008 Cleaver Brooks boiler, model CEW-101-500-150, fired on distillate oil	20.4 million BTU per hour heat input
6	Boiler #2 – 20 II Cleaver Brooks CEW-101500-200ST, 500 horsepower, fired on distillate oil	20.4 million BTU per hour heat input
7	Emergency generator # 1, Gen-Dom-1998 Generac 98A 032195, fired on distillate oil	80 kilowatts, 60 horsepower
8	Emergency generator #2, Gen-BP-1997 Cummins Onan 230DF AB, fired on distillate oil	230 kilowatts, 172 horsepower
9	Emergency generator #3, Gen-Hosp-2001 Generac 1740510100 Type SD400, fired on distillate oil	400 kilowatts, 298 horsepower

Note: BTU = British thermal unit.
Source: SDDENR 2013.

3.2.1.3 New Source Review

The New Source Review (NSR) permitting program, under Title I of the *Clean Air Act*, is a preconstruction permitting program that assures that air quality is not degraded by new stationary emission sources or modified old sources. There are three types of permits issued under this program (EPA 2015a):

- "Prevention of Significant Deterioration" NSR permits are required for new major sources or a major source making a major modification in an attainment area or unclassified area

- Nonattainment NSR permits are required for new major sources or major sources making a major modification in a nonattainment area
- Minor source NSR permits for new construction or modifications with emissions that do not meet the thresholds of major sources

3.2.1.4 State and Local Regulations and Coordination

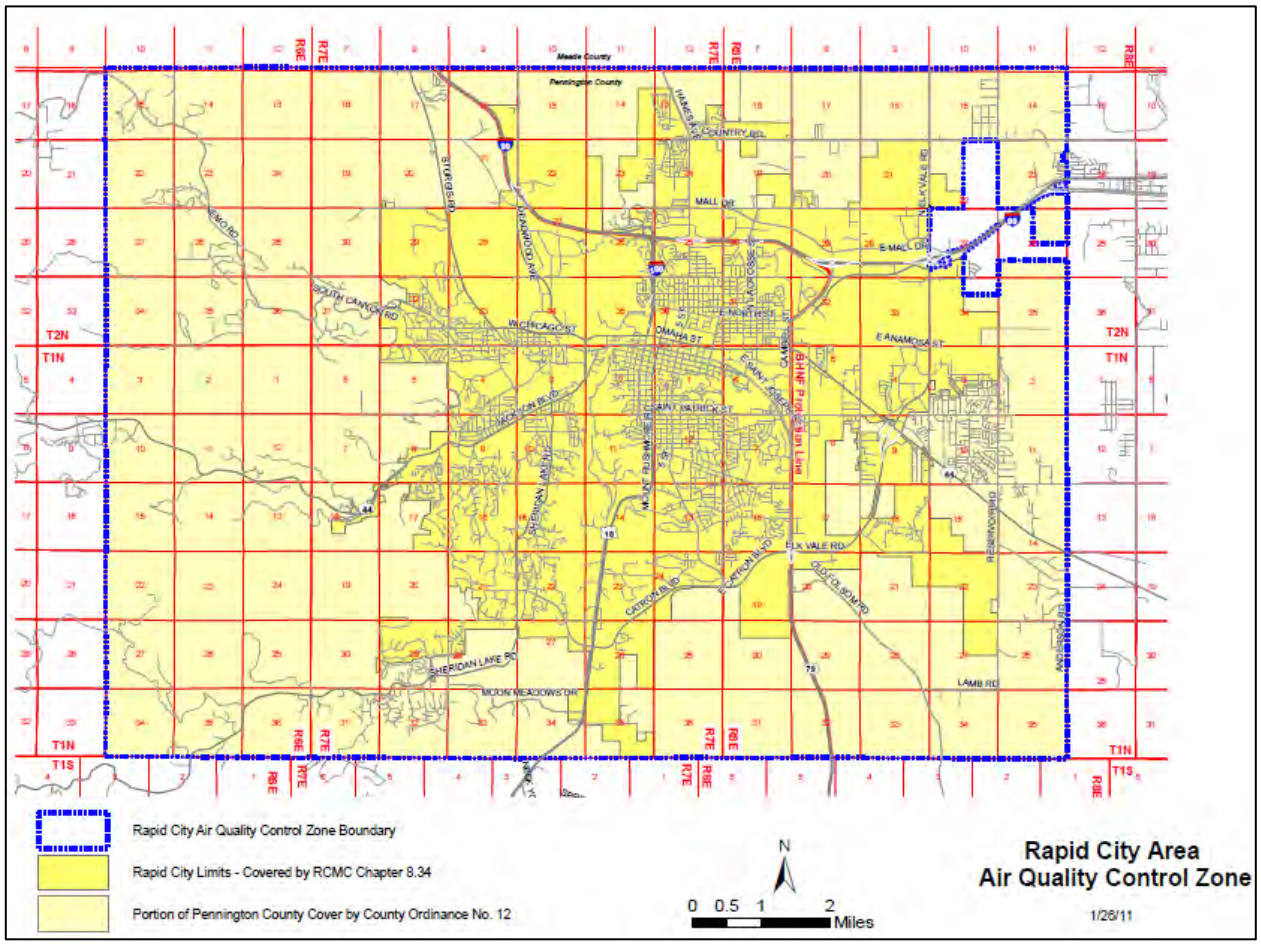
States may establish air quality standards that are more stringent than the federal standards (40 CFR 50.2), but South Dakota has adopted the federal standards. Air quality laws are included in South Dakota Codified Laws Section 34A-1, and rules for the state program are contained in the South Dakota Administrative Rules Section 74:36. State-wide air compliance and enforcement activities are coordinated by the SDDENR Air Quality Program.

South Dakota is a member state of the Western States Air Resources Council, which addresses air quality issues of regional concern (WESTAR 2014) and the Western Governors' Association initiative on weather and climate risk (Western Governors' Association 2014).

For project activities in the Rapid City area, the Pennington County Department of Ordinance Enforcement implements procedures for the enforcement of county ordinances relating to environmental and resource issues, among other issues. The only air quality-related ordinance is Pennington County Ordinance No. 12, *Fugitive Emissions and the Abatement of Smoke*. This ordinance applies to construction (and other activities) in a limited area of Pennington County.

Rapid City may administer an air quality control program within its jurisdiction, in accordance with South Dakota Codified Laws 34A-1-36. The Rapid City Air Quality Control Board works to maintain compliance with the NAAQS, especially particulate matter. The Rapid City Air Quality Control Board achieves its goals through programs to control, abate, and educate about fugitive dust emissions and smoke from wood burning and open burning (Rapid City 2014). Rapid City's air quality is regulated under Rapid City Code of Ordinance 8.34-*Fugitive Emissions and the Abatement of Smoke*. Figure 3.2-1 shows Rapid City air quality control zones.

No Fall River County or City of Hot Springs ordinances specifically address air quality issues.



Source: RCAQD 2014.

Figure 3.2-1. Rapid City Air Quality Control Zones

3.2.2 Current Conditions

Construction and operation of new facilities, and discontinued use of existing facilities, could occur in Hot Springs (Fall River County) and Rapid City (Pennington County) under Alternative A through G; therefore, the air quality analysis in this EIS focuses on these two counties.

3.2.2.1 Regional Climate

Weather and climate are important influences on air resources in this region. Cold weather limits the range of pollution control options available, and high winds in the area contribute to pollutant dispersion. Rapid City sits at an elevation of 3,250 feet and Hot Springs sits at an elevation of 3,448 feet. The climate of this region is classified as mid-latitude steppe according to the Koppen climate system and is characterized by arid summers and dry winters (NWS 2014). Average minimum and maximum temperatures measured at the Rapid City Weather Forecast Office are 16.4 and 37.4 degrees Fahrenheit in January and 61.7 and 84.3 degrees Fahrenheit in July. Average minimum and maximum temperatures in Hot Springs are similar: 14.4 and 41.3 degrees Fahrenheit in January and 57.2 and 89.2 degrees Fahrenheit in July. The average annual precipitation is 17.7 inches in Hot

Springs and 19.8 inches in Rapid City. Both locations show similar monthly rainfall patterns, with May typically being the wettest month and January the driest month (NCDC 2014a, 2014b). Prevailing winds are from the north and northwest, with average daily wind speeds ranging from 10 to 13 miles per hour (Cedar Lake Ventures, Inc. 2014).

Geography also has a particular influence on air quality in Rapid City, as summarized by SDDENR: "Western Rapid City lies in the middle of the geological formation termed the limestone racetrack that surrounds the Black Hills National Forest. It is bordered on the west and south by the Black Hills and on the east by a series of hogback hills creating a bowl-like formation ideal for air pollution problems" (SDDENR 1998). Air quality is poor when winter temperature inversions (cold air trapped below warm air) occur in this area (RCAQD 2014).

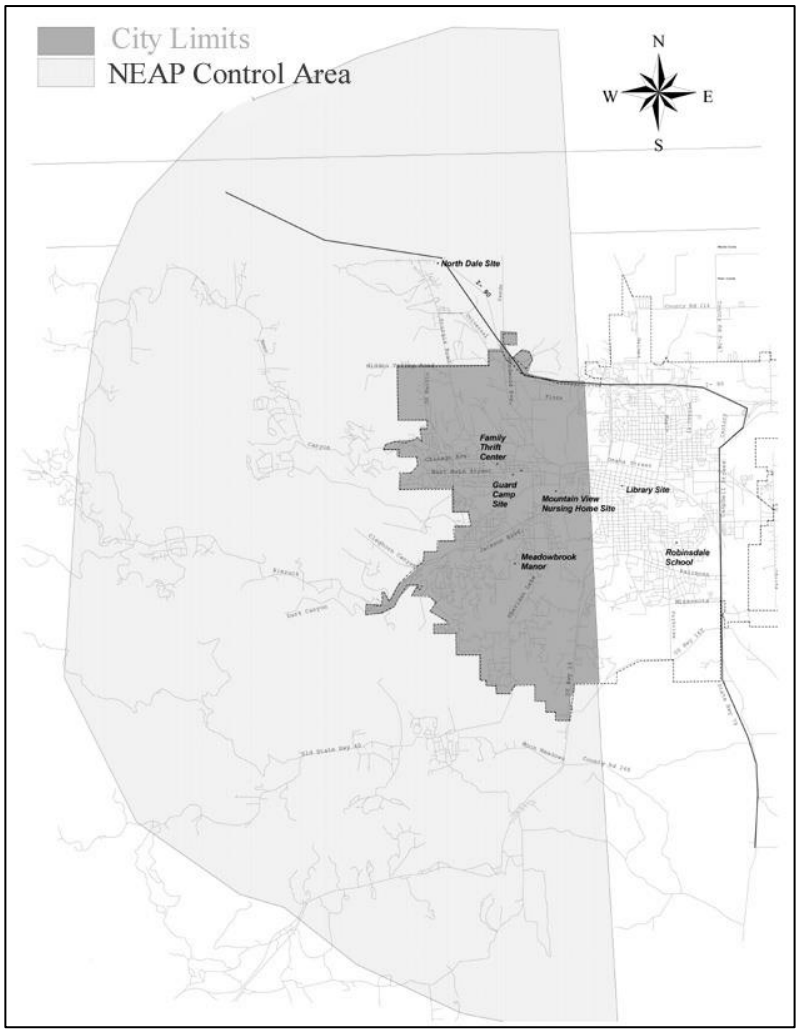
3.2.2.2 Regional Attainment Status for National Ambient Air Quality Standards

The project area includes the counties of Fall River and Pennington, SD. The region for which the U.S. EPA designates NAAQS attainment is the "Black Hills-Rapid City Intrastate Air Quality Control Region (South Dakota)" which consists of the South Dakota counties of Butte, Custer, Fall River, Lawrence, Meade, and Pennington (40 CFR 81.214). From 1978 to 1991, part of Pennington County was designated in nonattainment for the particulates standard that was in place at the time (EPA 2014b). Since then, the region has been designated as unclassified or in attainment for all criteria pollutants. At this time, there are no designated maintenance or non-attainment areas in South Dakota for any criteria pollutants (EPA 2014c, 2015b).

Though the region is currently in attainment for all criteria pollutants, particulate pollution has historically been a problem in the Rapid City area. In 1978, the area around Rapid City (before the current air quality control region was defined) was designated as non-attainment for a NAAQS for total suspected particulates that is no longer in effect (EPA 2014b). Since then, the area has had several exceedances of the NAAQS for particulate matter less than 10 micrometers in diameter (PM_{10}). In 1992, there were two exceedances of the PM_{10} standard that was promulgated in 1986 that did not violate the NAAQS because the form of the standard is "not to be exceeded more than once per year on average over 3 years". In 1996, there were three exceedances, followed by a fourth in 1997, triggering a review process by EPA. Additional exceedances of the PM_{10} standard were measured in Rapid City in 2000, in 2001, and twice in 2002 (RCAQD 2014). Still, the area is designated as in attainment for all particulate matter NAAQS due to an EPA policy of allowing exclusion of PM_{10} air quality data that are attributable to natural events (volcanic and seismic activity, wildland fires, or high wind events) (Nichols 1996). To qualify for this exclusion, the SDDENR developed a Natural Events Action Plan, and sources that contribute to fugitive dust emissions must install and implement best available control measures (SDDENR 1998, 2005). The state plan was approved by EPA in 1998 and updated in 2005. Best available control measures were developed for industrial fugitive dust sources in the west Rapid City area to which the plan applies (Figure 3.2-2) and are federally enforceable through the facility's minor source permits. High wind dust alerts are called when all of the following conditions are forecast, although they may be (and have been at times) called when only one or two of the conditions are expected:

- Hourly wind speeds exceed 20 miles per hour
- Peak wind gusts are greater than 40 miles per hour
- Five consecutive days of 0.02 inches or less of precipitation each day excluding dry snow

The fugitive dust emissions sources are individually notified of high wind dust alerts. During alerts, the SDDENR requests that construction activities be ceased or minimized, or that the facilities use additional measures to prevent fugitive dust. Restrictions on construction activities are voluntary (SDDENR 2005).



Source: SDDENR n.d.

Figure 3.2-2. Natural Events Action Plan Control Area.

3.2.2.3 Emission Sources

3.2.2.3.1 Regional Sources

The National Emission Inventory provides estimates of criteria and hazardous air pollutant emissions from all air emissions sources. The latest available National Emissions Inventory is from 2011. At the time of this writing, the 2014 inventory, the next inventory to be completed in the three-year cycle, is not yet available (EPA 2015c). Economic sectors emitting more than 100 tons per year of a pollutant in Pennington County or Fall River County are shown in Table 3.2-2.

Table 3.2-2. 2011 National Emissions Inventory Data

Pollutant	Economic Sectors Emitting More than 100 Tons per Year (aggregated for all sources in county)	
	Pennington County	**Fall River County**
Acetaldehyde	biogenics (vegetation and soil), commercial cooking, agricultural field burning, prescribed fire, wildfire, electric generations, industrial boilers, residential fuel combustion, oil and gas production, pulp and paper, mobile sources, solvent use, waste disposal	biogenics (vegetation and soil), commercial cooking, agricultural field burning, prescribed fire, wildfire, residential fuel combustion, oil and gas production, mobile sources, waste disposal
Ammonia	fertilizer application, livestock waste, prescribed fire	fertilizer application, livestock waste, wildfire
Benzene	bulk gasoline terminals, commercial cooking, agricultural field burning, prescribed fire, wildfire, electric generations, industrial boilers, residential fuel combustion, gas stations, oil and gas production, mobile sources, solvent use, waste disposal	bulk gasoline terminals, commercial cooking, agricultural field burning, prescribed fire, wildfire, residential fuel combustion, gas stations, oil and gas production, mobile sources, waste disposal
Carbon dioxide	prescribed fire, wildfire, mobile sources	prescribed fire, wildfire, mobile sources
Carbon monoxide	biogenics (vegetation and soil), agricultural field burning, prescribed fire, wildfire, residential wood combustion, cement manufacturing, industrial processes not elsewhere classified, mobile sources, waste disposal	biogenics (vegetation and soil), agricultural field burning, prescribed fire, wildfire, mobile sources
Formaldehyde	biogenics (vegetation and soil), commercial cooking, agricultural field burning, prescribed fire, wildfire, electric generations, industrial boilers, residential fuel combustion, oil and gas production, pulp and paper, mobile sources, solvent use, waste disposal	biogenics (vegetation and soil), commercial cooking, agricultural field burning, prescribed fire, wildfire, fuel combustion, oil and gas production, mobile sources, waste disposal
Hexane	bulk gasoline terminals, prescribed fire, wildfire, electric generations, residential fuel combustion, gas stations, oil and gas production, mobile sources, solvent use, waste disposal	bulk gasoline terminals, prescribed fire, wildfire, residential fuel combustion, gas stations, oil and gas production, mobile sources, solvent use
Methane	prescribed fire, wildfire	prescribed fire, wildfire
Methanol	biogenics (vegetation and soil), oil and gas production, pulp and paper, aircraft, solvent use, waste disposal	biogenics (vegetation and soil), oil and gas production, aircraft, solvent use, waste disposal
Nitrogen oxides	biogenics (vegetation and soil), prescribed fire, coal-fired electricity generation, residential natural gas use, cement manufacturing, industrial processes not elsewhere classified, mobile sources	biogenics (vegetation and soil), wildfire, mobile sources
PM_{10}	agriculture, construction, dust from paved roads, dust from unpaved roads, prescribed fire, wildfire, waste disposal	agriculture, dust from unpaved roads, prescribed fire, wildfire, mining

Table 3.2-2. 2011 National Emissions Inventory Data (continued).

Pollutant	Economic Sectors Emitting More than 100 Tons per Year (aggregated for all sources in county)	
	Pennington County	Fall River County
Particulate matter less than 2.5 micrometers in diameter	agriculture, construction, dust from paved roads, dust from unpaved roads, prescribed fire, wildfire	prescribed fire, wildfire
Sulfur dioxide	prescribed fire, coal-fired electricity generation, cement manufacturing	wildfire
Toluene	bulk gasoline terminals, commercial cooking, agricultural field burning, prescribed fire, wildfire, electric generations, industrial boilers, residential fuel combustion, gas stations, oil and gas production, mobile sources, solvent use, waste disposal	bulk gasoline terminals, commercial cooking, agricultural field burning, prescribed fire, wildfire, residential fuel combustion, gas stations, oil and gas production, mobile sources, solvent use, waste disposal
Volatile organic compounds	biogenics (vegetation and soil), bulk gasoline terminals, prescribed fire, wildfire, gas stations, pulp and paper, mobile sources, consumer and commercial solvent use, industrial surface coating and solvent use, nonindustrial surface coating, waste disposal	biogenics (vegetation and soil), prescribed fire, wildfire, mobile sources

Source: EPA 2015c.

3.2.2.3.2 VA BHHCS Facility Emissions

Fuel combustion and construction/maintenance activities at VA BHHCS medical facilities produce air emissions. Specifically, four boiler units (fed with distillate fuel oil) and three emergency generators (fed with distillate fuel oil) at the Hot Springs VAMC are permitted under Title V Air Quality Permit Number 28.0102-27. The Title V permit specifies the maximum operating rate for each unit, and requires recordkeeping for the volume and sulfur content of the distillate fuel oil burned in the boilers and the number of hours each unit is in operation. Additionally, the Title V permit specifies limits for visible emissions, total suspended particulate emissions, and sulfur dioxide emissions. The VAMC is currently in compliance with the Title V permit conditions.

Construction and maintenance activities also produce air emissions, including total suspended particulate and fuel combustion by-products. These mobile sources are not individually permitted, and their operation is not continuous. Proper equipment maintenance prevents unacceptable emissions from these mobile sources.

Emissions from contracted and leased facilities, such as the existing Rapid City CBOC, are not regulated by VA air quality permits.

3.3 Cultural Resources and Historic Properties

Cultural resources, including historic properties, are nonrenewable representations of our human past and heritage. The regulatory setting for these resources and their relationships to federal actions and undertakings are presented below, followed by background on their identification, areas of potential effects (APEs), consultation and outreach, and cultural background. Specific attention is given to historic properties of religious and cultural significance, historic districts, and to National Historic Landmarks (NHLs) (ACHP 2015).

3.3.1 Regulatory and Policy Framework

For purposes of analysis under the *National Environmental Policy Act* (NEPA), cultural resources encompass "historic properties" as defined in the NHPA, "archaeological resources" as defined in the *Archaeological Resources Protection Act*, and "cultural items" as defined in the *Native American Graves Protection and Repatriation Act*. NEPA provides an overarching consideration of the human environment to address these cultural, historic, and archaeological resources, properties, and items (collectively referred to as "cultural resources" herein).

"Historic properties" defined by the NHPA are any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. A historic property may include artifacts, records, and remains related to and located within such property, and properties of traditional religious and cultural importance to an Indian tribe that meet the NRHP criteria.

The regulations implementing Section 106 of the NHPA encourage the coordination of reviews under Section 106 with concurrent reviews under NEPA, the *Archaeological Resources Protection Act*, the *Native American Graves Protection and Repatriation Act*, and other authorities (36 CFR 800.3(c)). VA is following the substitution process of 36 CFR 800.8(c) to meet the Section 106 review requirements for cultural resources and historic properties for this federal action and undertaking. This means that VA is using the information and documentation required to prepare the EIS and record of decision for the reconfiguration proposal to comply with Section 106 in place of the procedures in 36 CFR 800.3 through 800.6.

3.3.2 Cultural Resource and Historic Property Identification

VA BHHCS applied the following approach to identify historic properties within the study area defined as the BHHCS service area (see Figure 1-1 in Section 1.1). This approach is based on the Council on Environmental Quality and Advisory Council on Historic Preservation guidance for integrating NEPA and Section 106 (CEQ/ACHP 2013).

- Establish, in consultation with the State Historic Preservation Office (SHPO), the APEs for the various alternatives of the reconfiguration proposal.
- Seek information from SHPO, other consulting parties including tribal and local governments, and appropriate archives for known and potential historic properties within the APE.

- Consult with SHPO and other consulting parties to determine NRHP eligibility for identified cultural resources in the APEs, and confirm for those already NRHP-listed properties their retention of significance, integrity, and character-defining features.
- Establish, in consultation with the Section 106 consulting parties, the phased approach to identifying and evaluating potential historic properties at places selected in the future for new facilities associated with the alternatives.

3.3.3 Areas of Potential Effects for Historic Properties

Within the VA BHHCS service area and EIS study area, VA identified two geographic areas (APEs) where the reconfiguration proposal could alter the character or use of historic properties. These APEs encompass the cities of Hot Springs and Rapid City (see Figure 1-1 in Section 1-1 for the locations of these cities within the VA BHHCS service area).

The Hot Springs APE (Figure 3.3-1) includes the VA Hot Springs campus and potential but as-yet unidentified locations for new VA facilities proposed under some of the EIS alternatives.

The Rapid City APE (Figure 3.3-2) includes the potential but as-yet unidentified locations for new VA facilities under some of the EIS alternatives.

The alternatives propose construction (new buildings or modifications to existing buildings) at locations yet to be identified in Hot Springs and Rapid City. When identified, these locations would receive phased review under the Section 106 process following 36 CFR 800.4(b)(2), and APEs would be revised, as necessary. VA would continue to adhere to Section 106 and guidelines in VA's cultural resource management procedures (VA 2011) during future planning and actions involving acquisition and construction of properties.

VA continues to consider the entire VA BHHCS service area as the EIS study area for cultural resources. No connected actions have been identified at other locations within the service area where effects from the proposed reconfiguration would extend; thus, no expansion is made to the APEs beyond the areas of Hot Springs and Rapid City or to include the Fort Meade VA campus.

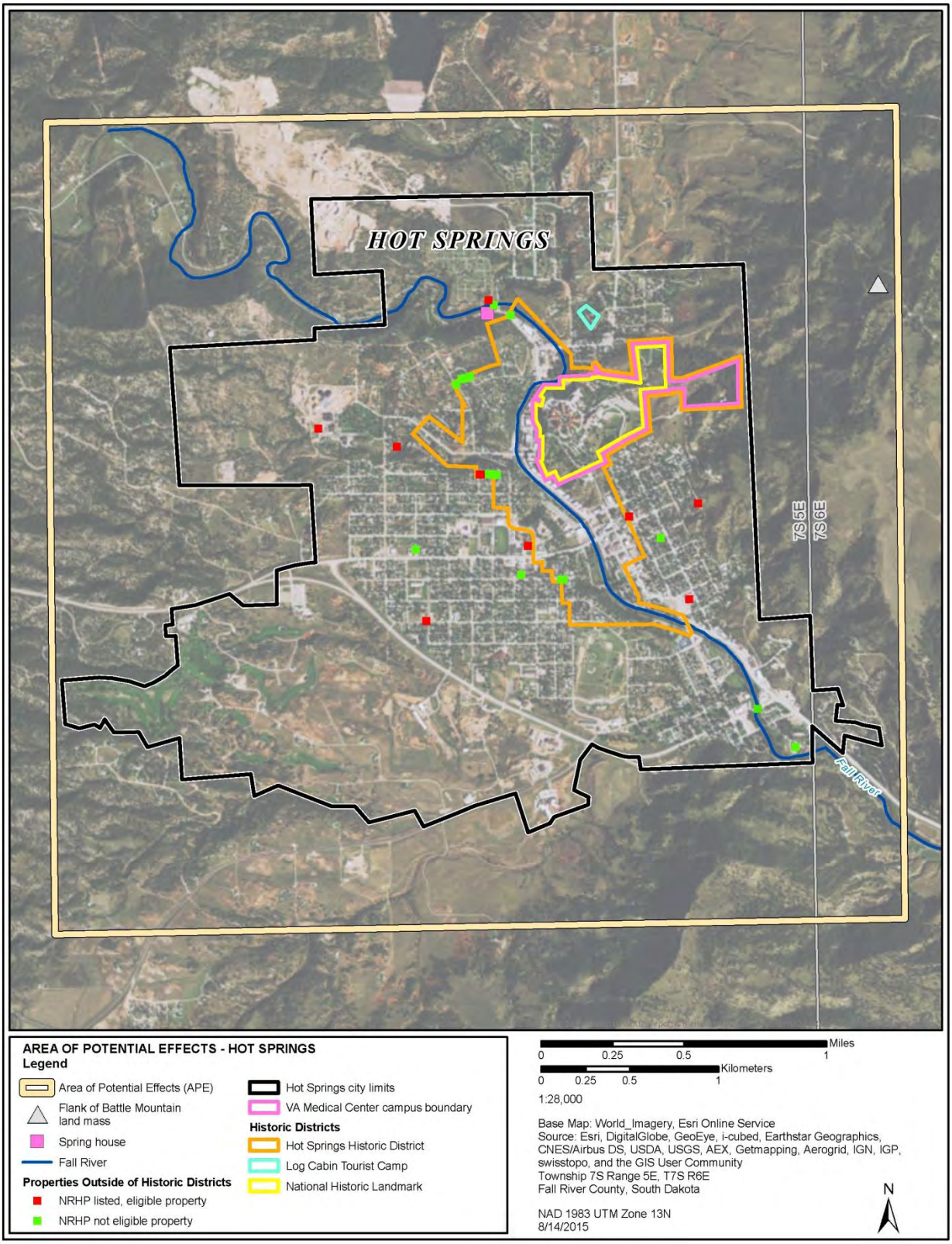


Figure 3.3-1. Area of Potential Effects – Hot Springs.

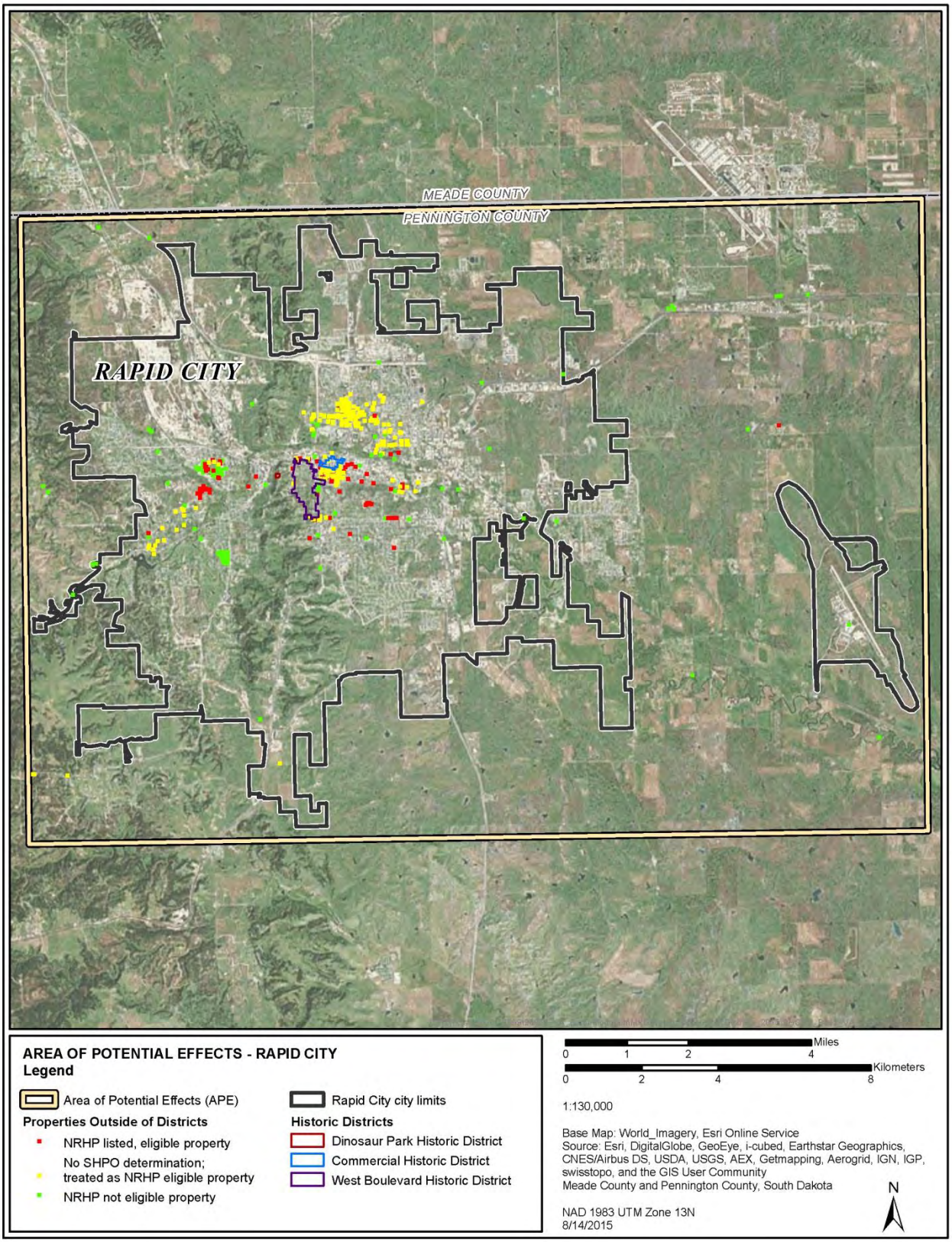


Figure 3.3-2. Area of Potential Effects – Rapid City.

3.3.4 Consultation and Outreach

In May 2012, VA BHHCS initiated consultation under NHPA Sections 106 and 110(f) to consider ways of identifying and avoiding, minimizing, or mitigating potential adverse effects to historic properties, including the Battle Mountain Sanitarium NHL that could result from the reconfiguration proposal. Following publication of the Notice of Intent in the Federal Register on May 16, 2014, which initiated the integrated NEPA/NHPA process to prepare an EIS for the reconfiguration proposal, VA re-engaged the consultation process. SHPO, the Advisory Council for Historic Preservation, the National Park Service, and stakeholders were also formally notified of the integrated process by letter dated May 13, 2014.

The public involvement process, identification of consulting parties, and consultation on historic properties for the integrated NEPA/NHPA process are described in Chapter 6, Public Involvement, Consultation, and Agency Coordination.

3.3.5 Cultural Background, Identified Cultural Resources and Historic Properties

Evidence of human occupation of the Black Hills region corresponds archaeologically to that of Northwest Plains cultures in general, spanning at least the previous 12,000 years (Kornfeld et al. 2010). Archaeological evidence of the human occupation of the current study area in prehistoric times commonly ranges from artifact scatters, lithic reduction sites (workshops), and lithic procurement areas (quarries) to hearths, stone circles, and rock features (cairns), as well as a variety of other archaeological site and feature types (USFS 1996, 2010). The VA Hot Springs campus may contain such common archaeological sites as prehistoric artifact and lithic scatters and historic debris or dump scatters where the land surface is not built up or the grounds not too extensively modified.

The Black Hills region was within the Great Sioux Reservation as the U.S. expanded its western frontiers and territories in the nineteenth century. Conflicts and incursions with prospectors, settlers, and troops through about 1877 ended in the U.S. Army's removal of the Sioux and their allies from the Black Hills. In 1879, Colonel W. J. Thornby staked a primitive claim at a spring on the headwaters of Fall River (City of Hot Springs 2015). Meanwhile, successful mining at Deadwood, about 65 air miles north of present-day Hot Springs, firmly established the Dakota Territory gold fields. Mining traffic also established a wagon route from Deadwood south, passing near the Thornby spring and claim, into Nebraska and the closest railroad access at Sidney (Federal Writers' Project 2006). The town of Hot Springs was developed in the 1880s, with resorts forming around the springs. The federal Battle Mountain Sanitarium was constructed by 1907.

These and other historic properties identified in the APEs are discussed in the following sections. Identification of cultural resources and historic properties within the APEs began with examination of the South Dakota SHPO's Historic Sites Survey files, available through the Cultural Resource Geographic Research Information Display (CRGRID) interface. The CRGRID data were supplemented by examining local and regional studies, and soliciting input from consulting parties on potential cultural resources.

3.3.5.1 Cultural Resources in Hot Springs Area of Potential Effects

CRGRID identified 321 cultural resources previously recorded within the 8.5-square-mile Hot Springs APE (Archaeological Research Center 2015). These resources, listed in Table 3.3-1, include the Battle Mountain Sanitarium NHL and two parks, Centennial Park and Chautauqua Park. Two historic districts in the area contain most of the historic buildings: the Hot Springs Historic District contains 231 buildings and the Log Cabin Tourist Camp District on the north side of the city has another 18 buildings. Figure 3.3-3 shows details of the historic districts within the Hot Springs APE. An individual historic property listed in the NRHP in 2009 is the 1929 dairy barn at the State Veterans Home. The remainder of the buildings at the State Veterans Home and its cemetery are not documented historic properties on record in the SHPO files.

Table 3.3-1. Summary of CRGRID Resources in Hot Springs Area of Potential Effects.

Resource Type	Total Resources	Reviewed[1] for NRHP		
		Listed	Eligible	Not Eligible
Prehistoric Archaeological (5)				
Artifact scatter	4			1
Stone feature (stone circle)	1			
Historic Archaeological (2)				
Artifact scatter	1			
Building/structure remnant	1			1
Combined Historic/Prehistoric Archaeological (2)				
Artifact scatter	2			1
Building, Structure (312)				
Structure and building	310	143	10	157
Park	2		1	1
Total	**321**	**143**	**11**	**161**

[1] Reviewed by SD SHPO for NRHP status.
Source: South Dakota CRGRID (Archaeological Research Center) 2015.

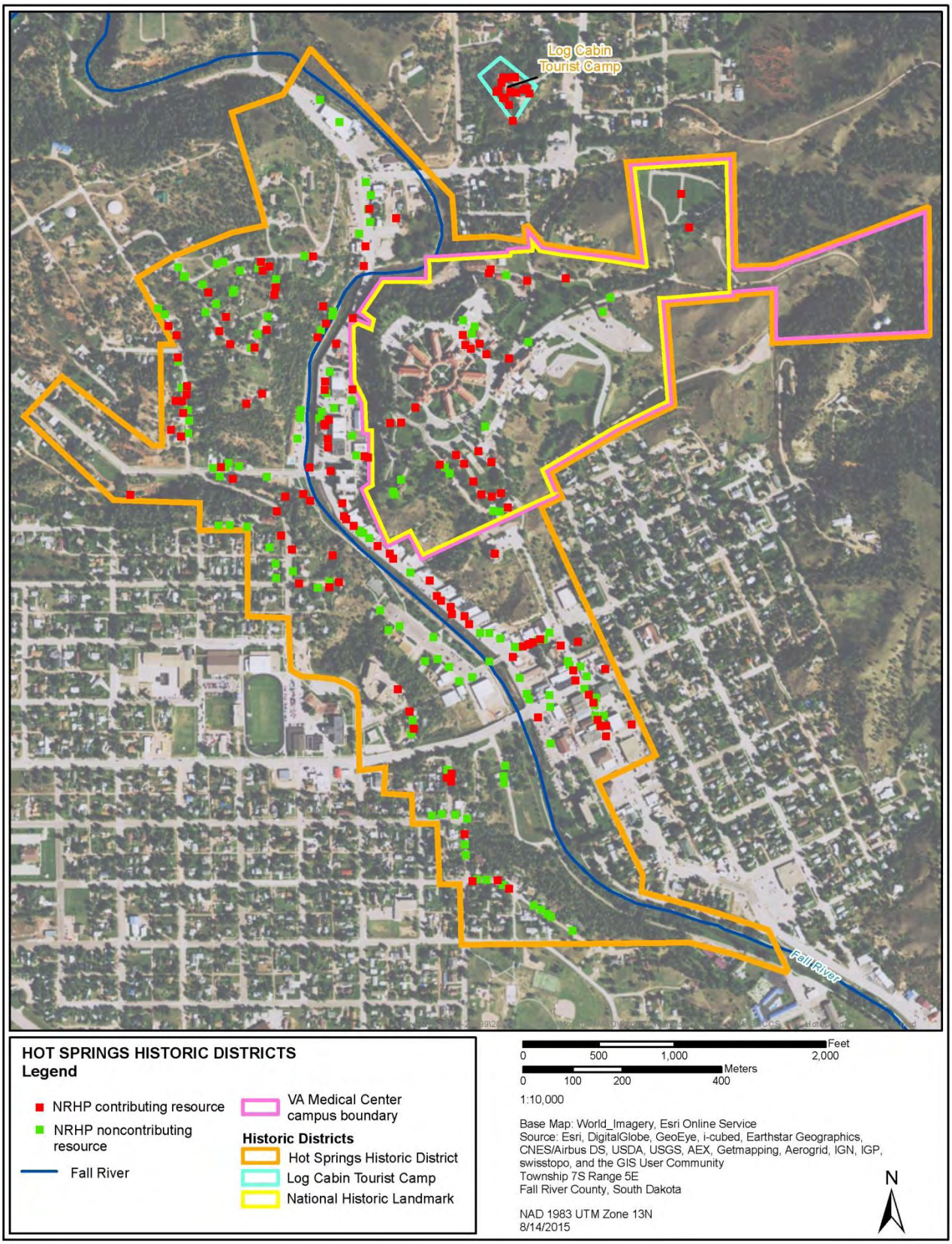


Figure 3.3-3. Historic Districts in Hot Springs Area of Potential Effects.

The Hot Springs APE includes the Battle Mountain Sanitarium NHL, which is discussed in Section 3.3.5.1.2, and a known sacred area to Native American tribes, which is discussed in Section 3.3.5.3. Stone features, such as the stone circle in the Hot Springs APE listed in Table 3.3-1 and cairns at archaeological sites are cultural resources of traditional importance to Native American tribes in the Black Hills region.

A sweat lodge constructed on the VA Hot Springs campus represents the ongoing Native American traditions. Although it is a location for cultural activities, the structure itself is not a cultural resource. The sweat lodge was built in 1993 by the Substance Abuse Residential Treatment program, but is used by non-program patients as well (L. Epperson, email to M. Peters et al., February 10, 2015). Along the lines of traditional practices, various parts of the VA Hot Springs campus have received Native American blessings in recent times. The campus also contains two religious chapels in the traditions of other cultures in American society.

The VA Hot Springs campus and its designed landscape are part of the constructed environment built during the development of the City of Hot Springs after 1880. However, the area surrounding the campus and some undeveloped parts of the campus retain elements of setting persisting from pre-development eras (see Section 3.3.5.3, Regional Cultural Resources), especially where natural areas remain.

3.3.5.1.1 Hot Springs Historic District

In 1881 a group of Deadwood entrepreneurs, including freight wagon operator Fred Evans, formed the Hot Springs Town-Site Company to attract the region's new wealth and visitors to a warm-springs resort on the Fall River in the southern Black Hills (Putz 1974). With two national rail system connections in the Black Hills, continued growth of the Hot Springs region included agricultural settlement, mining services, tourism, and health care (Hufstetler and Bedeau 2007).

Town founder and contractor Evans constructed the railroads' Union Depot building in 1891, and Fall River County erected a new courthouse on River Street near its Fall River crossing. Additional sturdy downtown commercial and institutional buildings followed, most of similar local sandstone (Putz 1974). Evans built the five-story sandstone Evans Hotel in 1892, added a hotel wing in 1893, and built his own house on Summit Avenue. The 1893 sandstone City Hall on River Street, the Public School, and 1895 IOOF (International Order of Odd Fellows) Hall on Chicago Avenue are also from this initial downtown development period. Residential subdivisions extended the city along its Fall River Valley streets with single-family homes typical of the period, built of local stone and wood (Putz 1974).

By the 1970s, preservationists recognized Hot Springs, with the surviving buildings noted above as well as the Battle Mountain Sanitarium of 1907, as significant and representing a Black Hills health spa of the early twentieth century. The SHPO and U.S. Department of the Interior listed downtown and several adjacent neighborhoods (generally the city limits circa 1920) on the NRHP as the Hot Springs Historic District (Putz 1974); see Figure 3.3-4. A complete and recent tally of contributing and noncontributing resources in the Hot Springs Historic District is a pending effort of the city and SHPO (Julin 2010).

Figure 3.3-4. Downtown Hot Springs along River Street.

3.3.5.1.2 Battle Mountain Sanitarium National Historic Landmark

Congress passed legislation in 1902, signed by President Theodore Roosevelt, adding a 10th federal facility to the post-Civil War National Home for Disabled Volunteer Soldiers (NHDVS), the Battle Mountain Sanitarium. The NHDVS in Hot Springs became the first fully equipped hospital among the system's traditional assisted living dormitories and accompanying cemeteries (Julin 2010).

The initial buildings for Battle Mountain Sanitarium were designed by Omaha architect Thomas Rogers Kimball. The associated landscape was designed by Kansas City urban planner George Edward Kessler. Construction was completed in 1907 for the majority of buildings still serving the VA Hot Springs campus. A new Main Hospital was added in 1926 and other improvements were made in the 1930s, following World War II, and through the late twentieth century (Julin 2010).

The Secretary of the Interior designated the Battle Mountain Sanitarium a NHL in July 2011. The buildings and campus are "an outstanding representation of the development of the [NHDVS], the first national system to provide benefits to volunteer soldiers…the only NHDVS branch to be established as an independent medical facility, rather than a residential institution" (Julin 2010). The NHL has 40 contributing buildings, sites, structures, and objects, interspersed with 17 noncontributing buildings and structures.

The NHL is focused on the 12 buildings of the main campus that reflect Kimball's original design (Figures 3.3-5 to 3.3-7). These include the administration building (Building 1) and connected hospital complex of Buildings 2 through 11, most of which are rectangular wards arrayed in a spoke arrangement around a center court, and connected by a circular arcade. A study on the character-defining elements of these buildings conducted in 2012 on behalf of VA concluded that the buildings retain a high degree of historic integrity (Treanor Architects 2012). The exterior of most buildings remain as originally designed, with additions and exterior fire escapes having been added. The interiors of buildings have been remodeled to serve a more contemporary use; however, much of the historic material remains intact. The later additions of wings onto the north and southeast of the 1926 hospital (Building 12) are two of the few major noncontributing components of the NHL (Julin 2010).

Figure 3.3-5. Battle Mountain Sanitarium, Administration Building (Building 1).

Figure 3.3-6. Westerly Overview of Battle Mountain Sanitarium/VA Hot Springs Campus.

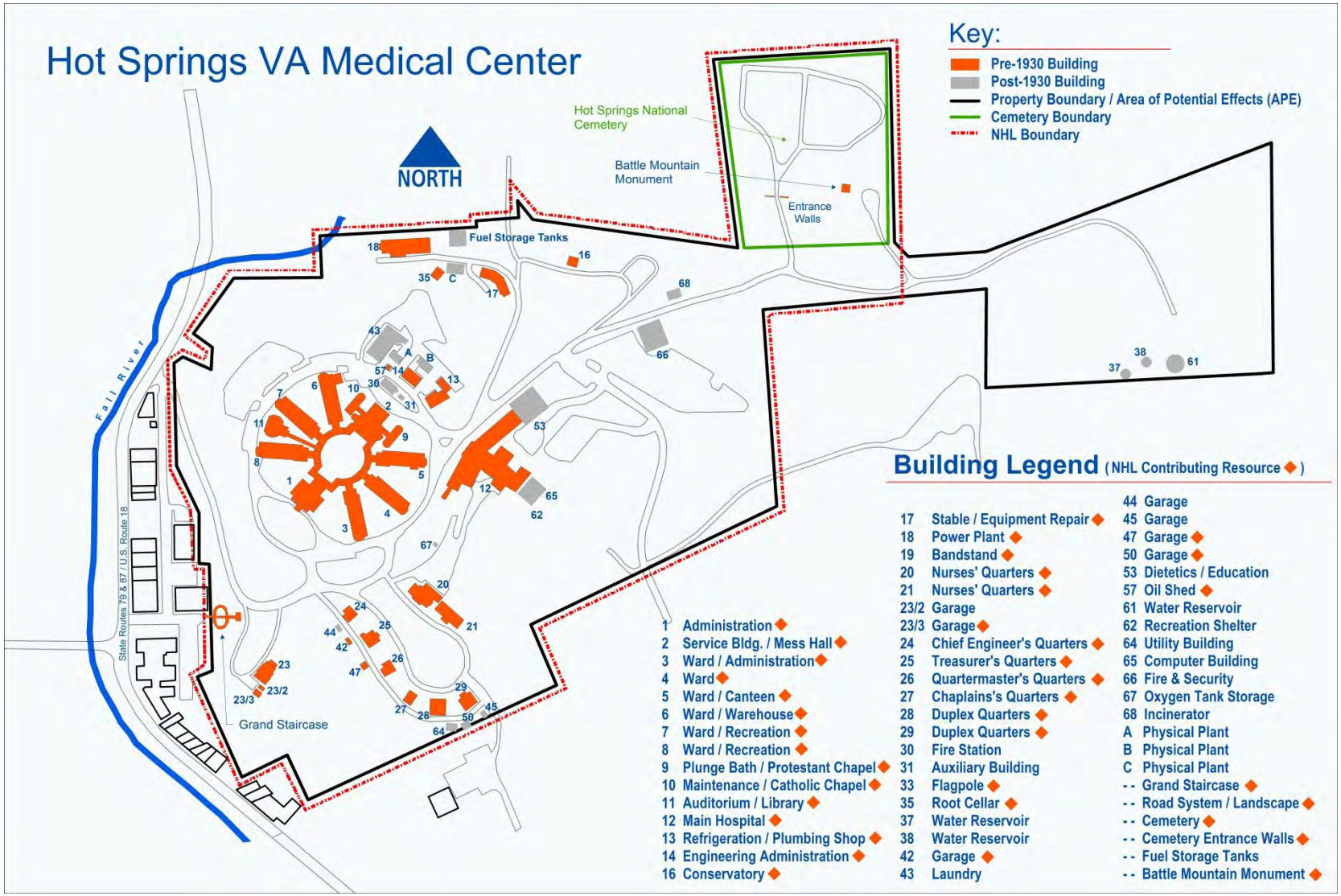


Figure 3.3-7. Battle Mountain Sanitarium National Historic Landmark.

While historically connected to the Battle Mountain Sanitarium as its water supply, the VA-owned spring house on Fall River (Figure 3.3-8) is outside of the NHL boundary and the Hot Springs Historic District. The water source appears as a spring house on Battle Mountain plans as early as 1903 (VA 1903), and is associated with institutional use of the local springs (Federal Writers' Project 2006). The original appearance of the structure over the spring is not known; however, updates include modern shingles, paint, and a security fence. This spring house is eligible for listing in the NRHP.

Figure 3.3-8. VA Spring House near Fall River.

As the first national Veterans care center to serve as an independent medical facility, the Battle Mountain Sanitarium is a place of long-established custom in the health care of generations of Veterans. During public scoping meetings and consultation with consulting parties, the Battle Mountain Sanitarium was recognized as a traditional place of care for the Veteran community. The presence of the Battle Mountain Sanitarium is part of what leads the City of Hot Springs to self-identify as "The Veterans Town". This customary or traditional use makes the Battle Mountain Sanitarium and the VA Hot Springs campus a traditional cultural property to the associated Veteran community (as "traditional cultural property" is defined by National Register Bulleting 38 [Parker and King 1998]). This traditional use is associated with the historic characteristics of feeling and association that make the NHL eligible for NRHP listing.

3.3.5.2 Cultural Resources in the Rapid City Area of Potential Effects

CRGRID identified 1,317 cultural resources located within the 150-square-mile Rapid City APE (Archaeological Research Center 2015). These resources are listed in Table 3.3-2. The historic districts in the APE contain most of the historic buildings. Figure 3.3-9 illustrates historic building and district distributions within the Rapid City APE. Dinosaur Park Historic District is a single historic property. Beyond the districts, another 25 historic properties within the Rapid City APE are listed in the NRHP.

Table 3.3-2. Summary of CRGRID Resources in Rapid City Area of Potential Effects.

Resource Type	Total Resources	Reviewed[a] for NRHP		
		Listed	Eligible	Not Eligible
Prehistoric Archaeological (50)				
Artifact scatter	23		1	13
Isolated artifact	17			17
Stone feature	6			1
Quarry	3			
Village site	1			1
Historic Archaeological (63)				
Building/structure remnant	26			22
Earthwork	9		4	4
Transportation route (road, railroad)	8		6	1
Artifact scatter	6			5
Well/cistern, dam	6			2
Isolated artifact	3			3
Rock art and monument	3			2
Industrial site	1			1
Burial site	1			
Combined Historic/Prehistoric Archaeological (9)				
Artifact scatter	6			2
Rock art	2		1	
Building/structure remnant, stone feature, artifact	1			1
Unknown Period Archaeological (2)				
Stone feature (cairn)	2			1
Building, Structure, and Built Landscape (1,193)				
Structure and building	1,167	467	78	325
Park, landscape structure	26	1	1	16
Total	**1,317**	**468**	**91**	**417**

[a] Reviewed by SD SHPO for NRHP status.
Source: South Dakota CRGRID (Archaeological Research Center 2015.

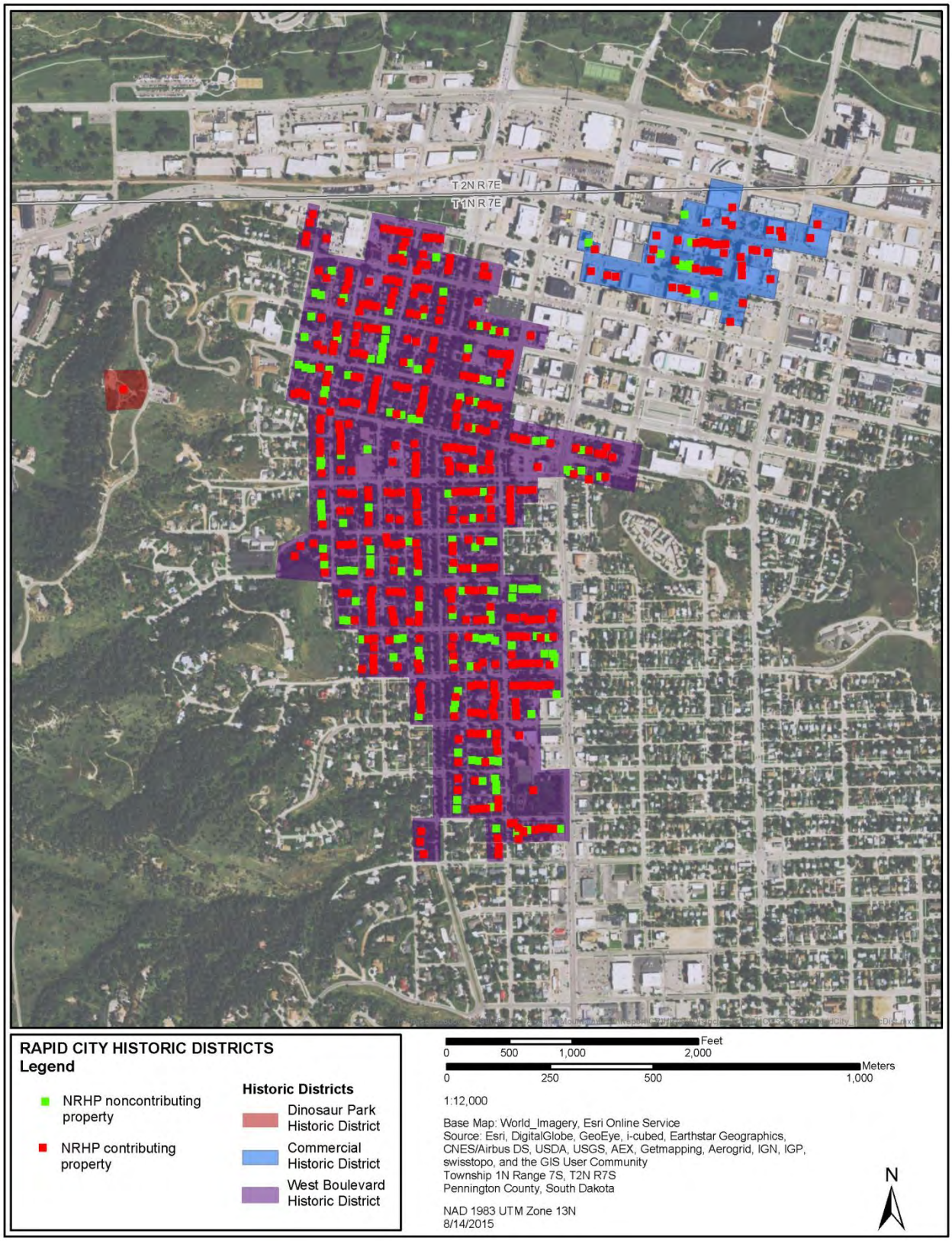


Figure 3.3-9. Historic Districts in Rapid City Area of Potential Effects.

3.3.5.2.1 Commercial Historic District

Listed in the NRHP in 1974 and expanded in 1998, the Commercial Historic District has 57 contributing resources from the late nineteenth through mid-twentieth centuries (Archaeological Research Center 2015).

3.3.5.2.2 West Boulevard Historic District

The West Boulevard Historic District, listed in the NRHP in 1974 and expanded in 1995, is southwest of the Commercial Historic District and has 535 contributing resources over 34 full and 14 partial subdivision blocks of primarily single-family detached residences built between 1900 and 1940 (Archaeological Research Center 2015; Kooiman et al. 1995).

3.3.5.3 Regional Cultural Resources

The Black Hills region is important in the heritage and traditions of Native American peoples who live or customarily lived in the region. The entire Black Hills landmass ("He Sapa" to some Siouan peoples) is sacred within certain Native American traditions (Sundstrom 1996). Within the Black Hills region, some higher profile landmarks continue to be well-recognized as specific sacred sites, including the Hot Springs area (Sundstrom 1996). Sundstrom (1996) distinguishes the "traditional or sacred landscapes" of the Black Hills to encompass three kinds of properties: (1) distinctive regions, such as the Black Hills or Bear Lodge Mountains; (2) specific points in the landscape, such as the hot springs or Bear Butte; and (3) kinds or types of places, such as springs and caves. The Hot Springs sacred site ("Minnekahta" to some Siouan peoples) constitutes a general—rather than discretely delimited—location, encompassing the entire area of the Fall River Valley and bounding mountains (the traditional use area) that contains the hot springs proximate to and south of present-day Evans Plunge in the Fall River floodplain within the City of Hot Springs. While Battle Mountain (Figures 3.3-1 and 3.3-10) is not distinctly identified in the ethnographic literature, this landform is recognized by a Siouan name ("He-oki-cize") by at least one nineteenth century source (Hans 1907). One archaeological artifact scatter is recorded on the Battle Mountain prominence (Archaeological Research Center 2015). Historic accounts referring to Battle Mountain tend to tie it to occupation of the Hot Springs area (SD SHPO et al. 1990; Hot Springs Chamber 2010). Sundstrom (1996) notes that the main areas of the Black Hills cultural landscape, including Hot Springs specifically, have a potential for connected traditional properties that are "less prominent [and] not as likely to have been recorded ethnographically," such as additional "high peaks, prominent buttes, springs, caves…." The VA Hot Springs campus is within the Fall River Valley, on the western foot of the Battle Mountain landform, within the vicinity of prominent hot springs locations. Therefore, the VA Hot Springs campus is in the Native American traditional area of the Hot Springs sacred site (Sundstrom 1996), interconnecting with the Battle Mountain landform. VA considers the Hot Springs sacred site area, with Battle Mountain interconnected, as a historic property of religious and cultural importance to Native American tribes with ancestral, aboriginal, or ceded land ties to the Black Hills Region.

Figure 3.3-10. View of Battle Mountain Land Mass from the VA Hot Springs Campus.

The Black Hills region and its features are traditionally important to a number of Northwest Plains tribes. In addition to the Sioux (Lakota, Dakota, and Nakota), these tribes include the Cheyenne, Arapaho, and Kiowa, as well as potentially the Ponca, Mandan, and other tribes with connections to the greater Northwest Plains culture area (Sundstrom 1996; Phillips et al. 2013). Sioux tribes retain historic claim to the Black Hills in U.S. treaty negotiations, first with the 1851 Treaty of Fort Laramie and then reiterated in the 1868 Treaty of Fort Laramie (Phillips et al. 2013). The list of tribes contacted for consultation is included in Appendix C.

Despite recent development and historic construction, there could be archaeological sites or materials that represent important connections to the traditional use of the Hot Springs/Battle Mountain area or the Black Hills. Archaeological sites or materials could exist on the VA Hot Springs campus or at locations yet to be identified in Hot Springs and Rapid City where construction could occur under the reconfiguration alternatives. Existing cultural resource site records (see Sections 3.3.5.1 and 3.3.5.2) indicate potential sites or materials include rock art, stone circles, and cairns. Locations for any construction or modification would receive phased review (see Section 3.3.6).

3.3.6 Phased Identification and Evaluation of Historic Properties

Certain alternatives could result in construction or renovation of additional VA facilities in Hot Springs and Rapid City, or cause ground-disturbing activities that could expose archaeological sites or features at the VA Hot Springs campus or yet to be identified locations. VA would continue phased identification and evaluation of historic properties when any specific locations for future construction are determined.

Phased review of new development locations is subject to identification and evaluation of cultural resources and historic properties pursuant to federal NEPA and NHPA Section 106 regulations (40 CFR 1502.16(g) and 36 CFR 800.4). Any discovery of historic properties during new development actions would be addressed under the Section 106 process pursuant to 36 CFR 800.13 (Post-Review Discoveries) and under NEPA pursuant to 40 CFR 1502.9(c).

3.4 Geology and Soils

Geological resources consist of surface and subsurface materials. Within a given physiographic province, geologic resources are described in terms of topography and physiography, geology, soils, and, where applicable, geologic hazards.

Topography and physiography relate to the shape and arrangement of a land surface, including elevation and the position of natural and human-made features.

Geology is the study of the physical and dynamic history of the Earth and provides information on the structure and configuration of surface and subsurface features. Geologic data are based on field observations of the surface and borings to identify subsurface composition.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils are described by their type, slope, and physical characteristics. In some cases, soil properties must be examined for their compatibility with particular construction activities or types of land use.

3.4.1 Regulatory and Policy Framework

The *Clean Water Act*, described further in Section 3.5.1, includes provisions that regulate soil erosion and stormwater runoff to navigable waters. The applicability of the Act to the proposed project is described in greater detail in Section 3.5, Hydrology and Water Quality.

The *Earthquake Hazards Reduction Act* was enacted to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." The act established the National Earthquake Hazards Reduction Program, led by the Federal Emergency Management Agency.

Executive Order 12699, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction* (1990), requires federal agencies to ensure that buildings (including both new construction and leases) are designed and constructed in accordance with appropriate seismic design and construction standards.

Executive Order 12941, *Seismic Safety of Existing Federally Owned or Leased Buildings* (1994), adopted standards for assessing the seismic safety of owned and leased buildings and mitigating unacceptable seismic risks in those buildings.

The International Building Code provides minimum standards to protect the public safety, health, and welfare in regards to building construction. The Code was developed to consolidate existing building codes into one uniform code, and includes specifications related to soils and foundations.

VA Directive 7512, *Seismic Safety of VA Buildings*, establishes policy regarding the seismic safety of VA buildings and incorporates requirements established by Executive Orders 12699 and 12941.

3.4.2 Current Conditions

3.4.2.1 Regional Geology and Seismicity

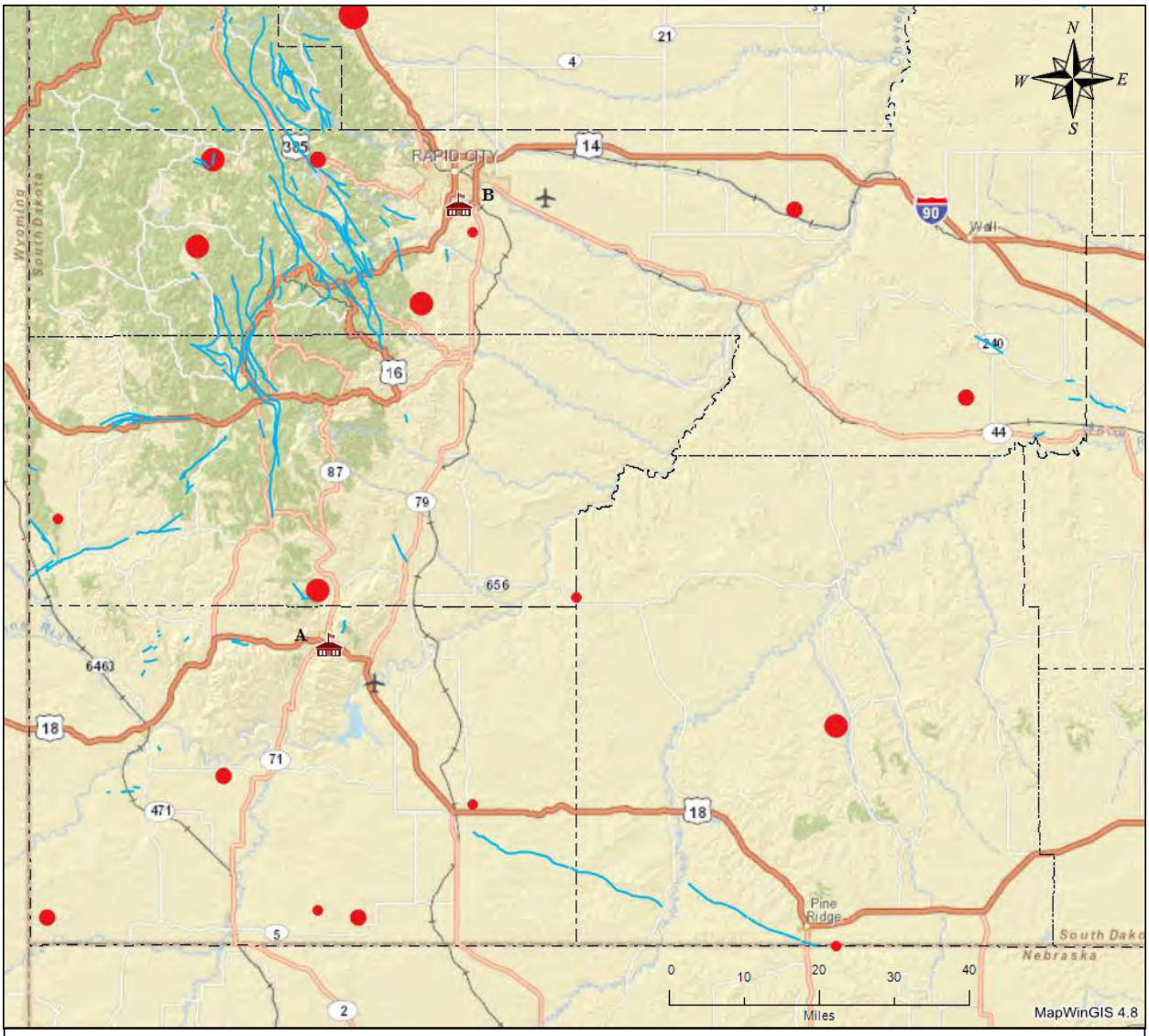
The Hot Springs and Rapid City areas are located near the border of the Pierre Hills and Black Hills physiographic divisions of the Great Plains province (SDGS n.d.). The Pierre Hills division consists of a series of smooth hills and ridges with rounded tops. This region is underlain by the Pierre shale formations and has lower elevations than the plateau country to the north and south (Malo 1997). The Black Hills division is a mountainous area consisting of a series of upturned sedimentary strata (hogbacks), arranged concentrically around a core of igneous and metamorphic rocks (Malo 1997).

Peak ground accelerations—an indicator of seismic event effects—in southwestern South Dakota are relatively low (two percent probability over 50 years of exceeding approximately 0.06 to 0.14 times the standard acceleration of gravity) (USGS 2014a). The region has a history of earthquakes ranging in intensity, as measured on the Modified Mercalli Intensity Scale (see Table 3.4-1), from III to VI (USGS 2007), with the more intense earthquakes and the majority of faults located within the Black Hills division. Figure 3.4-1 depicts the regional locations of earthquakes and faults.

Table 3.4-1. Modified Mercalli Intensity Scale.

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: USGS 2014b.



Legend

A – VAMC – Hot Springs
B – CBOC – Rapid City
Mercalli Intensity
III IV V VI
Faults

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source: SDGS 2013 and USGS 2007.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.4-1. Earthquakes and Faults in the Hot Springs and Rapid City Areas.

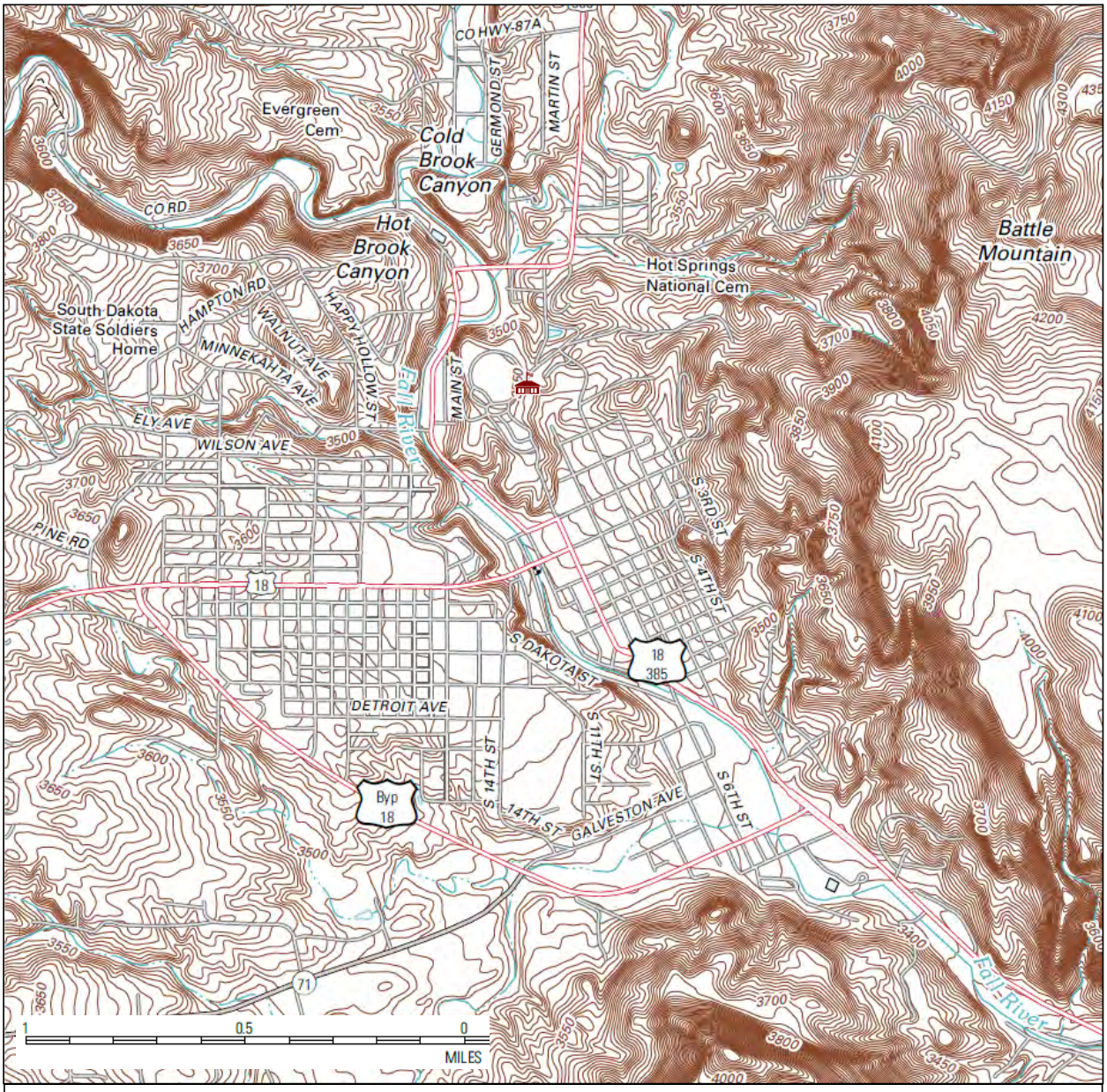
3.4.2.2 Hot Springs Area Topography and Soils

Topography in the Hot Springs, SD, area ranges from gently sloping (central city area) to severely sloped (mountainous areas surround the city), and generally slopes toward Fall River in the center of the city (see Figure 3.4-2).

The following geologic units are present in the Hot Springs area (see Figure 3.4-3) (USGS 2007):

- Jms
  - Morrison Formation (Late Jurassic): Light-gray to green and variegated red, brown, yellow, or lavender, siliceous claystone, shale, and siltstone containing interbedded sandstone and fresh-water limestone lenses. Thickness up to 150 feet (46 meters).
  - Unkpapa Sandstone (Late Jurassic): White, massive to thin-bedded, fine-grained, argillaceous sandstone. May be variegated to banded red, yellow, brown, or lavender. Thickness up to 267 feet (81 meters).
  - Sundance Formation (Late to Middle Jurassic): Greenish-gray, yellow, tan, red to orange, and white, variegated, interbedded, fine- to coarse-grained sandstone, siltstone, clay, and limestone. Thickness 250 to 350 feet (76 to 107 meters).
  - Gypsum Springs Formation (Middle Jurassic): Massive white gypsum and minor maroon siltstone and shale. Thickness up to 40 feet (12 meters).
- Pmo
  - Minnekahta Limestone: Purple to gray, finely crystalline, thin- to medium-bedded limestone with varying amounts of red shale. Thickness 30 to 50 feet (9 to 15 meters).
  - Opeche Shale: Red siltstone, argillaceous sandstone and shale interbedded with caliche layers. Thickness 85 to 130 feet (26 to 40 meters).
- PPm – Minnelusa Formation: Variegated, yellow to red, gray to brown, pink to purple, and black, interbedded sandstone, siltstone, shale, limestone, dolomite, calcarenite, chert, and brecciated beds. Thickness 394 to 1,175 feet (120 to 358 meters).
- Qal – Alluvium: Clay to boulder-size clasts with locally abundant organic material. Thickness up to 75 feet (23 meters).
- Qt – Terrace Deposits: Clay to boulder-size clasts deposited as pediments, paleochannels, and terrace fills of former flood plains. Thickness up to 75 feet (23 meters).
- TrPs – Spearfish Formation: Red sandy shale, siltstone, sandstone, and minor limestone. Interbedded with abundant gypsum. Thickness 328 to 559 feet (100 to 170 meters).

Hot Springs area is primarily urban with little to no agricultural activity. No land within the city limits is designated as prime farmland. In 1980, about 12,000 acres in Fall River County, or about 1 percent of the total acreage, met the requirements for prime farmland. All of this acreage was used for irrigated crops, mainly corn and alfalfa (USDA 1982).



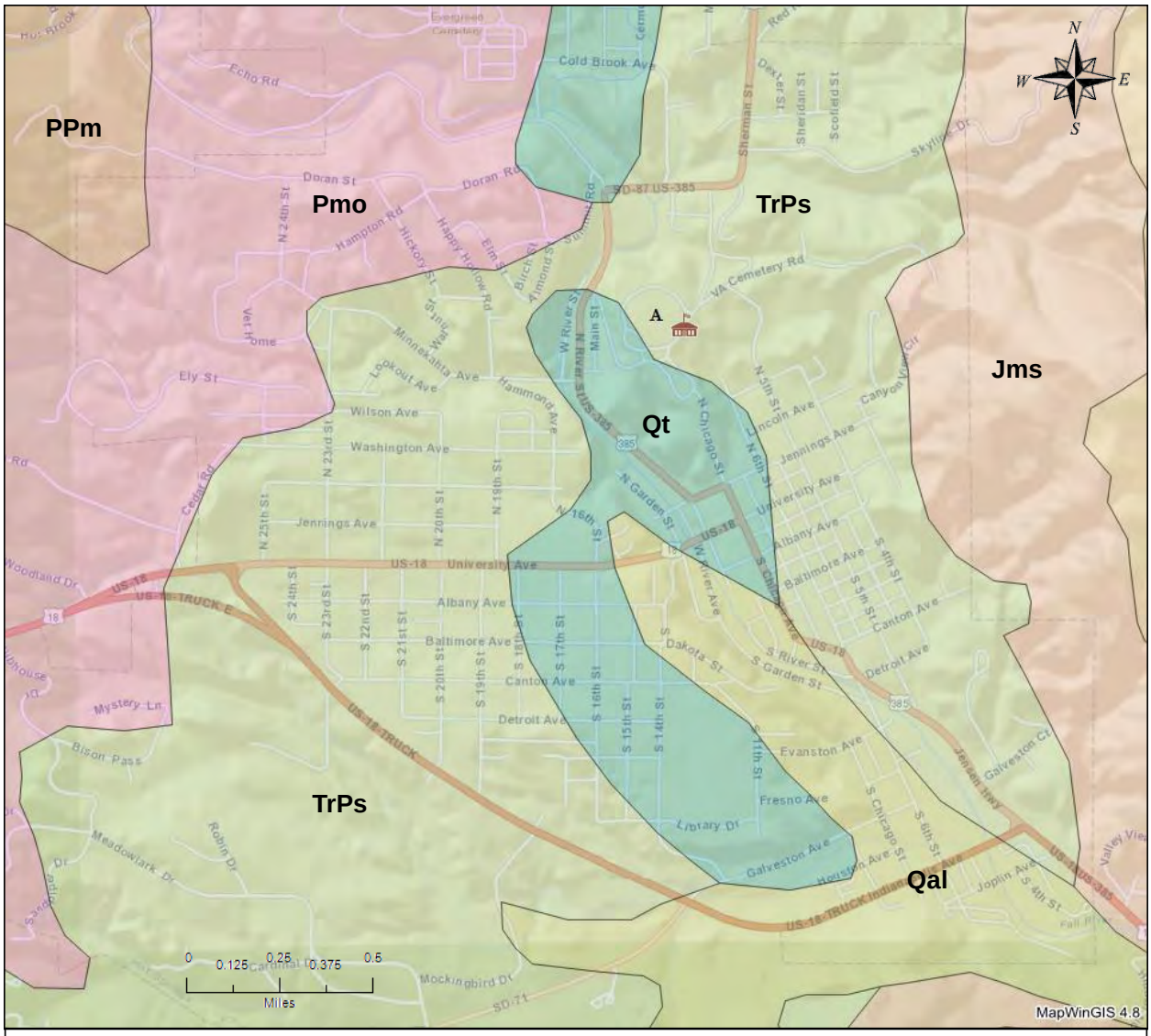
Legend

VAMC – Hot Springs

N
W E
S

Basemap Source: Hot Springs Quadrangle, 7.5-Minute Series. USGS 2012a.
Contour Interval = 10 feet

Figure 3.4-2. Topography: Hot Springs, SD.



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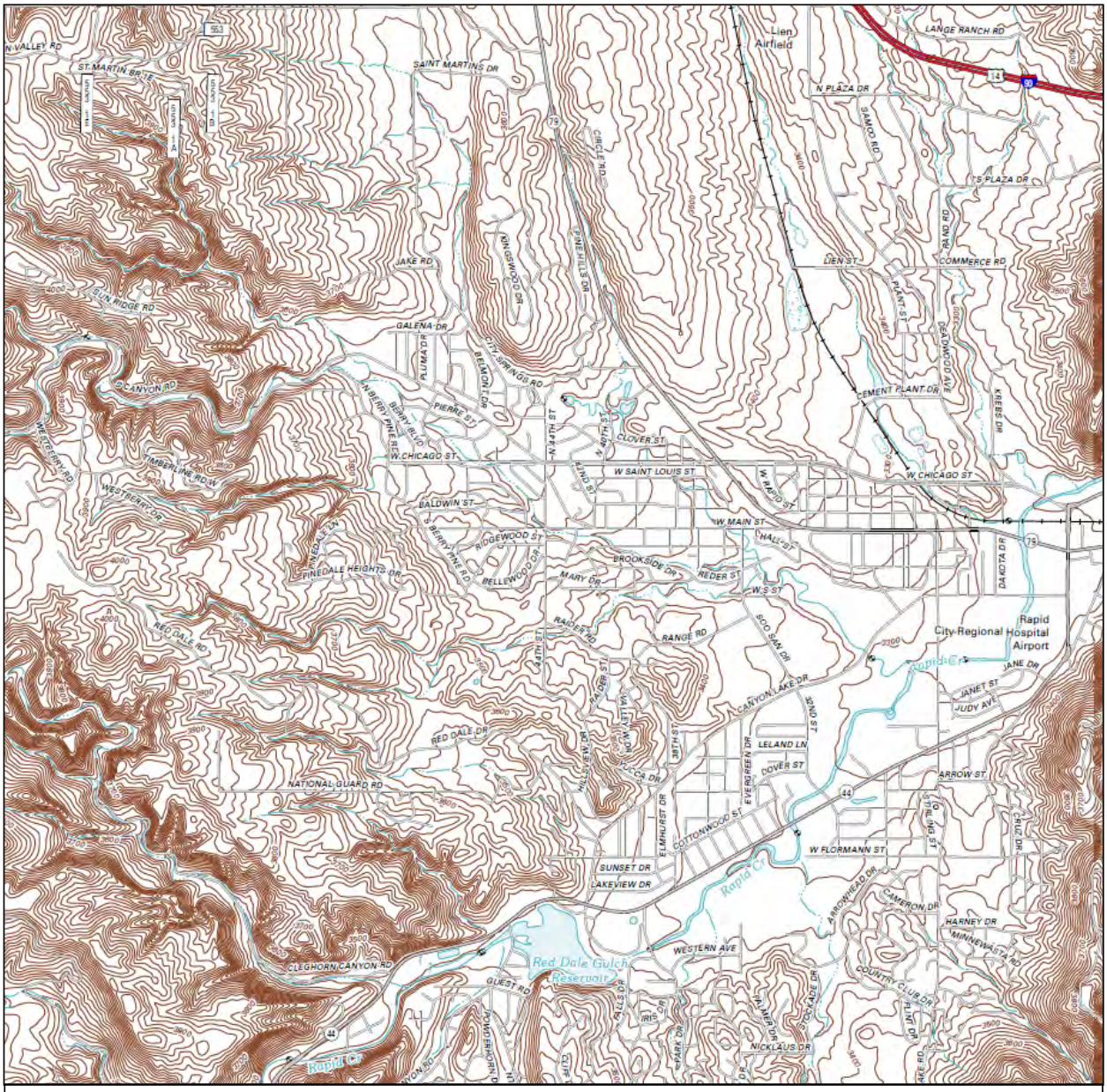
A – VAMC – Hot Springs

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source: USGS 2007.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.4-3. Geologic Units, Hot Springs, SD.

3.4.2.3 Rapid City Area Topography and Soils

Topography in the Rapid City, SD, area ranges from gently sloping (central and eastern city area) to moderately sloped (ridge separating the western and eastern city areas), and generally slopes toward Rapid Creek in the center of the city (see Figures 3.4-4 and 3.4-5).



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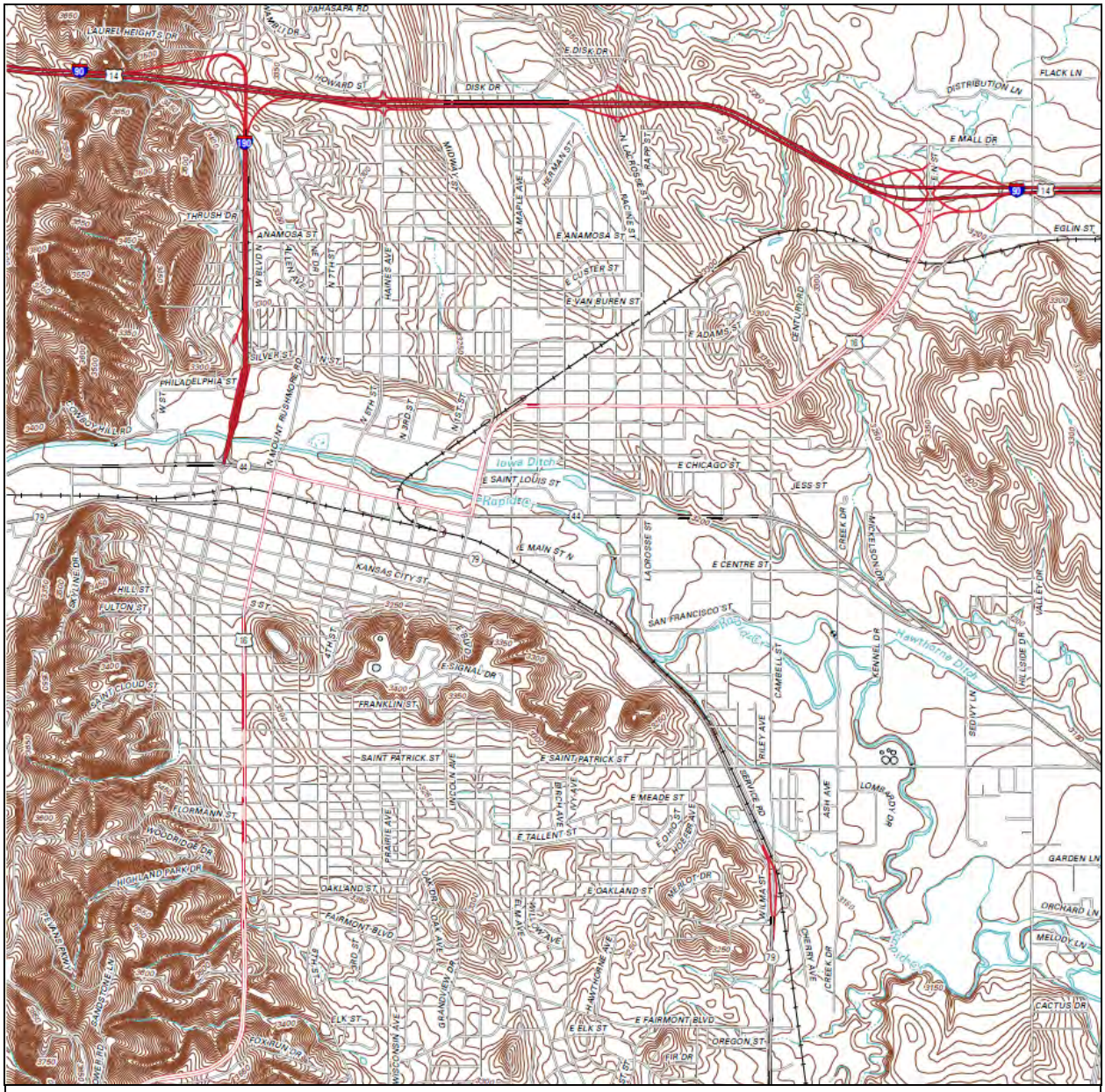
1 0.5 0 MILES

N W E S

Basemap Source: Rapid City West Quadrangle, 7.5-Minute Series. USGS 2012b.
Contour Interval = 20 feet

Figure 3.4-4. Topography: Rapid City, SD (west).



Legend

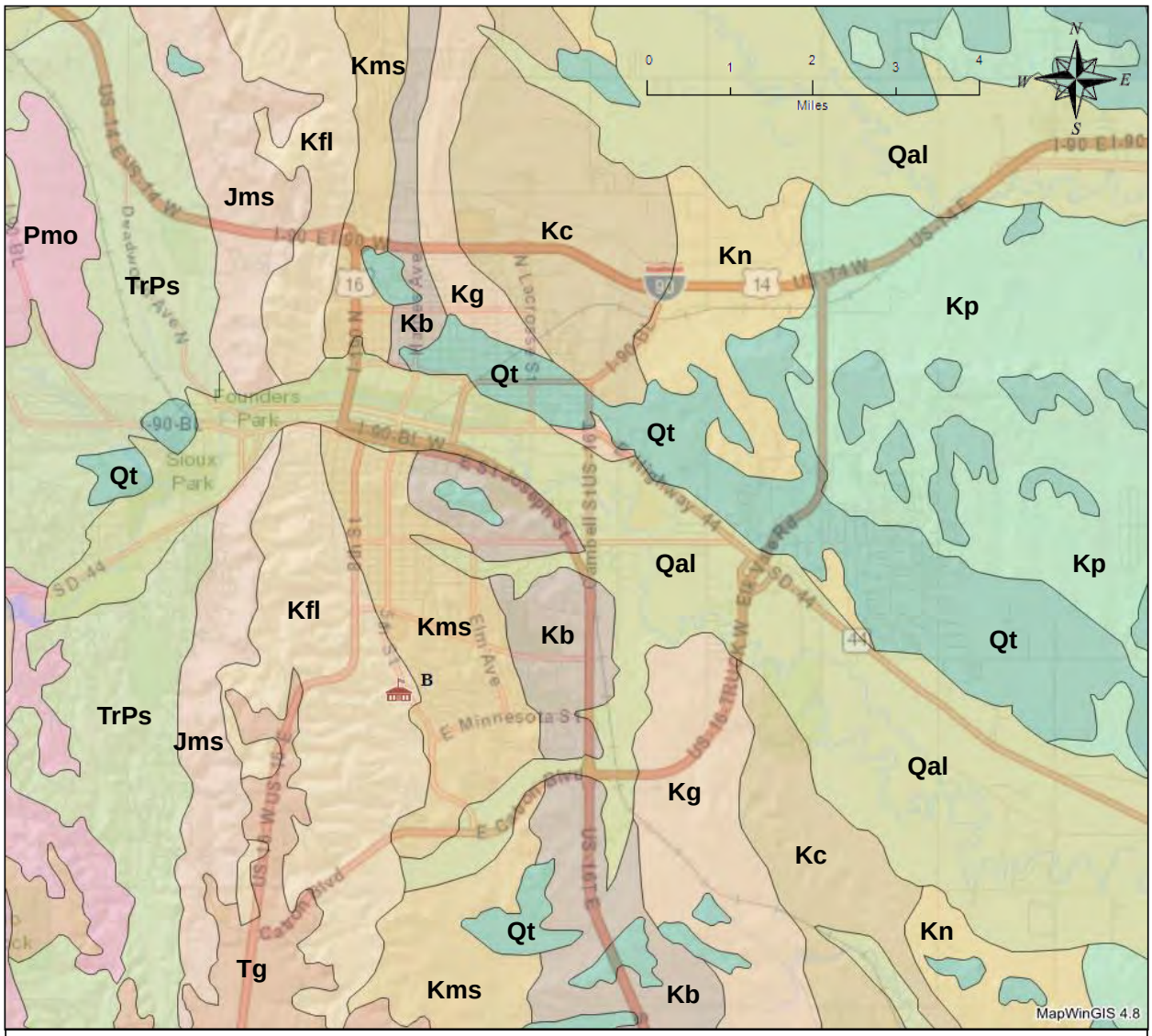
CBOC – Rapid City

Basemap Source: Rapid City East Quadrangle, 7.5-Minute Series. USGS 2012c.
Contour Interval = 10 feet

Figure 3.4-5. Topography: Rapid City, SD (east).

The following geologic units are present in the Rapid City area (see Figure 3.4-6) (USGS 2007):

- Jms
  - Morrison Formation (Late Jurassic): Light gray to green and variegated red, brown, yellow, or lavender, siliceous claystone, shale, and siltstone containing interbedded sandstone and fresh-water limestone lenses. Thickness up to 150 feet (46 meters).
  - Unkpapa Sandstone (Late Jurassic): White, massive to thin-bedded, fine-grained, argillaceous sandstone. May be variegated to banded red, yellow, brown, or lavender. Thickness up to 267 feet (81 meters).
  - Sundance Formation (Late to Middle Jurassic): Greenish-gray, yellow, tan, red to orange, and white, variegated, interbedded, fine- to coarse-grained sandstone, siltstone, clay, and limestone. Thickness 250 to 350 feet (76 to 107 meters).
  - Gypsum Springs Formation (Middle Jurassic): Massive white gypsum and minor maroon siltstone and shale. Thickness up to 40 feet (12 meters).
- Kb – Belle Fourche Shale: Dark gray to black bentonitic shale containing minor limestone lenses, bentonite layers, fossiliferous calcarenite, and large, ferruginous, carbonate concretions. Thickness 150 to 350 feet (46 to 107 meters).
- Kc – Carlile Shale: Dark gray to black, silty to sandy shale with several zones of septarian, fossiliferous, carbonate concertions. Contains up to three sandstone beds near the middle of the formation and sandy calcareous marl at the base. Thickness 345 to 620 feet (105 to 189 meters).
- Kfl (Inyan Kara Group)
  - Fall River Formation: Variegated brown, red, gray to purple, calcareous, well-sorted, fine-grained sandstone, siltstone, and shale containing mica flakes. Thickness 100 to 200 feet (30 to 61 meters).
  - Lakota Formation: Yellow, brown, red-brown, gray to black silty shale, pebble conglomerate, and massive to thin-bedded, cross-bedded sandstone. Locally interbedded with fresh-water limestone and bituminous coal beds. Thickness 35 to 500 feet (11 to 152 meters).
- Kg – Greenhorn Formation: Gray shale, mudstone, marl, calcarenite, and shaley limestone grading upward into light gray to tan, alternating marl and thin-bedded, fossiliferous limestone. Thickness 225 to 315 feet (69 to 96 meters).
- Kms
  - Mowry Shale: Black to gray, siliceous, fissile shale and siltstone containing bentonite layers, and sparse sandstone dikes and sills. Thickness 125 to 250 feet (38 to 76 meters).
  - Newcastle Sandstone: Gray, light-brown to yellow, discontinuously distributed siltstone, claystone, sandy shale, and fine-grained sandstone. Thickness up to 290 feet (88 meters).
  - Skull Creek Shale: Dark gray to blueish-gray shale containing ferruginous, and carbonate concretions. Thickness 150 to 275 feet (46 to 84 meters).



Legend

B – CBOC – Rapid City

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source: USGS 2007.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.4-6. Geologic Units: Rapid City, SD.

- Kn – Niobrara Formation: White to dark gray argillaceous chalk, marl, and shale. Weathers yellow to orange. Contains thin, laterally continuous bentonite beds, chalky carbonaceous shale, minor sand, and small concretions. Thickness 160 to 225 feet (49 to 69 meters).
- Kp – Pierre Shale: Blue-gray to dark gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, or light-brown chalky shale. Contains minor sandstone, conglomerate, and abundant carbonate and ferruginous concretions. Thickness 1,000 to 2,700 feet (305 to 823 meters).

- Pmo
  - Minnekahta Limestone: Purple to gray, finely crystalline, thin- to medium-bedded limestone with varying amounts of red shale. Thickness 30 to 50 feet (9 to 15 meters).
  - Opeche Shale: Red siltstone, argillaceous sandstone and shale interbedded with caliche layers. Thickness 85 to 130 feet (26 to 40 meters).
- Qal – Alluvium: Clay to boulder-size clasts with locally abundant organic material. Thickness up to 75 feet (23 meters).
- Qt – Terrace Deposits: Clay to boulder-size clasts deposited as pediments, paleochannels, and terrace fills of former flood plains. Thickness up to 75 feet (23 meters).
- Tg – Gravel Deposits: Clay to boulder-size clasts primarily from igneous and metamorphic rocks of the central Black Hills. Also includes Phanerozoic lithic clasts and rare vertebrate fossils. Thickness up to 60 feet (18 meters).
- TrPs – Spearfish Formation: Red sandy shale, siltstone, sandstone, and minor limestone. Interbedded with abundant gypsum. Thickness 328 to 559 feet (100 to 170 meters).

Rapid City is primarily urban with little to no agricultural activity. No land within the city limits is designated as prime farmland.

3.5 Hydrology and Water Quality

The hydrologic setting of a project includes both surface water and groundwater, and the quantity and quality of each. Local climates are also useful in describing and understanding the local hydrologic setting. While related to hydrology, floodplains and wetlands are discussed separately Section 3.9.

Surface water resources typically consist of rivers, streams, lakes, and wetlands. Groundwater consists of subsurface hydrologic resources, and is an essential resource that functions to recharge surface water and is often used for potable water consumption, agricultural irrigation, and industrial applications. Surface water and groundwater resources are important contributors to the economic, ecological, recreational, and human health of a region.

3.5.1 Regulatory Framework

3.5.2.1 Clean Water Act

The *Clean Water Act of 1977* gave the U.S. EPA the authority to set effluent standards on an industry-by-industry basis, and continued the requirements to set water quality standards for contaminants in surface waters by requiring each state to adopt water quality standards for receiving water bodies (Section 303). The Act requires the discharge of any pollutant from point sources into navigable waters to be authorized by a permit obtained under the NPDES (Section 402). The NPDES establishes limits on specific pollutants in order to restore and maintain the chemical, physical, and biological integrity of the surface water resource. The NPDES also regulates discharge of non-point sources of water pollution, such as stormwater.

Section 303 of the *Clean Water Act* requires states to adopt water quality standards for all surface waters based on the designated beneficial use. The SDDENR received EPA approval of their 2014 Integrated Report, identifying impaired water bodies within South Dakota that require water quality standards.

Section 404 of the *Clean Water Act* regulates the discharge of dredge or fill material into waters of the U.S., which includes wetlands (see Section 3.9).

3.5.2.2 Energy Independence and Security Act

In 2007, the *Energy Independence and Security Act* was passed, which in part (Section 438) established new stormwater design requirements for federal development and redevelopment projects to reduce the impacts of stormwater runoff. Specifically, construction projects that disturb more than 5,000 square feet must maintain or restore the predevelopment hydrology to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow.

3.5.2 Current Conditions

South Dakota has 14 major river basins, most of which drain into the Missouri River. The Hot Springs and Rapid City areas lie within the Upper Cheyenne River Basin (SDDENR 2014). Hot Springs is located in the Fall River subwatershed, within the Fall River watershed (hydrologic unit 101201090105) (USGS 2009).

The VA Hot Springs campus contains both impervious surfaces (which allow little infiltration of precipitation into the soil and generate higher levels of runoff) and landscaped areas. Surface runoff of stormwater is generally in a westerly direction toward Fall River, which runs through Hot Springs. The annual mean flow in Fall River through Hot Springs is 24.2 cubic feet per second (USGS 2014a). Fall River is designated as an impaired water due to stream temperature exceedances for the coldwater permanent fish life beneficial use (SDDENR 2014). The watershed contains highly erodible soils. VA holds a surface water discharge system general permit (permit number SDG860037) authorizing the discharge of water from water treatment and/or distribution system activities to Fall River and includes monitoring and sampling requirements (SDDENR 2010).

The majority of Rapid City is located in the Cyclone Ditch-Rapid Creek subwatershed, within the Middle Rapid Creek watershed (hydrologic unit 101201100204) (USGS 2009). Primarily impervious surfaces surround the Rapid City CBOC. Surface runoff of stormwater is generally in an easterly direction towards Rapid Creek, which runs through Rapid City. The annual mean flow in Rapid Creek through Rapid City is 69.5 cubic feet per second (USGS 2014b). Rapid Creek is designated as an impaired water due to *Escherichia coli* and fecal coliform exceedances for the immersion recreation beneficial use (SDDENR 2014). The watershed contains highly erodible soils.

The availability of groundwater resources in the project area is influenced by many factors including location, local recharge and groundwater flow conditions, and structural features. The major confined aquifers in the project area are (from shallowest to deepest) the Inyan Kara, Minnekahta, Minnelusa, Madison, and Deadwood aquifers (USGS 2003). Groundwater quality is generally good with limitations related to aesthetic qualities associated with hardness and high concentrations of chloride, sulfate, sodium, manganese, and iron; very few health-related limitations exist (USGS 2003). Each of the aquifers is described below, based on information in USGS (2003).

- Shallow unconfined aquifer: Both the Hot Springs and Rapid City areas are underlain by a shallow unconfined aquifer. These alluvial deposits are generally adjacent to streams in the floodplain and readily yield water to wells.
- Inyan Kara Aquifer: The uppermost confined aquifer is the Inyan Kara aquifer, which lies below the Rapid City area, but is absent below the Hot Springs area. The depth to the top of this group below the Rapid City area ranges from less than 200 feet (outcrop in central Rapid City) to 2,000 feet.
- Minnekahta Aquifer: The Minnekahta aquifer lies below both the Hot Springs and Rapid City areas. The depth to the top of this group below the Rapid City area ranges from less than 200 feet (outcrop on the western side of Rapid City) to 3,500 feet. The depth to the top of this group below the Hot Springs area is 200 to 400 feet.
- Minnelusa Aquifer: The Minnelusa aquifer lies below both the Hot Springs and Rapid City areas. The depth to the top of this group below the Rapid City area ranges from less than 200 feet to 3,500 feet. The depth to the top of this group below the Hot Springs area is 200 to 400 feet.
- Madison Aquifer: The Madison aquifer lies below both the Hot Springs and Rapid City areas. The depth to the top of this group below the Rapid City area ranges from 600 feet to 4,000 feet. The depth to the top of this group below the Hot Springs area is 1,000 to 1,500

feet. The Madison aquifer returns the highest average well yields and temperatures are generally the warmest of the major aquifers.

- Deadwood Aquifer: The Deadwood aquifer lies below both the Hot Springs and Rapid City areas. The depth to the top of this group below the Rapid City area ranges from 1,000 feet to 4,500 feet. The depth to the top of this group below the Hot Springs area is 1,000 to 1,500 feet.

Hot Springs is known for the warm mineral springs found in the region. Initially settled in 1879 as Minnekahta (a Lakota Sioux word meaning Hot Water), the settlement was renamed Hot Springs in 1882. In 1890, Evans Plunge (an indoor pool fed by the natural springs) was constructed; the facility remains a local attraction today.

3.6 Wildlife and Habitat

This section describes the biological resources within the proposed project area. Biological resources include wildlife and plants and the habitats in which they exist. Habitat may be described in terms of ecological regions, or ***ecoregions***, which are geographical areas with similar climate and landforms, containing a variety of ecosystems characterized by their plant and animal communities and abiotic conditions, such as climate, soils, and elevation. Ecoregions are described at varying scales, using a Roman numeral classification scheme. Level I is the largest scale, dividing North America into 15 ecoregions. Levels II and III further divide the continent into 50 and 85 subregions, respectively, while further subdivisions (Level IV) includes hundreds of subregions. This discussion focuses on the subregions identified at the Level III and Level IV scale.

3.6.1 Regulatory and Policy Framework

The *Endangered Species Act* of 1973, as amended, is federal legislation that is intended to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing extinction of plants and animals. The law is administered by the Department of the Interior's Fish and Wildlife Service (FWS) and, for marine resources, the Commerce Department's National Oceanic and Atmospheric Administration. Section 4 of the *Endangered Species Act* addresses the listing and recovery of species and designation of critical habitat, which is a designated geographic area that contains feature essential for the conservation of a threatened or endangered species. Section 7 requires all federal agencies to ensure that any action they authorize, fund, or implement is not likely to jeopardize the continued existence of a federally protected species or result in destruction or adverse modification of its designated critical habitat. Section 9 prohibits the unauthorized "take" of federally protected species, which includes harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection of a protected species, or the attempt to engage in any such conduct. Federally protected species fall under one of two classifications:

- Endangered species are in danger of extinction throughout all or a significant portion of their range.
- Threatened species are likely to become endangered within the foreseeable future.

A species that is being considered by the FWS for protection as either endangered or threatened is described as "proposed" if a proposed regulation for its listing has been published in the Federal Register, or "candidate" if a proposed regulation has not been published.

The *Migratory Bird Treaty Act* of 1918 and Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, require federal agencies to minimize or avoid impacts on migratory birds that are listed in 50 CFR 10.13. If a federal action cannot avoid measurable negative impact on migratory birds, the responsible agency must develop and implement, within two years, a Memorandum of Understanding with the FWS to promote the conservation of migratory bird populations. Migratory birds are those that live, reproduce, or migrate within or across international borders during their annual life cycle. The Act prohibits the taking (hunting, wounding, killing, possessing, or transporting) of any migratory bird, their eggs, features, or nests.

The *Bald and Golden Eagle Protection Act* and the *Migratory Bird Treaty Act* provide continued federal protection for the bald eagle, which was removed from the federal list of endangered and threatened

wildlife in 2007, although it may still be protected where it is listed under state laws. National guidelines for bald eagle management have been developed (FWS 2007).

Golden eagles received protection under the *Eagle Act* in 1962 due to the threat of their extinction, their similarity of appearance to bald eagles, and their value to agriculture as predators of rodents. Both species of eagles have special significance to Native American culture.

The *Federal Noxious Weed Act* mandates control of noxious weeds by limiting possible weed seed transport from infested areas to non-infested sites. Executive Order 13112, *Invasive Species*, requires federal agencies to prevent the introduction of invasive species; provide for their control; minimize their economic, ecological, and human health impacts; and, to the extent practicable, not authorize, fund, or carry out management actions that are likely to cause the introduction or spread of invasive species.

3.6.2 Current Conditions

3.6.2.1 Regional Overview

Hot Springs in Fall River County and Rapid City in Pennington County and their immediate surroundings comprise the potentially affected environment for biological resources. These surroundings include the Black Hills area and Black Hills National Forest, which directly flank Rapid City on its western border and closely envelop the town of Hot Springs to the north and west. Black Hills National Forest encompasses over 1.2 million acres that consist primarily of early to late succession ponderosa pine communities with inclusions of white spruce, quaking aspen, paper birch, bur oak, mountain mahogany, and high mountain meadows. Riparian habitats consist mainly of sedges, forbs, and willows. The lower elevations include grassland prairie. The forest includes 11 reservoirs, 1,300 miles of streams, and 13,000 acres of wilderness (National Forest Foundation 2015).

Approximately half of Fall River County is occupied by the Buffalo Gap National Grassland to the south and the Black Hills National Forest to the north. Higher elevation areas to the north into the Black Hills National Forest create favorable growing conditions for ponderosa pine. The lower elevation areas surrounding the Black Hills to the south are primarily used as rangeland for livestock grazing and as agricultural land. Just south of Hot Springs is a wild horse sanctuary on 11,000 acres of grassland prairies, ponderosa pine forests, and canyons along the Cheyenne River. Ten miles south of town is the Angostura Reservoir and Recreation Area that includes 36 miles of shoreline and sandy beaches. It is one of the few reservoirs in southwestern South Dakota and is an important location for migratory birds (SDFGP 2015a).

More than half of Pennington County is occupied by the Black Hills National Forest; as a result, the majority of the land cover in this county consists of ponderosa pine forest associated with short to tall grasslands and agricultural fields (NRC 2009). Within Rapid City, the land bordering Rapid Creek is prone to periodic flooding; thus, the city has conserved much of the land along its banks as open greenways that include habitat conservation and environmentally sensitive areas. City preservation areas include the floodplains along Rapid Creek and Box Elder Creek, riparian and upland wooded areas, and wildlife corridors. Agricultural uses are located primarily to the north, east, and south of Rapid City, outside of the urban services boundary, although some active agricultural lands currently existing within the urban services boundary today. Buffer reserves are found around major public facilities, such as the airport and water reclamation plant. Publicly and privately owned forest

conservation areas are located in the forested areas primarily to the west of Rapid City limits as well as central locations along Skyline Drive and north of M Hill.

3.6.2.2 Vegetation

3.6.2.2.1 Black Hills

The Black Hills are dominated by ponderosa pine with open parklands and valleys covered by grasses. Pine forest intergrades with ponderosa pine woodland at lower elevations, in the lower Minnekahta Foothills, Red Valley, and Hogback Rim. This analysis focuses on the lower elevations of the Black Hills, which is the portion that abuts Rapid City and Hot Springs. In these areas, pine woodland includes somewhat closed to open, savanna-like stands of ponderosa pine. Bur oak, often mixed with ponderosa pine, can form large stands, especially in the northern and eastern parts of the Black Hills. Riparian hardwood vegetation at the lower elevations may include stands of bur oak with ironwood. Other riparian woodland types include cottonwood stands on low elevation floodplains, and a mix of hardwoods species such as oak, ash, boxelder, elm, and hawthorn in lower elevation draws and drainages.

Riparian shrublands at lower elevations typically consist of a mix of shrubs such as western snowberry, gooseberry, currant, and rose. Silver sagebrush occasionally forms large stands on floodplains. Thickets of western snowberry are common in draws and on floodplains.

Non-riparian shrubland types are best developed at lower elevations. Stands of big sagebrush are found in the outer part of the Hogback Rim. Mixed-grass prairie grasslands are most extensive at lower elevations, in the Minnekahta Foothills, Red Valley, and Hogback Rim. Dominant species include representatives of short, mixed and tallgrass prairies (Hall et al. 2002)

The Ponderosa Pine Woodland ecological system is best developed at lower elevations in the Black Hills, below 5,500 feet in the southern part and 4,500 feet in the northern part. Stands are occasional at higher elevations. This matrix system typically occurs in large-scale mosaics with grassland and shrubland types, and with bur oak in the northern and eastern Black Hills. These communities include ponderosa pine/bluebunch wheatgrass woodland, ponderosa pine/chokecherry forest, ponderosa pine/little bluestem woodland, ponderosa pine/Rocky Mountain juniper woodland, ponderosa pine/sedge woodland, and ponderosa pine/western wheatgrass woodland. Not all communities may be present, and some appear to be limited in distribution. Component communities can occur at higher elevations but are less common and not as extensive.

The Prairie ecological system also occurs at the same lower elevations in the Black Hills. Smaller stands of component communities occur at elevations as high as 6,000 feet in the southern Black Hills. This large patch system typically occurs in large-scale mosaics with ponderosa pine woodland communities and with low-elevation shrubland types. The Prairie ecological system includes stands of grassland communities, including western wheatgrass–green needlegrass mixed grass prairie, needle-and-thread–blue grama mixed grass prairie, northern Great Plains little bluestem prairie, northern plains big bluestem prairie, western wheatgrass–blue Grama–threadleaf sedge prairie, and wheatgrass–needle-and-thread mixed grass prairie. Not all communities may be present.

The Low Elevation Floodplain ecological system occurs along larger streams and rivers below 5,000 feet in the Black Hills. Most habitat is in private ownership; as a result, this system is under-surveyed and not well-characterized. It consists of various combinations of low elevation hardwood and

shrubland types, including ash–elm/wolfberry forest, box elder/chokecherry forest, cottonwood–peach-leaf willow floodplain woodland, cottonwood/wolfberry floodplain woodland, sandbar willow shrubland, silver sagebrush/western wheatgrass shrub prairie, and western snowberry shrubland. Grassland stands may also be present (Hall et al. 2002; USGS 2013).

3.6.2.2.2 Hot Springs

Hot Springs is located within the Level IV Foothills ecoregion of the Level III Black Hills Ecoregion. The Black Hills Foothills ecoregion consists of two contrasting landscapes, the Hogback Ridge and the Red Valley. The Hogback Ridge forms a ring of foothills surrounding the Black Hills. The Red Valley (of Racetrack) encircles most of the Black Hills dome and acts as a buffer between the Hogback Ridge and the Black Hills. Natural vegetation within this region includes ponderosa pine, woodlands and open savannas with an understory of western wheatgrass, needle-and-thread grass, little bluestem, blue grama, buffalo grass, and leadplant. In addition, Rocky Mountain juniper occurs in the south. Battle Mountain, which rises from the northeast edge of Hot Springs, is located in the Dakota Hogback region of the Black Hills. Most of the mountain is covered with ponderosa pine forest although some aspen can be found (USGS 2013; SummitPost 2014).

The Hot Springs VAMC grounds include mature vegetation. The bluff opposite of the site is thickly wooded. The campus slopes northeast at the rear of the hospital complex; the slope is covered with trees and shrubs.

3.6.2.2.3 Rapid City

Rapid City is generally consistent with an urban setting but the Rapid City area lies in the plains, just east of the hogback in the Black Hills, and is flanked to the west by the Black Hills Foothills ecoregion. Rapid City is located within the Northwestern Great Plains Ecoregion (Level III) and the Semi-arid Pierre Shale Plains. The Semi-arid Pierre Shale Plains are relatively treeless, consisting of rolling hills and grasslands. Native grasslands persist in areas of steep or unbroken topography, but they have been largely replaced by spring wheat and alfalfa over most of the ecoregion. Agriculture is limited by erratic precipitation patterns and limited opportunities for irrigation. The mixed grass prairie outside of Rapid City has a predominance of shortgrass species such as little bluestem and buffalograss (Omernik et al. 2008).

3.6.2.3 Wildlife

Wildlife populations in the Black Hills are diverse, consisting of species found in both western and eastern states. Elk, mule deer, pronghorn, and white-tailed deer are commonly seen. Black bears have been spotted in the Black Hills. Mountain lions are increasing dramatically as a result of prolific herds of deer and elk. Coyote, bighorn sheep, and mountain goats are also frequently seen. Bald eagle, hawk, osprey, peregrine falcon, and another 200 species of birds can be found in the forest, especially along streams and near water sources.

Low elevation riparian ecosystems in the Black Hills National Forest are not well-documented (USFS 2005). Approximately one-half of all low elevation riparian systems on the forest are privately owned (USFS 2005). As with other riparian ecosystems found in the Black Hills, these low elevation riparian ecosystems are highly productive and have relatively high levels of biodiversity. Numerous emphasis species are associated with low-elevation riparian ecosystems.

Wildlife populations are more limited in the developed cities of Rapid City and Hot Springs; small mammal vertebrates (bats, mice, and rabbits) are common, although white-tailed deer may also be seen, including on the VA Hot Springs campus. Abundant bird species are found near Rapid Creek in Rapid City and Fall River in Hot Springs. The most common wildlife species near the town of Hot Springs are deer and pronghorn antelope, with other species present including elk, mountain lion, bighorn sheep, coyote, porcupine, fox, and rabbits. Like the entire Black Hills region, there is an abundance of bird species near Hot Springs.

Wildlife in the region of Rapid City includes many species of birds, reptiles, amphibians, and mammals that are characteristic of the Great Plains. Common wildlife species that occur around Rapid City are those typical of semi-developed grassland areas. Common mammals include mule deer, white-tailed deer, coyote, red fox, white-tailed jackrabbit, striped skunk, raccoon, black-tailed prairie dog, and big brown bat (SDGFP 2015b).

3.6.2.4 Fisheries

3.6.2.4.1 Black Hills

Streams in the southern Black Hills are generally intermittent or ephemeral; many disappear underground. Others empty into the Cheyenne River, one of the two main rivers that encircle the Black Hills National Forest. The Cheyenne River flows from Wyoming into the southern part of the forest, towards the southeast and then turns northeastward along the southern foothills. About 60 miles further downstream, the Cheyenne empties into Lake Oahe on the Missouri River.

Historically, fish species diversity was limited in the Black Hills. Native species include creek chub, fathead minnow, finescale dace, lake chub, longnosed dace, longnosed sucker, mountain sucker, and white sucker. Many non-native fish species have been introduced, including salmonids. Trout were first introduced from Colorado in the 1880s. Following introduction, fish were further distributed by fishing enthusiasts, and many streams became populated with trout from reproduction and movement within watersheds. The effects of these non-natives on the native fisheries are unclear, although it is known that trout compete for food and space and prey on small fishes. All native fish species still occur in the Black Hills at varying population levels.

3.6.2.4.2 Hot Springs

Hot Springs is located within the Fall River watershed. The major waterbodies that support fisheries in Hot Springs and surrounding environs include the Fall River, Hot Brook Creek, Cold Brook Creek, and the Angostura Reservoir located 10 miles to the south. Multiple species of warmwater fish are found in Hot Brook Creek and the Fall River including longnose dace, sand shiner, bluegill, green sunfish, white sucker, creek chub, plains topminnow, and domestic non-native goldfish and jack dempsey. Other species found in the Fall River include channel catfish, smallmouth bass, shorthead redhorse, rock bass, and common carp. The South Dakota Department of Game, Fish, and Parks and SDDENR independently conducted waterbody assessments dating back to 1998; neither agency documented coldwater species in either Hot Brook Creek or the Fall River, where water temperatures are warm, often exceeding 80° F. During the winter months, the water temperature remains high enough that the creek and river do not freeze. In 2010, both Hot Brook Creek and the Fall River were assessed by the SDDENR, who determined the beneficial use designation of "coldwater marginal fish life propagation waters" should be removed and replaced as follows:

- Fall River: From the confluence of Hot Brook and Cold Brook Creek all the way to the Cheyenne River, the beneficial use designation was changed to (4) Warmwater permanent fish life propagation waters; (8) Limited contact recreation waters; (9) Fish and wildlife propagation, recreation, and stock watering waters; and (10) Irrigation waters.
- Hot Brook Creek: From Section 19, Township 7 South, Range 5 East to the confluence of Cold Brook Creek, the beneficial use designation was changed to (1) Domestic water supply; (4) Warmwater permanent fish life propagation waters; (8) Limited contact recreation waters; (9) Fish and wildlife propagation, recreation, and stock watering waters; and (10) Irrigation waters.

Cold Brook Dam was constructed on Cold Brook Creek to reduce flood damages in the Fall River Basin. Cold Brook Reservoir, located less than one mile north of Hot Springs, is managed for flood control and recreation. It is approximately 32 acres in area and contains rainbow trout, largemouth bass, black crappie, and green sunfish (SDGFP 2007). The reservoir is currently managed as a trout fishery (rainbow trout) with monthly stocking when water temperatures permit adequate survival; bass are managed as natural yield.

Angostura Reservoir lies to the southeast of Hot The reservoir is classified as a warmwater permanent fishery. Primary species (game and forage) include walleye, channel catfish, smallmouth bass, gizzard shad, largemouth bass, black crappie, spottail shiner, and emerald shiner. Secondary and other species include bluegill, common carp, green sunfish, northern pike, northern redhorse, river carpsucker, white sucker, yellow perch, and freshwater drum (SDGFP 2013a).

3.6.2.4.3 Rapid City

Rapid City is located primarily within the Rapid Creek watershed, with the Box Elder Creek watershed running just to the north of Rapid City. Rapid Creek is the largest stream in the Black Hills of western South Dakota. It is an important stream for anglers and has two dams on it creating Pactola Reservoir and Canyon Lake. Canyon Lake is a small reservoir (25 acres) located in the southwestern part of Rapid City. It is a popular for fishing and contains rainbow trout (stocked throughout the year), brown trout, and white sucker (SDGFP n.d.).

Like most streams in the Black Hills, Rapid Creek experienced drastic changes in flow over the past 15 years. Most of western South Dakota experienced moderate to severe drought from 2002 to 2008 (SDGFP 2013b), followed by four years of above average precipitation, and then lower than average precipitation in 2012. Drastically varying flow events likely changed fish populations and habitat throughout Rapid Creek.

Another stressor for Rapid Creek fish populations is the diatom *Didymosphenia geminate* (didymo or rock snot), that was discovered there in 2002. By 2004 large mats of didymo were present in the creek and generated complaints about aesthetics and water quality.

The majority of Rapid Creek and its tributaries are managed as a wild trout (natural yield) fishery. One area of Rapid Creek within Rapid City is managed for catch and release, from Jackson Boulevard upstream through the Meadowbrook Golf Course to Park Drive (SDGFP 2013b). Popular fishing areas with good access on Rapid Creek are around Pactola Reservoir and within Rapid City. As part of a statewide fisheries survey in 2013, eight species of fish were sampled in Rapid Creek. Brown trout were the most abundant in every segment and rainbow trout were found

in all five segments. Other species were found in low densities and included creek chub, longnose dace, white sucker, rock bass, mountain sucker, and bluegill. Most of these non-trout species occur near the reservoirs located on Rapid Creek (SDGFP 2013b). The SDGFP developed the *Fisheries Management Plan for Black Hills Streams 2015-2019* to guide fisheries management activities over the next five years (SDGFP n.d.).

The Box Elder Creek watershed lies north of the Rapid Creek watershed. The creek flows east through the northwest end of Rapid City and drains into the Cheyenne River south of Wasta, SD. A state fisheries survey conducted on the creek in 2012 captured eight species of fish; the most abundant species was longnose dace. From a game fish perspective, the creek appears to change from a brown trout fishery to a brook trout fishery with upstream progression. Other species found were mountain sucker, creek chub, stonecat, and black bullhead (SDGFP 2012a).

3.6.2.5 Protected Species

Protected and sensitive biological resources include listed (threatened or endangered), proposed, and candidate species under the *Endangered Species Act*; state-listed threatened or endangered species; and migratory birds. Sensitive habitats include those areas designated by the FWS as critical habitat and sensitive ecological areas as designated by state or federal rulings. Sensitive habitats can also include wetlands, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (such as migration routes, breeding areas, and crucial summer and winter habitats).

Federally and state listed threatened and endangered species in Fall River and Pennington Counties are listed in Table 3.6-1.

The *South Dakota Wildlife Action Plan* (SDGFP 2012b) addresses the protection of all fish and wildlife species, with a priority on "species of greatest conservation need". The plan identifies essential habitats within the state, the habitats that have changed since the state was settled, which animal species need special attention to ensure their long-term survival, and ways to be more proactive in wildlife and habitat management. Table 3.6-2 lists the species of greatest conservation need whose habitat range includes all or part of Fall River or Pennington Counties, or are located within the portion of the Black Hills Ecoregion that lies at the fringe of Hot Springs and Rapid City areas, based on the current distribution map in the Plan.

Table 3.6-1. Threatened and Endangered Species in Fall River and Pennington Counties

Scientific Name	Common Name	Status	
		Federal	State
Fall River County			
Anthus spragueii	Sprague's pipit	Candidate	—
Calidris canutus rufa	Red knot	Threatened	—
Centrocercus urophasianus	Greater sage grouse	Candidate	—
Chrosomos neogaeus	Finescale dace	—	Endangered
Haliaeetus leucocephalus	Bald eagle	Delisted	Threatened
Myotis septentrionalis	Northern long-eared bat	Threatened	—
Pandion haliaetus	Osprey	—	Threatened
Vulpe velox	Swift fox	—	Threatened
Pennington County			
Anthus spragueii	Sprague's pipit	Candidate	—
Calidris canutus rufa	Red knot	Threatened	—
Catostomus catostomus	Longnose sucker	—	Threatened
Cinclus mexicanus	American dipper	—	Threatened
Falco peregrinus	Peregrine falcon	—	Endangered
Grus americana	Whooping crane	Endangered	Endangered
Haliaeetus leucocephalus	Bald eagle	Delisted	Threatened
Lontra canadensis	Northern river otter	—	Threatened
Macrhybopsis gelida	Sturgeon chub	—	Threatened
Mustela nigripes	Black-footed ferret	Endangered	Endangered
Myotis septentrionalis	Northern long-eared bat	Threatened	—
Pandion haliaetus	Osprey	—	Threatened
Rhodiola integrifolia ssp. *leedy*	Leedy's roseroot	Threatened	—
Sterna antillarum	Least tern (interior population)	Endangered	Endangered
Vulpe velox	Swift fox	—	Threatened

Source: FWS 2015; SDGFP 2015b.

Table 3.6-2. Species of Greatest Conservation Need in Fall River and Pennington Counties.

Birds	
Bald eagle (year round resident inside Black Hills ecoregion; summer resident outside region)	
Burrowing owl (summer)	
Ferruginous hawk (summer resident outside Black Hills region; migration inside region)	
Lark bunting – summer	
Northern goshawk (year round resident inside Black Hills region; winter resident outside region)	
Osprey (summer resident inside Black Hills region; migration outside region)	
Peregrine falcon – migration	
Mammals	***Insects***
Fringe tailed myotis (year-round)	Great Plains tiger beetle (year-round) [a]
Fringe tailed myotis (year-round)	Indian Creek tiger beetle (year-round) [b]
Silver haired bat (summer)	Iowa skipper (year-round) [a]
Townsend's big eared bat [a]	Little white tiger beetle (year-round) [b]
Fish	Ottoe skipper
Finescale dace (tributaries to Cheyenne) [a]	Regal fritillary (butterfly) (year-round)
Mountain sucker	***Flying Insects***
	Dakota stonefly (Cheyenne tributaries) [a]
	Dot-winged baskettail (Cheyenne tributaries) [a]

[a] Designated in Hot Springs area / Fall River County only.
[b] Designated in Rapid City area / Pennington County only.
Source: SDGFP 2012b.

Certain species that are protected under the *Migratory Bird Treaty Act* are present within the region at various times throughout the year given the state's proximity to the Central Flyway, a north-south migratory bird route. There are 24 migratory birds of concern in Fall River and Pennington Counties (FWS 2015):

American bittern
bald eagle
bell's vireo
black-billed cuckoo
Brewer's sparrow
burrowing owl
dickcissel
ferruginous hawk
golden eagle
grasshopper sparrow
greater sage-grouse
Hudsonian godwit
Lewis' woodpecker
loggerhead shrike
long-billed curlew
marbled godwit
mountain plover (Fall River County only)
pinyon jay
prairie falcon
red headed woodpecker
sage thrasher
short-eared owl
Swainson's hawk
upland sandpiper

3.7 Noise

Noise is defined as any sound that is undesired by the recipient and typically includes sounds not present in the natural environment, such as sounds emanating from aircraft; highways; and industrial, commercial, and residential sources. Noise generally interferes with normal activities or otherwise diminishes the quality of the natural environment. Noise may be intermittent or continuous, steady or impulsive, stationary or transient.

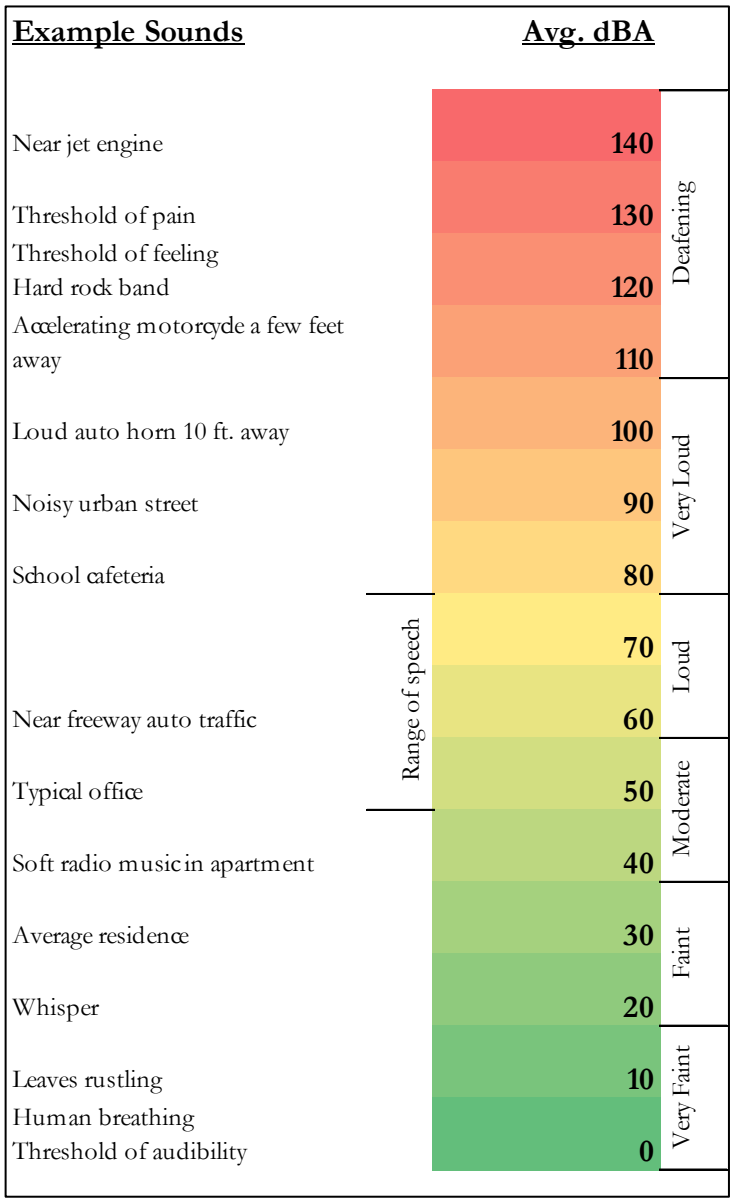
The standard measurement unit of sound is the decibel (dB), which represents the relationship between a measured sound pressure level and the minimum sound level a person with good hearing can detect reported on a logarithmic scale. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by three dB, and a halving of the energy would result in a three dB decrease, both of which are barely perceptible to the human ear.

The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, sound can be characterized by several methods. The most common method is the "A-weighted" sound level (dBA), which gives greater weight to the frequencies audible to the human ear by filtering out noise frequencies not audible to the human ear. Human judgments of the relative loudness or annoyance of a sound correlate well with the dBA levels of those sounds. Therefore, the dBA scale is used for measurements and standards involving the human perception of noise. Figure 3.7-1 provides common sounds and the corresponding sound levels to demonstrate human perception of the correlation of noise with acoustical energy.

Noise levels vary continuously with time, and various descriptions of noise are used to account for this variance with time, including L_{eq} (which is the equivalent continuous sound level), L_{min} and L_{max} (which are the minimum and maximum noise levels recorded during a monitoring period), and L_{dn} (which is the day-night average sound level).

The construction and operation of new facilities generates noise. Construction-related noise is associated with the operation of construction equipment and vehicles, both in transit to/from and at the project site. Equipment noise levels also vary as a function of the usage factor or percentage of time the equipment is employed. Table 3.7-1 provides a list of noise levels associated with typical construction equipment.

The Roadway Construction Noise Model is a national noise screening model developed by the Federal Highway Administration to predict construction noise levels and determine compliance with regulatory noise limits.



Source: HUD 2009.

Figure 3.7-1. Common Sounds and Corresponding Sound Levels

Table 3.7-1. Noise Levels Associated with Typical Construction Equipment.

Equipment	Typical Noise Level 50 feet from source (dBA)	Typical Usage Factor (%)
Backhoe	80	40
Clam shovel (dropping)	93	20
Compactor (ground)	80	20
Compressor (air)	80	40
Concrete mixer truck	85	40
Concrete pump truck	82	20
Concrete saw	90	20
Crane	85	16
Dozer	85	40
Dump truck	84	40
Excavator	85	40
Flat bed truck	84	40
Front end loader	80	40
Generator	82	50
Grader	85	40
Jackhammer	85	20
Man lift	85	20
Pickup truck	55	40
Pneumatic tools	85	50
Pumps	77	50
Scraper	85	40
Tractor	84	40
Warning horn	85	5

Source: FHWA 2006.

Note: Typical construction equipment selected from Roadway Construction Noise Model default equipment list.

Ground-borne vibration is commonly associated with noise since vibration sources include many of the same sources (for example, construction equipment and vehicles) and may also interfere with normal activities or otherwise diminish the quality of the natural environment. Ground-borne vibration is not a common environmental problem, as it is unusual for vibration from sources such as road vehicles to be perceptible, even in locations close to major roads. Perceptible vibration sources for projects similar to that analyzed in this EIS include construction-related equipment (for example, heavy earth-moving equipment and pile-driving equipment).

Ground-borne vibration is typically reported as the root mean square of the vibration velocity level in vibration decibels. The approximate threshold for human perception of vibration is 65 vibration decibels.

3.7.1 Regulatory Framework

3.7.1.1 Noise Control Act

The U.S. EPA Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. Upon its enactment, the office also implemented the *Federal Noise Control Act* of 1972, which established programs and guidelines to identify and address the effects of noise on public health and welfare and the environment. Table 3.7-2 summarizes recommended guidelines for noise levels considered safe for community exposure without the risk of adverse health or welfare effect (EPA 1974). To prevent hearing loss over the lifetime of a receptor, the yearly average L_{eq} should not exceed 70 dBA, and the L_{dn} should not exceed 55 dBA in outdoor activity areas or 45 dBA indoors to prevent interference and annoyance.

Table 3.7-2. Summary of EPA-Recommended Noise Level Standards

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards and playgrounds
Indoor activity interference and annoyance	$L_{dn} \leq 45$ dB	Indoor residential areas
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools

Source: EPA 1974.

In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982, responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in the rulings by EPA in prior years are still upheld by designated federal agencies, allowing more individualized control for specific issues by designated federal, state, and local government agencies. The *Noise Control Act* is applicable to the project insofar as it establishes general guidelines for acceptable noise levels perceived by adjacent or onsite receptors.

3.7.1.2 Federal Transit Authority Ground-Borne Vibration Guidelines

The Federal Transit Authority has established guidelines for maximum-acceptable vibration criteria for different land uses. Maximum acceptable vibration criteria based on the frequency of an event are applied to the different land uses to address the human response to ground-borne vibration (FTA 2006).

The Federal Transit Authority also established criteria addressing the potential for construction-caused vibration annoyance or interference. The primary concern related to construction vibration is the potential to cause structural damage to buildings by the operation of heavy-duty construction equipment. Situation-specific criteria address the level of vibration considered acceptable before it may result in damage to structures or different building types (FTA 2006).

3.7.1.3 Department of Veterans Affairs Master Construction Specifications, Temporary Environmental Controls

Section 01 57 19 of VA's master construction specification includes specific mitigating actions that would be required of any development on VA property to reduce construction-related noise (VA 2011). In particular, construction activities would mainly be limited to the hours of 8:00 a.m. to 6:00 p.m. and would abide by local noise ordinances. In addition, all equipment is required to be properly maintained and muffled such that noise levels of specific equipment would not exceed those shown in Table 3.7-3. VA also requires monitoring of noise levels at least once every five days during high noise generating construction activities.

Table 3.7-3. Maximum Permissible Construction Equipment Noise Levels.

Earthmoving Equipment	Maximum Permissible Noise Level (L_{max}) (dBA)	Materials Handling Equipment	Maximum Permissible Noise Level (L_{max}) (dBA)
Front loader	75	Concrete mixer	75
Backhoe	75	Concrete pump	75
Dozer	75	Crane	75
Tractor	75	Derrick, impact	75
Scraper	80	Pile driver	95
Grader	75	Jack hammer	75
Truck	75	Rock drill	80
Paver	80	Pneumatic tools	80
Pump	75	Saw	75
Generator	75	Vibrator	75
Compressor	75		

Source: VA 2011.

Note: Maximum permissible construction equipment noise level measured at 50 feet from source.

3.7.1.4 Local Noise Control Ordinances

According to Rapid City Ordinance 10.20.020(A), "Every motor vehicle shall, at all times, be equipped with a muffler in good working order and in constant operation to prevent excessive raucous or unusually loud noise, smoke or flame, and no person shall operate a motor vehicle upon the streets and highways of the city which is not so equipped, or which is equipped with a muffler cutout, bypass, Hollywood pipes or any similar device."

3.7.2 Current Conditions

For each project area, noise-sensitive land uses were identified. Noise-sensitive land uses include:

- Nearby residential areas
- Schools
- Hospitals
- Hotels/motel;
- Churches/cemeteries
- Libraries
- Public parks

Baseline sound levels were measured at representative locations in the vicinity of each currently operating facility. Sound levels were measured using an Extech Instruments Model 407736 digital sound level meter, which meets American National Standards Institute S1.4-1983 and International Electrotechnical Commission 60651 Type II standards. The meter's internal calibration feature was checked prior to obtaining measurements at each location, and the meter was operated on the A-weighting scale with slow response using a porous windscreen. Sound level measurements were taken at intervals over a recorded monitoring period at each location. Notes regarding monitoring conditions were recorded, and the L_{eq}, L_{min} L_{max}, and 10-, 50-, and 90-percentile (L_{10}, L_{50}, and L_{90}) values were determined.

3.7.2.1 Hot Springs Area

The Hot Springs area is generally consistent with an urban or suburban setting. As such, the predominant noise sources in the area include mobile sources (such as personal and commercial vehicles) and stationary sources (such as heating, ventilation, and air conditioning units attached to buildings). Vehicle traffic and associated noise is heaviest along U.S. Highway 18 (University Avenue), U.S. Highway 18 Bypass (Indianapolis Avenue), and U.S. Highway 385 (N. River Street / Fall River Road).

Noise-sensitive land uses in the Hot Springs area were identified and mapped (see Figure 3.7-2). Table 3.7-4 lists the noise-sensitive receptors and their proximity to the existing Hot Springs VAMC. Hotels/motels, places of worship, and residential areas are also considered noise-sensitive land uses; these land uses were not depicted in Figure 3.7-2 due to their great numbers in the project area.

Table 3.7-4. Noise-Sensitive Receptors in Hot Springs Area.

Receptors within 0.5 miles of Hot Springs VAMC: • National Cemetery • Kidney Spring Park	Receptors within 1 mile of Hot Springs VAMC: • Evergreen Cemetery • Chautauqua Park • Centennial Park • Brookside Park • Hot Springs Elementary School • Hot Springs Middle/High School • Bethesda Lutheran School
Receptors within 1.5 miles of Hot Springs VAMC: • Butler Park • Hot Springs Library	Receptors within 2 miles of Hot Springs VAMC: • State Home Cemetery • Fall River Hospital • Umiker Park

Legend

A – VAMC – Hot Springs
C1 – National Cemetery
C2 – Evergreen Cemetery
C3 – State Home Cemetery
H1 – Fall River Hospital
L1 – Hot Springs Library
P1 – Chautauqua Park
P2 – Kidney Spring Park
P3 – Centennial Park
P4 – Brookside Park
P5 – Butler Park
P6 – Umiker Park
S1 – Hot Springs Elementary School
S2 – Hot Springs Middle/High School
S3 – Bethesda Lutheran School

½-mile radius
1-mile radius
1 ½-mile radius
2-mile radius

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source: Data Compiled by Labat Environmental, Inc., 2014.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.7-2. Hot Springs Area Noise-Sensitive Receptors.

Sound level measurements were collected at four locations in the Hot Springs area to determine representative existing sound levels. These monitoring locations are shown in Figure 3.7-3. Sound levels were measured using an Extech Instruments Model 407736 digital sound level meter. Notes regarding monitoring conditions were recorded, and the L_{eq}, L_{10}, L_{50}, L_{90}, L_{min}, and L_{max} values were determined (see Table 3.7-5). The measured daytime sound levels are characteristic of a typical urban area.

Noise-sensitive buildings are also commonly considered as vibration-sensitive receptors. Historic or lightweight buildings are considered most vulnerable to vibration disturbance or damage. Vibration due to passing vehicles was not noticeable during the collection of sound level measurements.

Table 3.7-5. Existing Sound Level Measurements in the Hot Springs Area.

Site	Location	Time	Sound Level (dBA)					
			L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{min}
1	Butler Park	7:50 a.m.	48.1	52.2	50.4	47.4	46.7	46.5
2	Hot Springs VAMC	8:06 a.m.	47.9	50.3	48.9	47.6	46.8	46.5
		9:50 a.m.	48.0	50.7	49.5	47.6	46.8	46.5
3	Near Chautauqua Park	8:23 a.m.	51.9	66.4	48.0	47.5	47.0	46.9
4	Centennial Park	9:33 a.m.	51.8	61.9	52.4	48.7	47.5	47.0

Source: Data collected by Labat Environmental, Inc., November 17, 2014.

Key: L_{eq} = equivalent sound level, L_{MIN} = minimum sound level, L_{max} = maximum sound level, L_n = sound level exceeded n% of the specific time period.

Observation Notes:

Site 1: Quiet calm morning, occasional vehicles passing approximately 100 feet away.

Site 2: Quiet calm morning, occasional vehicles passing approximately 150 feet away.

Site 3: Quiet calm morning, occasional vehicles passing adjacent to location.

Site 4: Quiet breezy morning, occasional vehicles passing adjacent to location.

3.7.2.2 Rapid City Area

The Rapid City area is generally consistent with an urban setting. As such, the predominant noise sources in the area include mobile sources (such as personal and commercial vehicles) and stationary sources (such as heating, ventilation, and air conditioning units attached to buildings). Vehicle traffic (and associated noise) is heaviest along Interstate 90, U.S Highway 16 (Mount Rushmore Road), SD-79 (St. Joseph Street / Main Street), and SD-44 (Omaha Street).

Noise-sensitive land uses in the Rapid City area were identified and mapped. Figure 3.7-4 shows noise-sensitive land uses in the vicinity of the existing Rapid City CBOC, and Figure 3.7-5 shows noise-sensitive land uses in the Rapid City metropolitan area. Table 3.7-6 lists noise-sensitive receptors and their proximity to the existing Rapid City CBOC. Hotels/motels, places of worship, and residential areas are also considered noise-sensitive land uses; these land uses were not depicted in Figures 3.7-4 and 3.7-5 due to their great numbers.

Legend

Sound Level Monitoring Location

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source: Data Compiled by Labat Environmental, Inc., 2014.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.7-3. Hot Springs Area Sound Level Monitoring Locations.

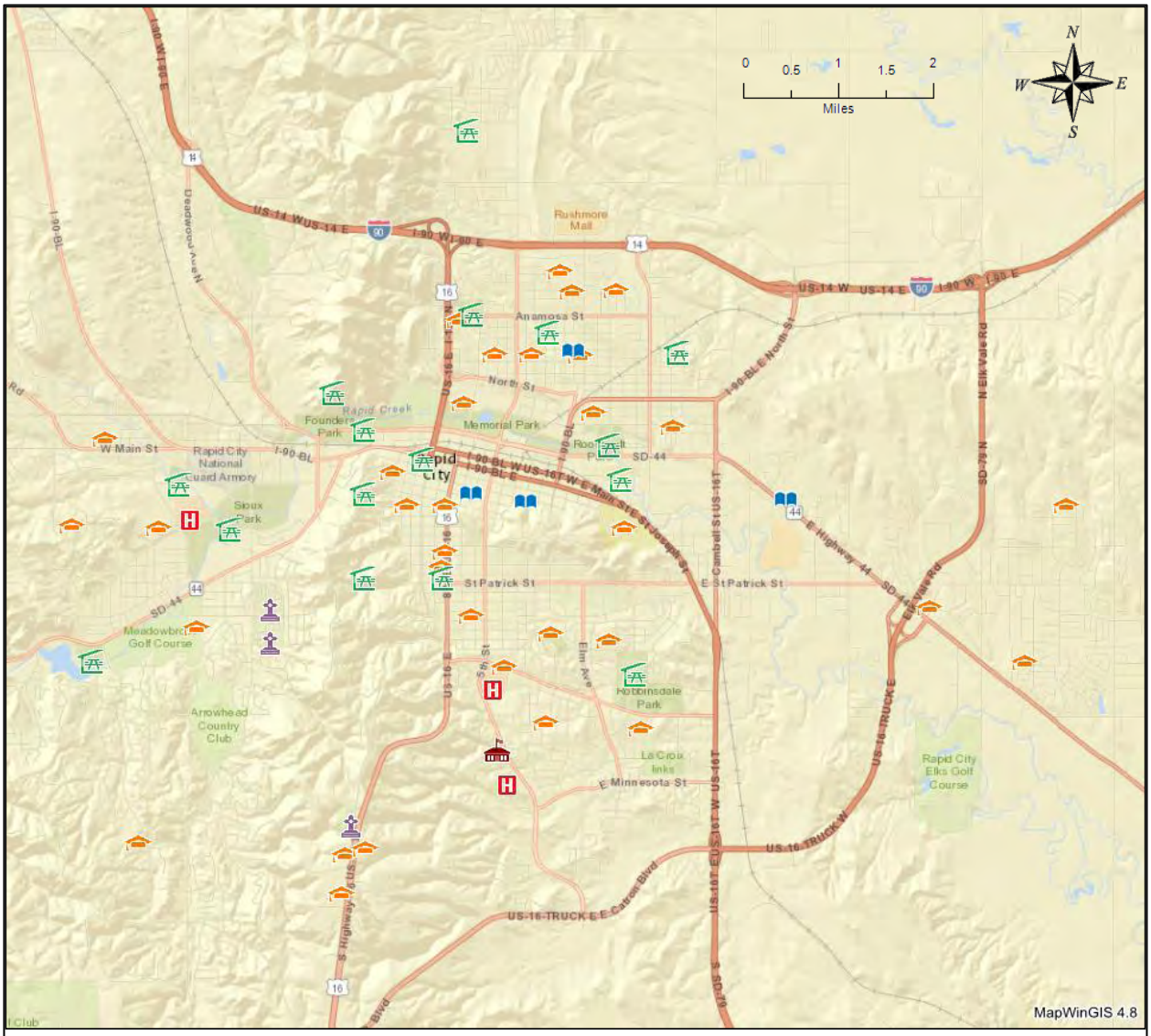
Legend

B – CBOC – Rapid City
C3 – Pine Lawn Memorial Park
H1 – Rapid City Regional Hospital
H2 – Black Hills Surgical Hospital
P1 – Robbinsdale Park
P2 – Wilson Park
P3 – Skyline Wilderness Park
S1 – Grandview Elementary School
S2 – St. Paul's Lutheran School
S3 – Saint Thomas More High School
S4 – South Middle School
S5 – Robbinsdale Elementary School
S6 – USD School of Medicine
S8 – Wilson Elementary School
S31 – Memorial Christian School
S32 – Calvary Christian School
S33 – Zion Lutheran School

½-mile radius
1-mile radius
1 ½-mile radius
2-mile radius

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source Data Compiled by Lab at Environmental, Inc., 2014.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.7-4. Rapid City Area Noise-Sensitive Receptors (CBOC Vicinity).


0
0.5
1
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2
Miles
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S
Rushmore Mall
Anamosa St
North St
Rapid Creek
Founders Park
Memorial Park
W Main St
Rapid City National Guard Armory
Sioux Park
Rapid City
St Patrick St
E St Patrick St
Meadowbrook Golf Course
Arrowhead Country Club
Robbinsdale Park
La Crosse Links
E Minnesota St
Rapid City Elks Golf Course
US-14 W US-14 E
I-90 W I-90 E
US-16 TRUCK E
US-16 TRUCK W
US-16 TRUCK E E Catron Blvd
US-16 B
US-16 E
US-16 W
US-16 E
US-16 W
US-16 E
US-16 W

Table 3.7-6. Noise-Sensitive Receptors in Vicinity of Rapid City CBOC.

Receptors within 0.5 miles of Rapid City CBOC: • Black Hills Surgical Hospital	Receptors within 1 mile of Rapid City CBOC: • Rapid City Regional Hospital • Grandview Elementary School • Saint Thomas More High School
Receptors within 1.5-miles of Rapid City CBOC: • South Middle School • University of South Dakota School of Medicine	Receptors within 2 miles of Rapid City CBOC: • Pine Lawn Memorial Park • Robbinsdale Park • Wilson Park • St. Paul's Lutheran School • Robbinsdale Elementary School • Wilson Elementary School • Calvary Christian School • Zion Lutheran School

Sound level measurements were collected at four locations in the Rapid City area to determine the representative existing sound levels. These monitoring locations are shown in Figure 3.7-6. Sound levels were measured using an Extech Instruments Model 407736 digital sound level meter. Notes regarding monitoring conditions were recorded, and the L_{eq}, L_{10}, L_{50}, L_{90}, L_{min}, and L_{max} values were determined (see Table 3.7-7). The measured daytime sound levels are characteristic of a typical urban area.

Noise-sensitive buildings are also commonly considered as vibration-sensitive receptors. Historic or lightweight buildings are considered most vulnerable to vibration disturbance or damage. Vibration due to passing vehicles was not noticeable during the collection of sound level measurements.

Table 3.7-7. Existing Sound Level Measurements in the Rapid City Area

Site	Location	Time	Sound Level [dBA]					
			L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{MIN}
1	Rapid City CBOC	10:52 AM	54.3	64.4	55.5	52.9	51.1	50.3
2	Rapid City Reg. Hospital	11:07 AM	53.5	57.7	55.4	52.8	50.4	49.9
3	Robbinsdale Park	11:23 AM	57.6	65.2	60.3	56.6	52.5	51.1
4	Rushmore Mall	11:46 AM	55.6	66.3	57.1	53.2	51.4	50.7

Source: Data collected by Labat Environmental, Inc., November 17, 2014.

Key: L_{eq} = equivalent sound level, L_{MIN} = minimum sound level, L_{max} = maximum sound level, L_n = sound level exceeded n% of the specific time period.

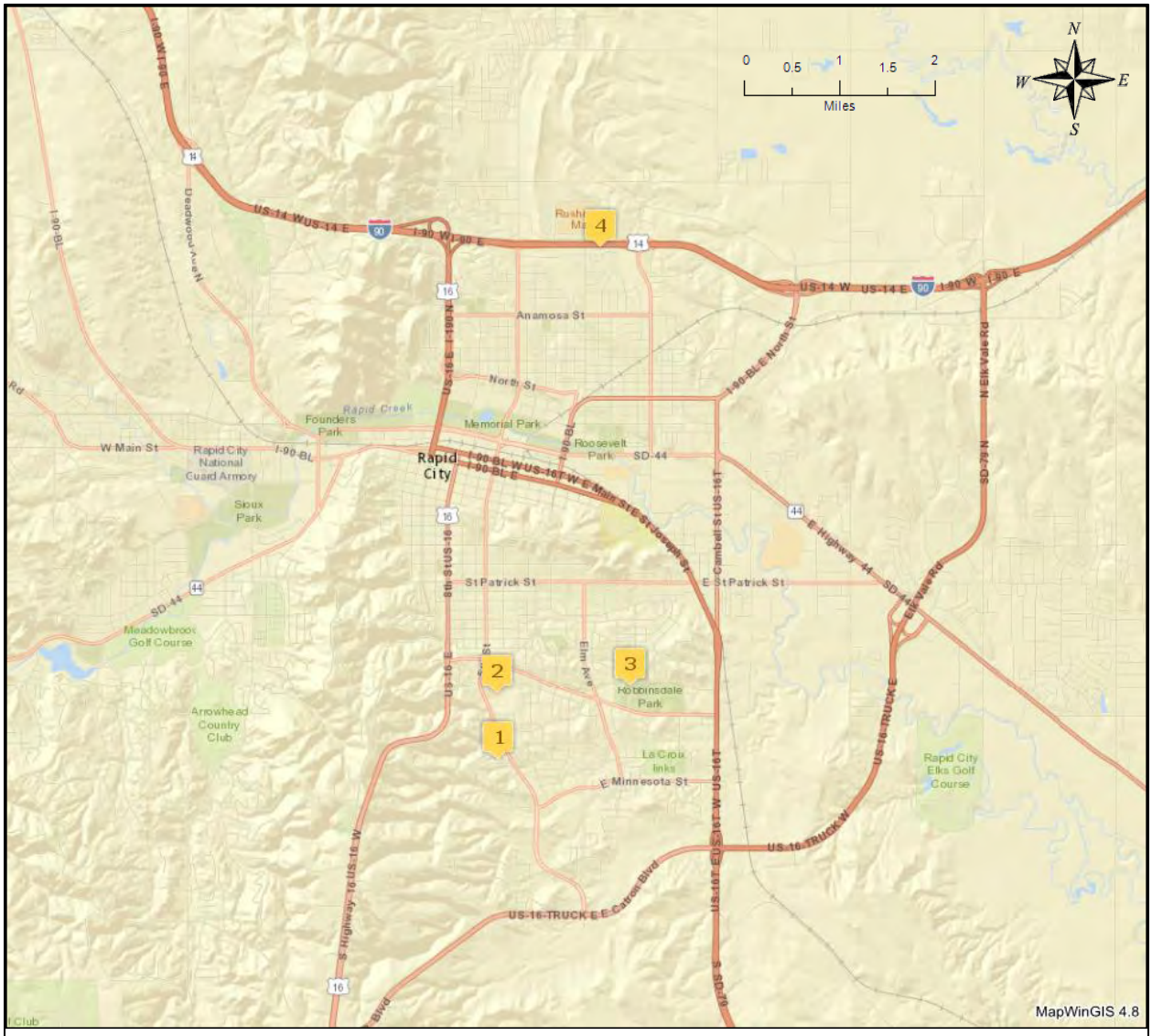
Observation Notes:

Site 1: Breezy day, cars passing by approximately 100 feet away on active roadway.

Site 2: Breezy day, gusty winds, cars passing by approximately 200 feet away on active roadway.

Site 3: Gusty winds, cars passing by adjacent to location, people talking and yelling.

Site 4: Gusty winds, I-90 approximately 500 feet away, cars passing adjacent to location.



Legend

Sound Level Monitoring Location

Projection: WGS84 Web Mercator (Auxiliary Sphere)
Source: Data Compiled by Labat Environmental, Inc., 2014.
Basemap Source: ArcGIS Online World Street Map, 2014.

Figure 3.7-6. Rapid City Area Sound Level Monitoring Locations.