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# Table of Contents

<b>Introduction</b> .....	4
<b>The Healthy Forest Restoration Act</b> .....	5
<b>Community Discussion</b> .....	5
<b>Fire Protection</b> .....	6
<b>Fire History</b> .....	7
<b>Community Assessment</b> .....	8
<b>Values</b> .....	9
Structure Hazard Assessment Survey.....	10
Historical Sites .....	10
Watersheds .....	11
<b>Hazards</b> .....	11
Fire Regime Condition Class .....	13
<b>Risks</b> .....	14
Topography .....	14
Weather .....	15
Fire Resistive Building Construction .....	15
Survivable Space .....	16
Wildland Urban Interface Buffers .....	16
<b>Agency Projects</b> .....	20
<b>Community Action Plan</b> .....	20
<b>Community Action Items</b> .....	22
<b>Fuel Treatment Requirements</b> .....	23
<b>Fire Resistive Building Requirements</b> .....	24
<b>Fire Resistive Plant Species</b> .....	25
<b>Firewise Landscaping</b> .....	26
<b>Fire Hazard Severity Form</b> .....	27
<b>Signature Page</b> .....	29
<b>Glossary</b> .....	30
<b>Bibliography</b> .....	32

## Introduction

A Community Wildfire Protection Plan, CWPP, is a community-based forest management planning process that identifies areas that may be at risk from wildfire and helps develop projects and priorities to mitigate the risks associated with hazardous fuels and insect infestation. New incentives generated by the enactment of the Healthy Forest Restoration Act in 2003 and the National Fire Plan in 2000 provide a mechanism for identified and prioritized hazardous fuels projects to be given consideration by the USDA Forest Service and the USDI Bureau of Land Management. For a community to take full advantage of this new opportunity it must develop a Community Wildfire Protection Plan. Collaboration with federal agencies and other interested parties is important to develop a sound comprehensive mitigation plan. Another aspect of a Community Wildfire Protection Plan addresses ideas that homeowners and communities can implement to reduce the structural ignitability of structures and other values in the Wildland Urban Interface by utilizing Fire Wise practices and procedures. This CWPP is a dynamic plan that can change as collaborators encounter additional information, changed conditions and/or new opportunities that address wildfire and hazardous fuels reduction needs. Rapid City is developing a Community Wildfire protection Plan and associated Hazardous Fuels Reduction Program for their city that is independent from this plan.

Wildfires in the upper Midwest, including the Black Hills, are burning more acres with greater intensity than any other time in recent history. These larger catastrophic fires may be a result of denser forests, continued drought conditions and high stand mortality rates, as a consequence of increased insect infestation. Active fire suppression activities that have occurred over the past 100 years have contributed to higher stocking levels across the landscape. These denser stands are conducive to insect infestation and also contribute to high intense stand replacement conflagrations. Weather conditions during burn periods greatly influences fire behavior, e.g. fuel moisture, wind, and temperatures. The circumstances during a fire event such as conditions of fuels, temperature, relative humidity, fire behavior and topography are important when planning mitigation strategies.



*Battle Creek Fire 2002. Courtesy of the USFS.*

Protecting lives, property, resources and critical infrastructure is the primary concern for mitigating the threat from wildfire. Areas of higher fuel loads cause more concern during wildfire events for firefighter and public safety. Consideration should be given to provide safe egress for the public during a fire event; also emergency responders need safe ingress/egress during fire suppression activities. Another concern is the increased amount of people developing and living in the Wildland Urban Interface, (WUI). The WUI is a set of conditions that exist when structures and other human development meet or intermingle with Wildland or vegetative fuels. As structure density increases in an area, consideration must be given not only to the natural vegetation but also to urban fuels. For example, homes are urban fuels and would contribute to fire intensity if ignited. Fire Wise practices and procedures can greatly reduce structural ignitability by interrupting fire spread and reducing receptive fuel beds in and around structures. Public education about wildfire prevention can help reduce loss of life, property and resources.

Collaborative efforts between local Government, local fire officials, State and Federal entities responsible for forest management will develop mitigation strategies for Pennington County to reduce the threat from uncontrolled wildfire. Prioritization of hazardous fuels reduction projects on a landscape scale will be based on criteria within the WUI zones. Structure density, hazardous topography, conifer canopy condition and proximity to state and federal treatment areas will be used to

prioritize fuels reduction projects on federal and nonfederal property. These prioritized zones will provide needed information to identify areas that need mitigation work to reduce the risk from uncontrolled wildfire. Collaborative efforts to identify and prioritize hazardous fuels reduction activities and the associated prescriptions and preferred treatment methods will be utilized. Open public meetings will be held to help develop protection and hazard mitigation needs for Pennington County. These meetings will be open to all interested parties who are interested in reducing the threat from wildfire.

Wildfire does not recognize governmental or jurisdictional boundaries and the occurrence of fire crossing these lines is common. Firefighter and public safety is the number one priority. Reducing the risk to values from uncontrolled wildfire is an important concern in Pennington County.

### **The Healthy Forest Restoration Act**

The Community Wildfire Protection Plan concept is outlined in the Healthy Forest Restoration Act of 2003. This act provides the basis to encourage and allow comprehensive community based forest planning and prioritization of fuel reduction projects. This legislation includes statutory incentives for the USDA Forest Service and the USDI Bureau of Land Management to give consideration to priorities and planning suggestions set out in individual Community Wildfire Protection Plans.

The Healthy Forest Restoration Act builds on the National Fire Plan and the Ten Year Comprehensive Strategy for reducing Wildland fire risks to communities and the environment. It also establishes an expectation that federal land management agencies will work with communities and local governments to reduce fire and forest health risks within and around WUI areas and Communities At Risk (CAR). The HFRA specifically encourages efforts to restore healthy forest conditions by authorizing expedited environmental assessments, administrative appeals and judicial review for hazardous fuels projects on federal land and gives preference in the use of these authorities to agencies who partner with communities in a collaborative fashion.

Community Wildfire Protection Plans provide communities with a mechanism to influence where and how federal agencies implement fuel reduction projects on federal lands and how additional federal funds may be distributed for projects on non-federal lands.

### **Community Discussion**

Pennington County was officially formed from unorganized land located in Dakota Territory during the 1875 gold rush. The county was named for John L. Pennington, governor of the Dakota Territory from 1874 to 1878. It is situated in western South Dakota with Wyoming on the west, Lawrence and Meade counties on the north, Ziebach, Haakon, and Jackson counties on the east and Shannon and Custer counties on the south. The total area of the county is 2,782 square miles or 1,780,653 acres.

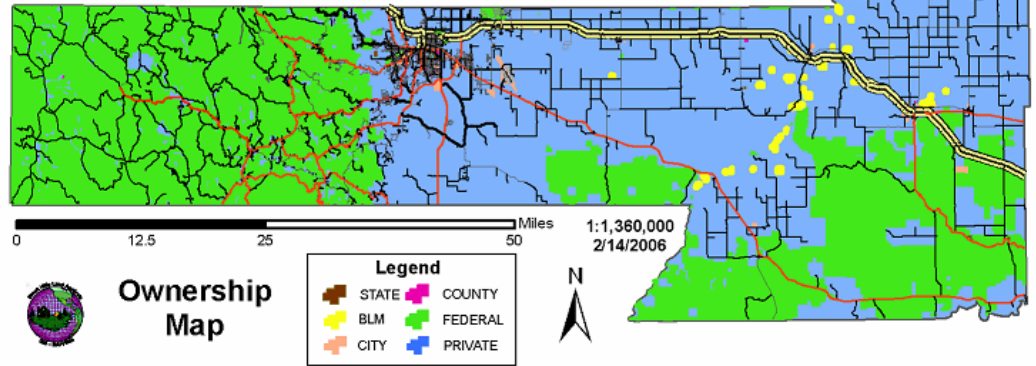
Primary landowners in Pennington County include; City/ Township, County, National Park Service, Private, State of South Dakota, USDA Forest Service and USDI Bureau of Land Management. State law established a unique area in western Pennington County in 1941 to protect the timber in areas subject to unusual fire dangers. This area is known as the Black Hills Forest Fire Protection District and it consists of 860 square miles or 550,376 acres within Pennington County.

The Black Hills National Forest covers a portion of five western South Dakota counties; the largest portion being in Pennington County. There are approximately 394,000 acres managed by the



USDA Forest Service, in Pennington County. The USDI Bureau of Land Management also manages approximately 17,460 acres in Pennington County.

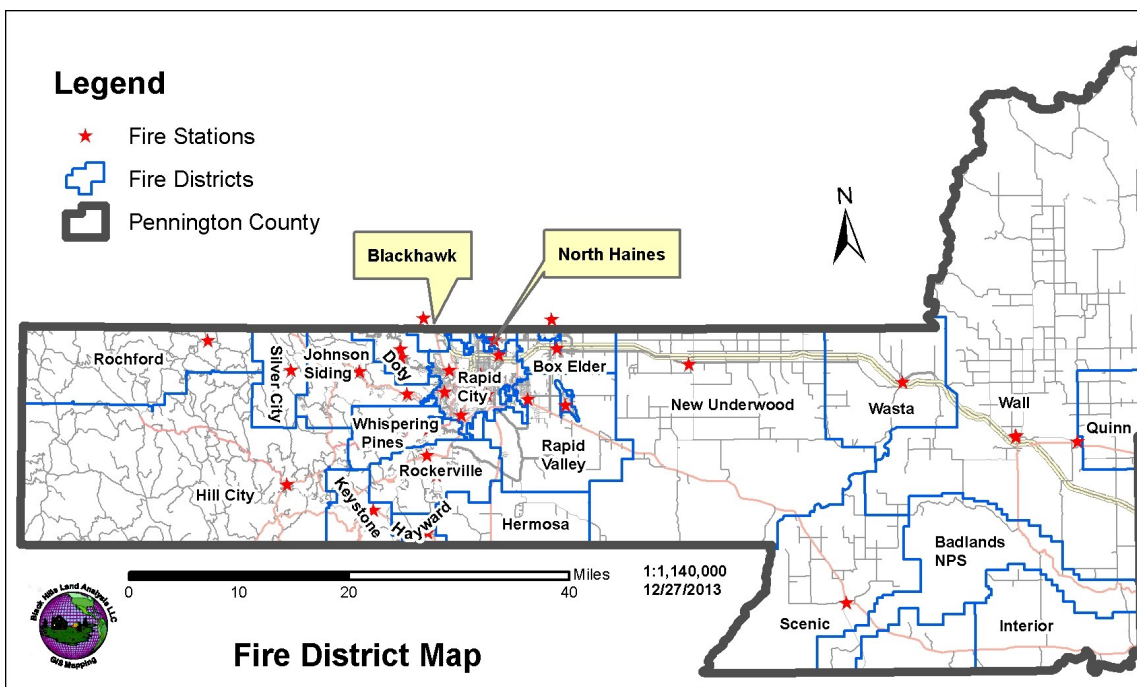
Located almost entirely in Pennington County is a unique topographical area called the Badlands. The Badlands are located in the eastern portion of the county and consist of formations of deep canyons, towering pinnacles and grasslands. There are approximately 150 square miles or 96,890 acres in the Badlands National Park. Known around the world, Mount Rushmore is a national symbol for all Americans. The four presidents carved in stone are truly American icons. The mountain itself and the Mt. Rushmore National Memorial entail approximately 2 square miles or 1287 acres. There are approximately 1,075,714 acres of private property in Pennington County. There is also state land consisting of school lands, game production areas and fish hatcheries accounting for 741 acres. City/township property account for 6,485 acres and Pennington County owns 272 acres. Approximately 60% of the property in Pennington County is privately owned and the other 40% is managed by governmental entities.

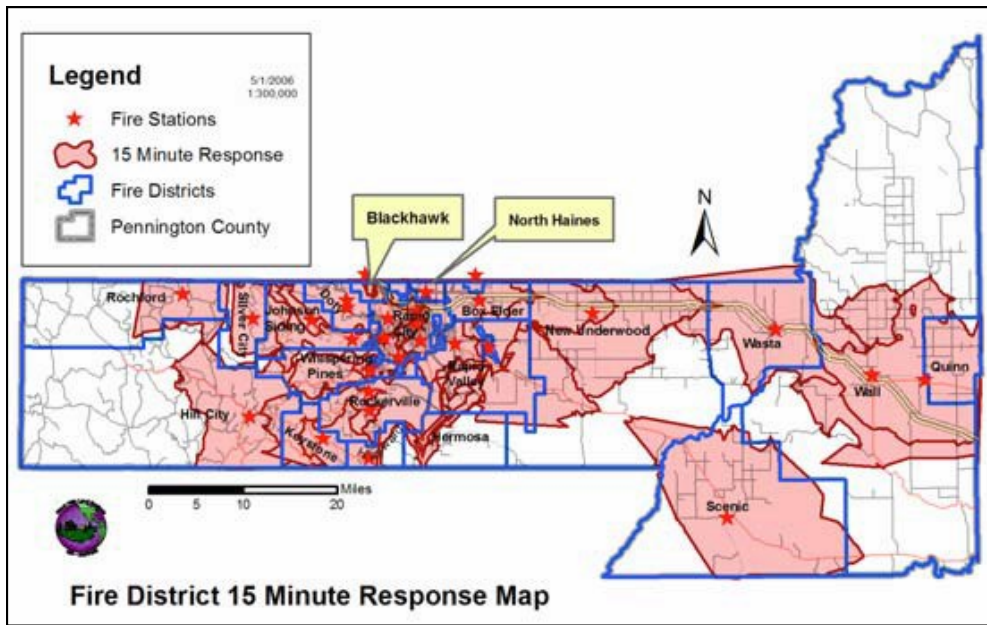


### Fire Protection

21 fire districts provide fire protection for Pennington County; 19 of these are volunteer fire departments and two, Rapid City and Ellsworth, are paid career fire departments. 14 of the 21 districts intersect the Black Hills Forest Fire Protection District. There are a total of 30 fire stations Countywide. Some of the fire districts cover enough area to require multiple stations. For example, Rapid City has 7 fire stations within their district. The level of emergency preparedness in Pennington County relies primarily on volunteer fire fighters except for Rapid City and Ellsworth Air Force Base. Response capability may vary dramatically depending on the day and time of the incident. Most departments can respond and be effective until the incident severity exceeds the capability of

the responding agency. As the severity of an incident increases the capability and effectiveness of suppression crews may be dramatically reduced. Considering the downward trend of volunteer fire department memberships, most departments would be unable to staff all of their apparatus 24 hours a day, 7 days a week. Most





volunteers cannot stay out on a fire for extended amounts of time because of employment and other obligations. All of the departments in Pennington County have increased their wildland response capability in recent years. The cost of refurbishing or replacing fire apparatus makes it difficult for many of the departments to upgrade older apparatus. Many of the older apparatus are still in use but the serviceability of this older equipment may be a concern.

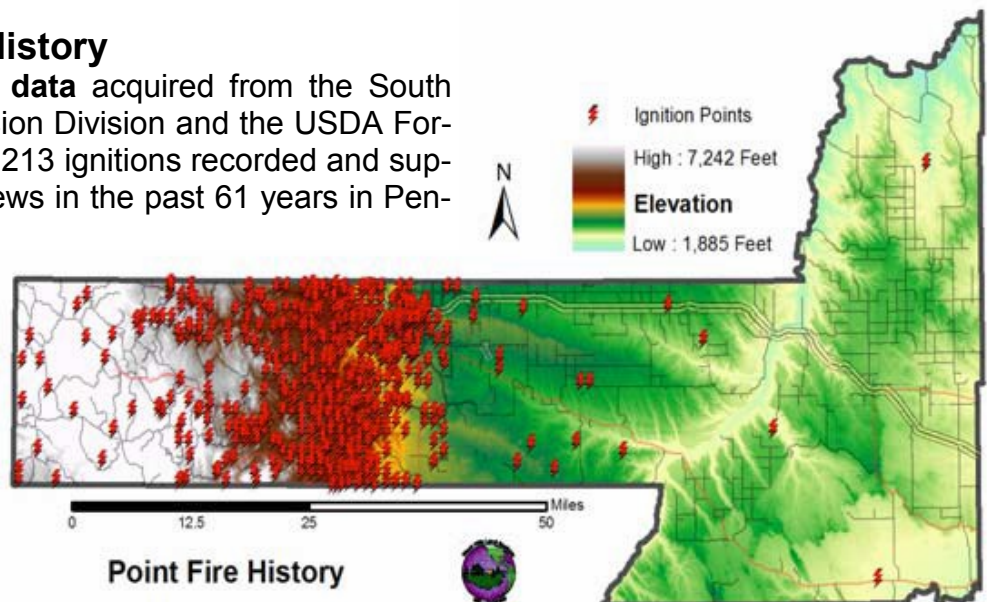
The South Dakota Wildland Fire Suppression Division Rapid City District has 4 personnel during the winter months plus a 9-person hand crew. During fire season they have 10 personnel plus a full 20-person hand crew. They have 4 Type 6 Engines and one Type 3 CAFS Engine.

Currently the USDA Forest Service has 5 Type 6 and one Type 4 Engines on the Mystic District of the Black Hills National Forest. All 6 Engines are available with seven day per week coverage from June 1 through September 30. Additional resources may be brought in during elevated fire danger or fire activity on Federal Jurisdiction Response Areas. There is also a Type 3 Helicopter with a 110-gallon bucket available. This ship is staffed with a 4 to 5 person module with a maximum of 7 personnel during elevated fire danger.

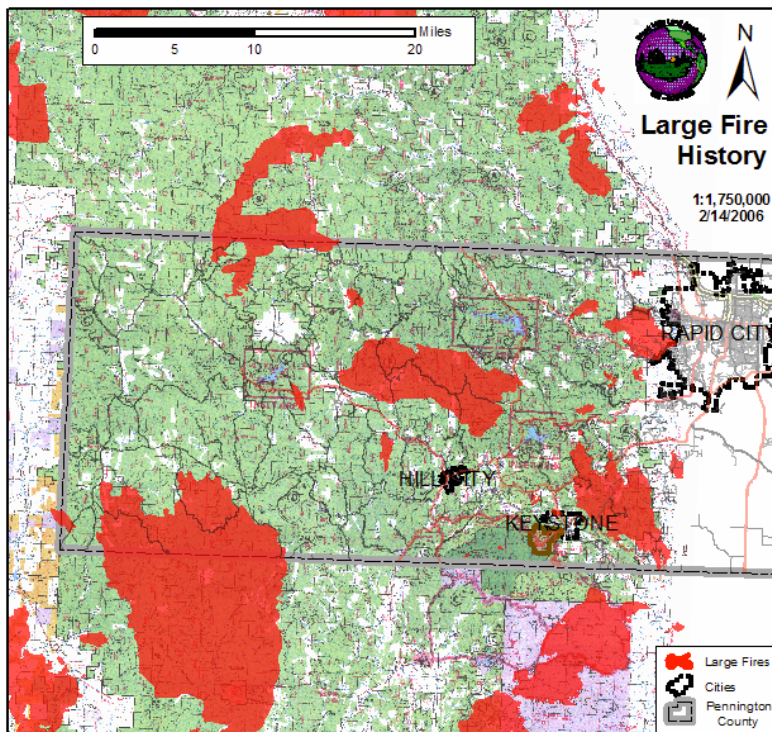
A Type 6 Engine, or brush truck, carries between 150 and 400 gallons of water and has a minimum pump capability of 30 gpm at 100 psi. It is required to have 300 feet of 1½” hose and 300 feet of 1” hose with associated fittings and appliances. These engines require 3 personnel. A Type 4 Engine has a capacity of carrying a minimum of 750 gallons of water and has a pump capacity of 50 gpm at 100 psi, a minimum of 300 feet of 1 ½ inch hose and 300 feet of 1-inch hose. A Type 3 Engine carries more than 500 gallons and has a minimum pump capability of 150 gpm at 250 psi. It is required to have 500 feet of 1½” inch hose and 500 feet of 1” hose with associated fittings and appliances. These engines require 3 personnel also. A Type 3 Rotary Helicopter contains 5-8 seats and can transport up to 1200 pounds of cargo. It requires a minimum of a 100-gallon bucket.

### Fire History

According to **point fire data** acquired from the South Dakota Wildland Fire Suppression Division and the USDA Forest Service, there have been 1,213 ignitions recorded and suppressed by fire suppression crews in the past 61 years in Pennington County. These fires range from .1 to 13,000 acres. Of the 1,213 fires recorded, 54 percent were within the identified ½ mile WUI zones. Fuel loads, fire weather and fuel moisture content and topography determine the spread rate of wild land fire. Many of the fire records for



the past 100 years are not accurate or the data is incomplete. Many historically large fires have names, acres burned, and possibly an ignition point location but most records have no specific perimeter, severity data, and fuel or weather conditions recorded during the event. Fire history is important and efforts to develop and maintain accurate information are essential. The fire history data acquired and analyzed for this plan was the best available data at the time.



### Large Fire History

2005 Old Hill City Road	124 acres
2003 Elkhorn	40 acres
2002 Lost Cabin	23 acres
2002 Sheldon	690 acres
2002 Battle Creek 1	3,495 acres
2000 Jasper	83,511 acres
1991 Horse Creek	673 acres
1988 Westberry Trails	4778 acres
1940 Matt	498 acres
1939 McVey	20,759 acres
1936 Battle Creek	1142 acres
1936 Johnson	700 acres
1934 Bloody Gulch	584 acres
1931 Rochford	20,934 acres
1931 Blanchard	807 acres
1926 Spring Creek	284 acres
1911 RR	218 acres
1911 East Boundary	228 acres

The above list of **large fires** was compiled from USDA Forest Service data. There have been 22 large fires recorded; these fires range from 23 acres to 83,500 acres and occurred between 1911 and 2005.

All or a portion of each of these fires burned within Pennington County. There are particular years that fire activity was much more severe; 1911, 1931, 1939, 2000, and 2002 show more activity and more acres burned. Many fire scars, from the 1930's on, were still evident on a 1973 land satellite image. This could indicate that some of these fires burned very intensely and caused stand mortality to a majority of the acres burned. These years of higher fire activity may have had dryer conditions prior to and during the fire season and fire weather during the burn period that may have caused increased fire behavior. Fire history in the Black Hills indicates that extreme fire behavior is not uncommon when favorable environmental conditions are present, e.g. low humidity, high temperatures, low fuel moisture content and high winds.

In the pre-fire suppression era before European Settlement, wildfires burned more frequently but usually with less intensity. This resulted in a more open savanna type condition with widely spaced stands of mature Ponderosa Pine. Indications show pre-settlement forest stand density levels may have typically been 30-40 mature trees per acre. This would generally provide 15-20 feet of separation between the canopies. The greater amount of acres burned annually helped the ground fuel from accumulating into dense fire prone fuel conditions. Timber litter or surface fuel loads were maintained at lower levels by naturally occurring ground fires. The dead litter and regeneration were not given a chance to form the vertical continuity that fire requires to get off the ground and into the forest canopy thus less intense fires may have occurred.

## Community Assessment

Values in Pennington County need to be protected from the existing hazards and associated risks of wildfire and insect infestation. Data acquired from the Pennington County Department of Equalization in December 2005 indicate there are approximately 36,000 structures in the County with an assessed value of approximately \$6.6 billion.



There are approximately 22,000 structures within the Black Hills Forest Fire Protection District; these structures have an assessed value of \$3.8 billion. Many structures in Pennington County may be at risk from wildfire due to overstocked forest stands and non-Fire Wise conditions around structures. Considering the increasing number of people moving into the WUI and other activities occurring in the forest, objectives and plans need to be identified and implemented across the landscape to be more prepared for wildfire.

## Values

Values at risk in Pennington County include structures, improvements and critical infrastructure owned by County, Federal, Municipal, Private, Utilities and State entities. Agricultural, commercial, historical property, rangeland, recreational, residential, timber products, watersheds, wildlife habitat are all values present in Pennington County. The economic value and development of private land in Pennington County is very diverse but very important for sustained economic growth.

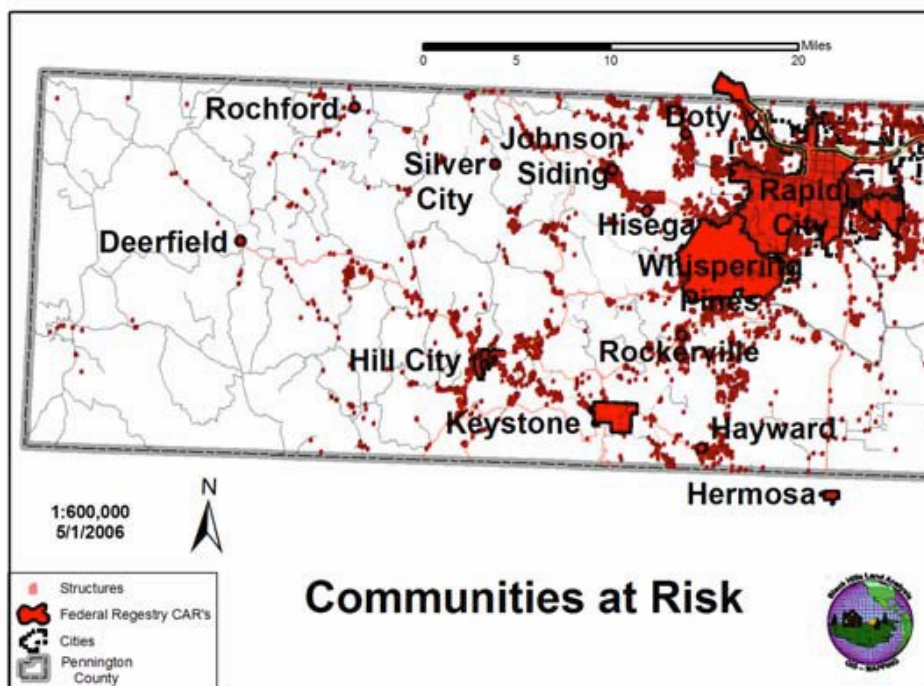
The United States Department of Agriculture in conjunction with the United States Department of Interior identified a list of communities and placed them in the Federal Register. These communities are in the WUI areas and in the vicinity of federal lands that have been identified as being at high risk from wildfire. Everyone living in Pennington County should be eligible to receive the same consideration and benefits as the people that are identified in Communities At Risk in the Federal Register, if they are threatened from hazardous fuels that would influence fire behavior. Areas of Pennington County that are also at high risk from wildfire including, but not limited to, the Communities identified in the Federal Register. These identified communities that are on the Federal Register include Box Elder, Deerfield, Hayward, Hill City, Hisega, Johnson Siding, Keystone, Rapid City, Rochford, Rockerville, Silver City and Whispering Pines. In addition, this plan recognizes any community that is at risk from uncontrollable wildfire as a community at risk.

Of the approximate 36,000 inhabited structures located in the county; the structures from 8 municipalities and 2,424 sub-divisions. The surrounding property and structures, including the aesthetic importance of the vegetation on the landscape, must be protected to maintain the value of the area. The beauty and appeal of living in the Black Hills could be jeopardized by uncontrolled high intensity conflagrations.

There are 67 recreation sites associated with the Black Hills National Forest that provide camping and recreation activities for forest visitors. There are also private campgrounds and recreation areas that are of major concern during a fire due to evacuation and logistical concerns.

Some of the larger private campgrounds have 500 or more campsites and cabins and may have 2000 or more people on-site per day. The total number of visitors to the Black Hills National Forest in 2004 was 3.4 million people. The majority of this was motorized travel through the forest. Loss of aesthetics from catastrophic wildfire would be very detrimental to attracting visitors to the area.

This plan will help collaborate ways to share and develop interagency cooperation for hazardous fuel treatments within



Pennington County. Stakeholders working together to develop continuity between different fuel projects will make treatment areas more effective. All interested stakeholders should share the burden of wildfire prevention in Pennington County. Protecting life, property and natural resources all add to the economic sustainability of the County.

### Structure Hazard Assessment

Structures in Pennington County should be assessed to determine their preparedness for wildfire using Form 502 as a guideline. Access, signage, vegetation, canopy condition, fuel type, topography, water source, fire department response time, survivable space, roofing material, building construction and placement of utilities and other fuel sources are all considered during the assessment process. Preliminary assessment data of 346 structures in Pennington County indicate the following conditions:

- 74% were rated high or extreme hazard from wildfire
- 46% are at risk from crown fire within 100 feet of the structure
- 85% have treated between 30% and 70% of their survivable space
- 15% have treated more than 70% of their survivable space.
- 9% have non-fire rated roof coverings

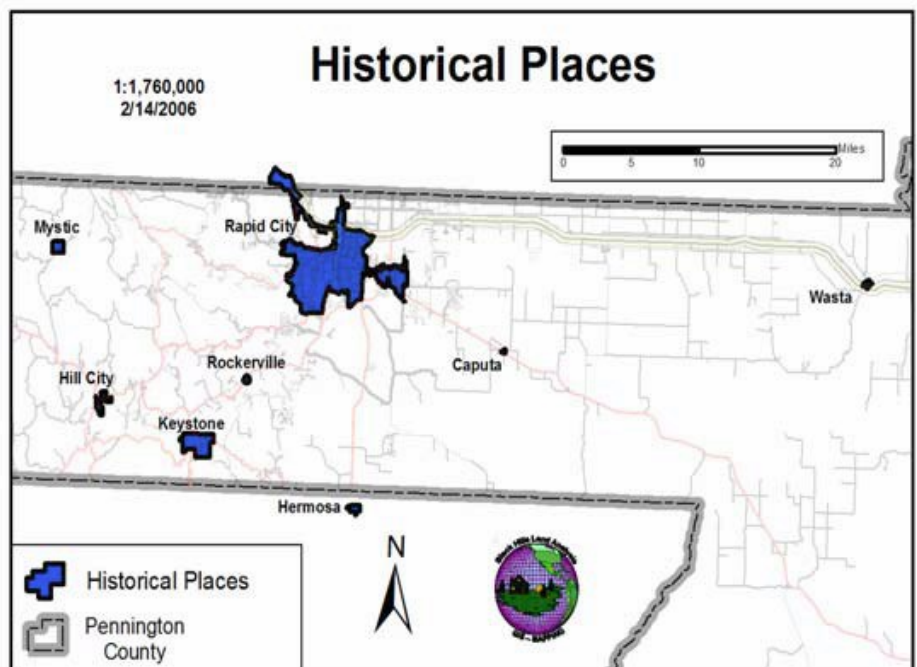
The above data supports the need for a formal hazardous fuels reduction program that will create survivable space around values and critical infrastructure in Pennington County. Reducing hazardous fuels and improving survivable space will help reduce fire intensity near values at risk. Reducing hazardous fuels also will provide fire suppression crews a safer environment to perform fire suppression activities.

### Historical Sites

There are 50 registered historical sites in Pennington County. Of these, 30 sites are located in Rapid City. Hill City and Keystone both contain 4 registered sites. Caputa, Hermosa, Mystic, Rockerville and Wasta account for 8 sites. 4 site locations are restricted due to prehistoric Native American significance.

Properties listed in the National Register of Historic Places include buildings, bridges, districts, railroads and sites that are significant in American and Native American archeology, architecture, culture, engineering and history. The National Park Service administers the National Register, which is a branch of the United States Department of the Interior. One historical site may consist of many structures; for example the town of Mystic has many significant historical buildings and sites but the town as a whole is counted in the National Register as one site. These sites present a range of beautiful historic places throughout the County. Visitors can access places well worth visiting in the Black Hills.

Both individual historic destinations and districts can be easily found that cover a tremendous range for points of interest. The historical places in Pennington County are not only important for historical value but local residents and tourists value them. Mitigation efforts to help preserve these sights are im-



portant and should be considered during fuel treatments in these areas.

## Watersheds

Watersheds in Pennington County must to be managed in such a way as to minimize the chance of catastrophic fire that would threaten these water sheds. When managing watersheds, consideration to protecting and enhancing soil productivity, water quality and quantity and timing of water flows. Maintaining healthy watersheds is critical to supporting a healthy forest and also provides water sources to communities by transferring water into aquifers. Watershed management will enhance watersheds by implementing practices to retain soil stability and improve or maintain water production.

Securing favorable conditions of water flow and preserving or enhancing aquatic values should be a major concern. Wildfires significantly alter the collection and transportation of water through a watershed. Increased flow rates after a catastrophic fire event may include severe ash and mud slides that may be very detrimental to areas down-stream.

In Pennington County the major bedrock aquifers are the Madison and the Minnelusa formations. The outcrops of the Madison and Minnelusa formations occur on both the west and east side of Pennington County. An outcrop is a part of a geologic formation that is exposed to the land surface. On the western side the outcrops occur on the Limestone Plateau; on the eastern side they occur near the foothills. Losses that contribute to aquifer recharge occur in numerous streams that cross outcrops of various rock formations that are exposed around the periphery of the Black Hills. The Madison and Minnelusa aquifers receive recharge from stream flow losses and precipitation on the outcrop. These primary aquifers provide the resource for communities to draw precious water for daily activities. Stream flow recharge to the Minnelusa aquifer generally is less than to the Madison aquifer because much stream-flow is lost

to the Madison aquifer before reaching downhill to the outcrop of the Minnelusa Formation. These stream flow losses are recognized as an important source of local recharge to regional bedrock aquifers. Most streams lose all of their flow up to some threshold rate. Stream flow is maintained through a loss zone when the threshold is exceeded. Watersheds need to be protected from catastrophic wildfire.

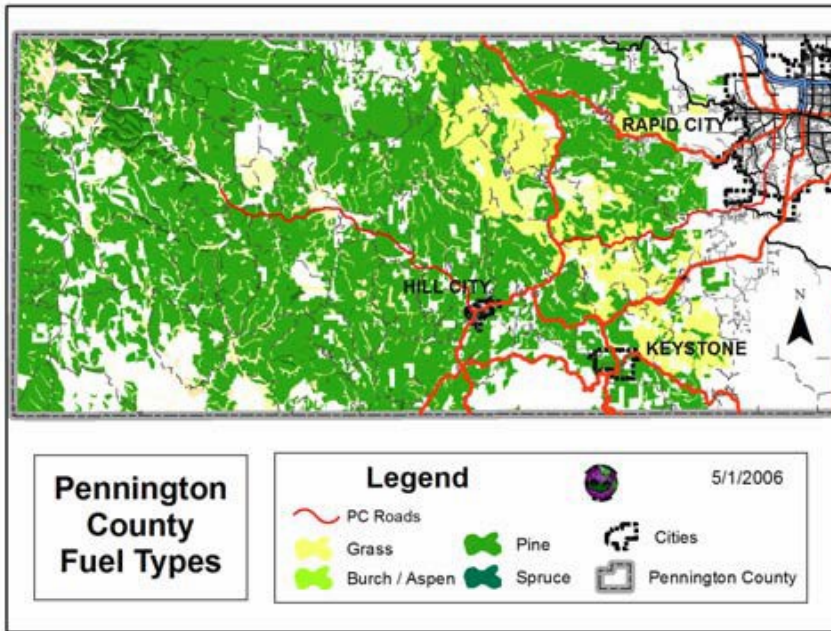
Water sources should be created for the purpose of fire suppression and fire-fighting agencies should be made aware of the locations and amount of water on hand and how these sources are maintained. Many areas in Pennington County may not have readily available water sources for fire suppression and this could greatly impact fire suppression activities. Water sources will be mapped and information will be documented about these sources. This information will be available to fire departments for suppression activities.

## Hazards



*Battle Creek Fire 2002.*

The vegetation coverage across Pennington County is very diverse. The eastern portion of the County is primarily Great Plains Grasses with hardwoods in various draws and drainages. There may also be areas of Ponderosa Pine stands that could pose a threat to structures in the eastern portion of Pennington County. Hardwoods dominate the lower foothills surrounding the Black Hills. Burr Oak, Iron Wood, Quaking Aspen and Paper Birch are some of the primary hardwood vegetation types. These areas of deciduous vegetation types are not as conducive to high intensity crown fires. That is they are not as likely to carry sustained fire through the canopy. Hardwood stands throughout the county should be identified and measures taken to promote the restoration of these fire resistive spe-



cies. These areas of deciduous vegetation create a diversity of fuels that significantly reduce fire intensities.

Meadow enhancement programs should also be implemented to reduce the encroachment of conifers and other non-native vegetation into meadows and open spaces. These open spaces provide fuel breaks and areas of opportunity for fire suppression activities.

The Black Hills have an abundance of White Spruce also known as “Black Hills Spruce”. Spruce typically grows on the northern slopes and in the bottoms of drainages where more moisture is available. The vegetation on these North Slopes is generally much denser due to the higher moisture levels and the relationship to the sun.

North Slopes usually have less fire frequency than South and West Slopes. Occasionally hot, dry weather patterns make conditions right for North Slope fuels to burn and possibly with extreme intensities. The branching habit of a Spruce Tree is usually continuous from the ground to the top of the tree, which makes them more conducive to torching and crowning. When a spruce tree torches it showers embers and firebrands and can create hazards associated with spot fires. Drier winters and lack of spring storms reduces the fuel moisture in large fuel sources that are present in the forest. This may contribute to increased fire behavior. Spruce regeneration in areas that are not historically Spruce stands should be reduced to help protect and promote the original stand species.



Hazardous fuels can also be associated with cured grasses found on the prairie. Tall grasses that are cured and available to burn can generate high intensity fires that can spread very quickly. These grass fires can be very dangerous because of the volatility of the fuels involved. Several firefighter fatalities in South Dakota have occurred on the prairie with grass as the fuel model. Shelterbelts need to be maintained properly to help preserve them from wildfire. Maintenance may include disk-



ing between rows of trees to reduce the amount of fine, flashy fuels. Removing dead material and restoring with fire resistive plant species may help a shelterbelt survive a wildfire event by reducing fire intensity. Shelterbelts that are continuously regenerated and properly maintained can create a buffer that may reduce fire intensity and provide suppression opportunities during a fire event.

Ponderosa Pine should be one of the primary concerns when considering hazardous fuel types in Pennington County. Thinning of live conifers to create canopy separation helps reduce the chance of high intensity stand replacement fires from occurring. A sur-

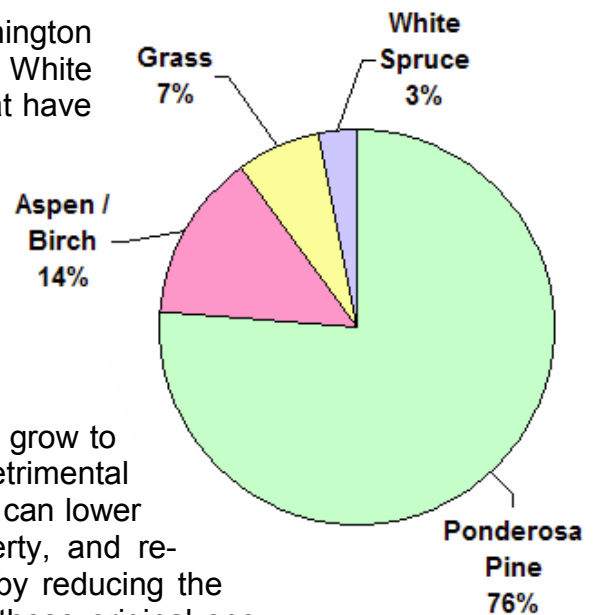


face fire generally burns with lower intensities and provides the larger more mature trees a better chance of survival. These surface fires also help consume typical forest litter and keep fuels from building up to a hazardous level. Fuel reduction activities should target reducing surface fuels such as storm-damaged trees, insect infestations, conifer slash and timber litter. Breaking the vertical continuity of the ladder fuels that contribute to torching and crowning fire behavior help reduce the chance of the fire spreading into the canopy and also improves forest health. Another benefit of reducing crown fires is maintaining the aesthetics after a fire event, thus protecting the economic sustainability

across the landscape.

The primary vegetation affecting wildfire in Pennington County is medium grass, forbs, Ponderosa Pine and White Spruce. There are many areas in Pennington County that have had the absence of fire for over 100 years. This has resulted in abnormally high fuel loads measured in tons/acre ratios of fuel. These fuels increase the threat from wildfire by increasing fire intensities and possibly providing a path for fire to spread into the forest canopy. This is not only detrimental to the forest but it can allow a fire to become a large enough conflagration to quickly overwhelm fire suppression crews.

Fire history in Pennington County shows fires can grow to large sizes with extreme fire behavior thus being very detrimental to forest health. Proactive planning and mitigation efforts can lower fire intensities, thereby reducing the loss of life, property, and resources. Existing hardwood stands should be favored, by reducing the encroachment of conifers. Not only does restoration of these original species maintain the forest in a more natural state but also the deciduous vegetation is much more resistant to sustained crown fire. The USDA Forest Service has developed vegetation data coverage on national forest system lands. Of 450,000 acres, 7% is grassland, 14% is Aspen/Birch, 3% is White Spruce and 76% is Ponderosa Pine. 150,000 acres are unclassified or are irrelevant. Stocking data on private land is generally unavailable.



### Fire Regime Condition Class

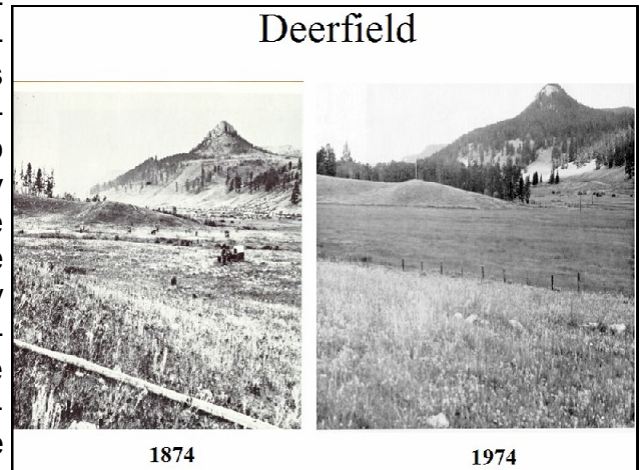
Fire regime condition classes are qualitative measures describing the degree of departure from historical fire regimes. Alterations of key ecosystem components such as species composition, structural stage, stand age, stand density, canopy closure and fuel loads may result from departure of historic conditions. One or more of the following may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, insects or disease or other past management activities.

The USDA Forest Service, data classifies the Black Hills National Forest Historical Fire Regime as low intensity, with high frequency. This means that the historical fire frequency was 35-years or less and that fires generally burned at low intensities and low to moderate severities.

Condition classes range from 1-3 where a rating of 1 means that the forest environment is not at risk of losing any major components or at risk of significant change of one or more of its major ecosystem components. A rating of 3 indicates that the forest area is at high risk of significant

change to one of those components. An easy indicator of condition class is to count the number of fire return intervals or frequency intervals missed. Generally speaking, if an area has missed 3 or more frequency return intervals then the stand is at high risk of significant change.

The USDA Forest Service data identifies the Black Hills National Forest to be in a Condition Class 3. Fire regime condition classes have been significantly altered from the historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historic frequencies by multiple return intervals. This has resulted in dramatic changes to one or more of the following: fire size, intensity, severity and landscape patterns. Vegetation attributes have been significantly altered from their historic range. The structure and orientation of fuels in Pennington County vary tremendously. Some areas have had fuels reduction projects done in recent history; other areas have not. Areas that have had some type of fire or fuels activity may have less hazardous fuels than areas that have not had any vegetation management in many years.



## Risks

The risk of wildfire occurring in Pennington County is evident based on the fire history of the county. Ignitions have occurred from burning debris, campfires, equipment, fireworks, incendiary, lightning, vehicles, prescribed burns, power lines, railroads, smoking, target shooting, welding and other human caused events. Fire history records indicate that the risk of ignition is 3 times higher around inhabited areas. By utilizing better community planning of WUI areas, using Fire Wise choices to preserve life and property, utilizing hazardous fuels reduction, updating fire suppression apparatus and utilizing public education we can possibly decrease the potential risk from wildfire. It is not a matter of “if it burns, but when it burns”. Reducing risk means reducing the likelihood and frequency of an ignition from occurring. Heightened awareness of current forest condition verses historical forest conditions may help people become aware that we need to work toward getting the forest returned to a more natural condition on Federal and Non-Federal land. Reducing the risk from wildfire by lowering fire intensities can help save houses, values and the aesthetics that are associated with living in the Black Hills.

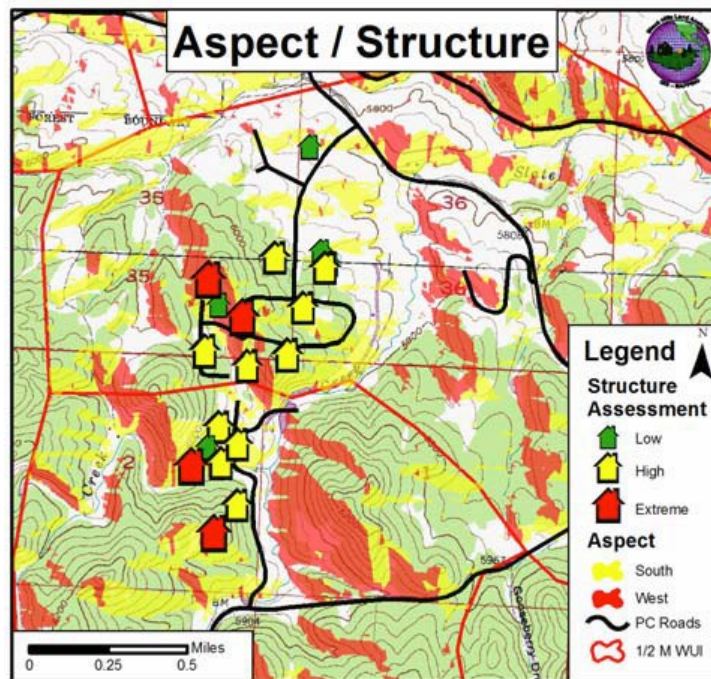
Structure density should also be considered when reducing the risk from wildfire. A structure burning inside of another structure’s survivable space adds to the overall intensity and spread of a wildfire. In many cases fire consumes structure after structure and the natural vegetation is not consumed. In these cases it is the urban fuels that are supporting the spread of the wildfire.

Another important consideration is the insurability of property in the county. If structures are at higher risk from wildfire, insurance companies may insure them at higher rates or they may not even insure these properties. Insurance companies are starting to recognize Firewise practices and techniques to reduce the exposure from wildfire. If we can make the overall area better prepared for wildfire, this may help reduce insurance costs or possibly prevent insurance companies from canceling existing policies or denying insurance altogether.

## Topography

The topography of Pennington County will influence wildfire and must be considered when assessing the threat from wildfire. The shape of the country can influence the intensity and spread of wildland fire. Slopes with south or west aspects will become drier and the fuels will cure earlier in the season. The following sample of slope and aspect values were derived from a digital elevation model of Pennington County. Approximately 220,000 acres in Western Pennington County have a slope of greater than 30%. 858,799 acres have a south or west aspect. Topography alters the normal heat

transfer process and modifies the general weather patterns, producing localized weather conditions that influence fire behavior. Fires starting at the base of slopes become larger and more intense because of availability of up-slope fuels. As slope increases, rate of spread and flame lengths also increase. The topographic configurations of narrow canyons pose dangerous conditions that shout “Watch Out” for fire suppression crews. Values or improvements located in saddles, chimneys or at mid-slope or above need to consider additional mitigation efforts to reduce fire intensity in these topological challenged areas. The fuels on south and west slopes are also pre-heated from the sun and may produce more erratic fire behavior. Down slope areas adjacent to structures need to increase the amount of survivable space to provide additional protection to these values from wildfire. We cannot control when or where fire will occur, but with proactive planning and preparedness we may be able to lessen the impact it has on life, property and resources.



## Weather

Current weather patterns that are creating drought conditions in Pennington County may be contributing to the risk from wildfire. The overall climate of the Black Hills area is continental, which



is characterized generally by low precipitation, hot summers, cold winters and extreme variations in both precipitation and temperatures. Local climatic conditions are affected by topography, with generally lower temperatures and higher precipitation at the higher altitudes. Research indicates that historically there have been long durations of drought and wet periods dating back as far as the 1600’s. Long periods of drought directly affect tree mortality, insect activity and possibly contribute to more severe fire behavior.

During fire season in western South Dakota, when the winds are from the south the temperatures are usually higher and the relative humidity is usually lower. These conditions are conducive for fires to easily become large conflagrations that are hard to manage. Large fires also occur that are wind driven events. The spread rate and direction vary according to predominant wind direction, topography, fuel conditions, and relative humidity.

## Fire Resistive Building Construction

People need to be educated in the importance of Fire Wise building procedures and practices. A fire resistive roof covering is needed to protect a structure from initial ignition from firebrands. Fire resistive building materials need to be used to keep a wildfire from igniting a structure from direct flame contact or from radiant or convective heat transfer. Fire resistive vegetation should be used in the home ignition zone of a structure to help reduce intensities. Windows and skylights should be double paneled or tempered glass. No vinyl or plastic windows, door assemblies or siding. All openings in structures should have 1/8-inch metal screening to keep out embers and wind-blown fuels. A burning ember can travel up to one mile from a wildfire. Eaves should be enclosed and not

vented. All external walls and decks should have a one-hour fire rating. Debris needs to be kept off roofs and out of gutters. These areas should be re-checked throughout fire season. Heavy timber or log construction is acceptable; these materials have high mass and can absorb moderate to high amounts of heat before they reach ignition temperatures.

Firewood, combustible materials and other fuel sources should not be stored in unenclosed spaces beneath structures, on decks, under eaves, canopies or overhangs. These materials should be a minimum of 30 feet from the structure. These items should also be within the survivable space of the structure so they can be protected and do not present a hazard during a fire event.

All structures need be marked with the appropriate address signage. If the structure is not visible from the primary road the structures address number will be posted at the intersection of the primary road and driveway access and also on the structure. Signage should be reflective and clearly visible from all directions of travel and must be 6" high 1/2" wide and be of contrasting colors. In the case of a cluster of structures in an area, individual structure numbers should be very apparent to expedite emergency response.

Residents should be encouraged to develop a site-specific fire protection plan that addresses specific details to be more prepared from wildfire. These may include: topography, including aspect and slope, possible climatic conditions, fire history, water sources, evacuation egress, fire resistive building construction, fire protection systems, equipment, survivable space and vegetation management.

## **Survivable Space**

Survivable space around structures is very important when mitigating the risk from wildfire. Building materials, topography, types of vegetation and fuel loads are key considerations when determining how much survivable space is required. Effective survivable space varies from 30 to 200-feet around a structure and provides firefighters working room to safely perform suppression activities. Structures that are built on steeper slopes require more survivable space on the down-slope side. There is documented scientific research that indicates structures that are 100-feet or farther from high intensity crown fire normally do not ignite from the radiant or convective heat. Usually, it is the small things that people overlook that cause initial ignition of the structure. Survivable space needs to be maintained such that it will not support high intensity crown fire that may ignite a structure. Ladder fuels need to be removed to lower the possibility of the fire spreading into the canopy from the ground. Not only is there a danger of a fire approaching from outside an area but there is also the danger of a fire starting within the survivable space and spreading outward. Fuel modification within the survivable space can also reduce the threat to the surrounding forest. Fire resistive vegetation is an efficient way to reduce fire intensities. Hardwoods and deciduous types of vegetation are good ways to provide safety, while providing pleasing aesthetic value. Natural barriers such as rock walls, gravel and other fuel breaks also help reduce the spread of fire.

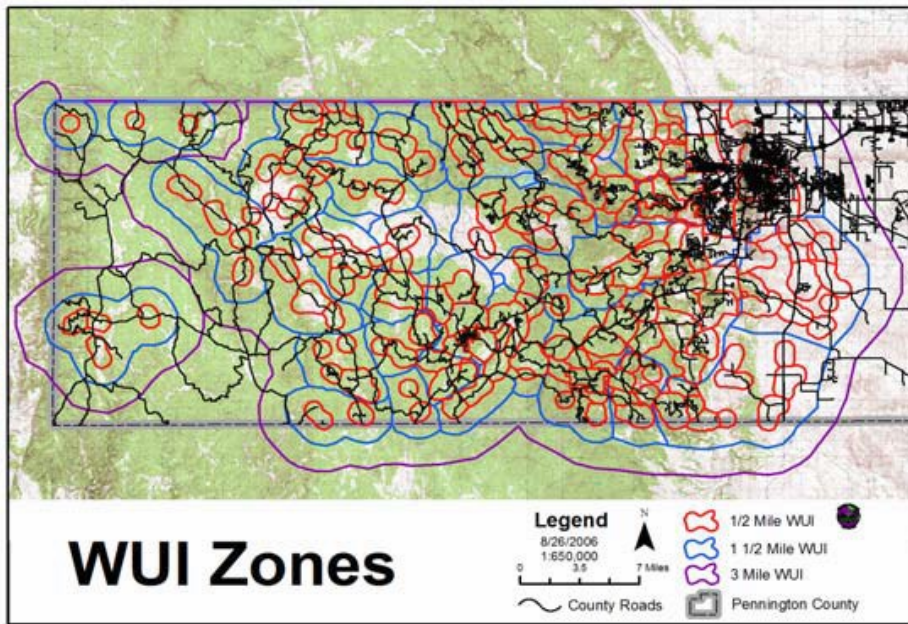
Structures situated in the prairie areas also need to give consideration to the hazards associated with fuels such as cured grasses. Mitigation efforts could include graveled driveways and/or disking fuel brakes. Rock, gravel or cultivated flowerbeds are also efficient fuel breaks. A fuel break adjacent to a structure will break the continuity and reduce the chance of fire spreading to and igniting the structure.

## **Wildland Urban Interface Buffers**

Treatments in identified ½, 1½ and 3-mile buffers will all fall under general prescription parameters until site-specific project areas are identified, at which time prescription elements will be developed according to site specific needs and conditions. An interagency collaborative process will identify and prioritize the site-specific project areas and associated prescription. The goal of fuels reduction projects will be to reduce the risk from fire by lowering fire intensities and reducing crowning and torching activities that threaten values in the WUI. Treatments should utilize wood fiber as



commercial logs, firewood or other forest products where practical. Main considerations for these projects should encourage hardwoods and enhance meadows by reducing encroachment of open space from Pine or Spruce. This will help generate fuel breaks and give fire suppression crews better opportunities for suppression activities. Restoration of original species in stands where Ponderosa Pine and White Spruce have encroached in the last century will help maintain a mosaic of vegetation and species viability of these stands. Existing Spruce stands tend to be uneven aged but usually prevail over hardwoods. Spruce stands need to be treated as any other conifer during hazardous fuel activities. Land managers should use thinning practices which maintain uneven aged or multi-storied stand structure to obtain stand diversity. These stands may need to be retained in a somewhat more open condition if they are to be managed for multistoried structure classes to achieve ladder fuel reduction objectives. Canopy base height, or the distance from the ground to where the canopy begins, should be considered to reduce torching and crowning during a fire event. This is achieved by interrupting the vertical continuity of the fuels also known as ladder fuels. Crowning Index, conditions needed for fire to spread through the canopy and Torching Index, conditions needed to torch individual trees, will help identify areas of elevated risk. Where available this data will be referenced to help develop fuels treatments. Dead standing trees that contribute to the threat in the WUI should be addressed especially if they pose a safety hazard to firefighters and the public. Riparian areas and north slopes may retain higher stocking levels where appropriate. Site-specific spatial data including structure density, hazardous topography, conifer canopy condition and proximity to state and federal treatment areas will be analyzed to identify hazards and help develop and prioritize projects that reduce



risk and decrease the potential of structural ignition from wildfire. Structure assessments in the WUI areas should be continued to help assess conditions in the county and determine future mitigation planning strategies. This information in conjunction with GIS will display information more efficiently to help show relationships that may not be apparent otherwise. This data is also important to managers during suppression activities and structure protection during a wildfire. Contact with homeowners during assessment activities allows one-on-one discussion of mitigation efforts landowners can do to reduce the threat from wildfire. People are more aware and interested in wildfire mitigation when it is their own property being discussed. Heightened interest by landowners in wildfire issues will help generate more support in the area of wildfire mitigation and promote higher levels of participation in the future. Encouraging people to live Firewise lives is crucial to protecting life and property. This cannot be achieved easily but will require the shared responsibility of everyone that has a stake in its success.

Structure data of Pennington County contributed to the development of 183 ½-mile WUI zones within the Black Hills Forest Fire Protection District that consist of approximately 248,831 acres. These ½-mile buffers have been identified around inhabited structures and defined communities at risk. The intent of these buffer zones is to reduce hazardous fuels to the point where the average worst condition during a wildfire would not support a high intensity crown fire in the vicinity of values in the WUI. This should be done by providing conifer canopy separation, removal of ladder fuels and reducing dead and down timber litter. Conifer stands need aggressive treatment to reduce the

chance of high intensity fire or lofted embers from endangering communities ahead of severe wildfire. When a wildfire approaches a structure through these ½-mile buffers, it should decrease in intensity and burn on the ground. This would give suppression crews a safer environment and better opportunities for protecting life, property and resources. The ½-mile buffer zones will have a target prescription of 20-feet of separation between conifer canopies. This can reduce the chance of active crown fire in the general vicinity of structures and other improvements. The ½ mile WUI zones will be the basis for prioritizing hazardous fuels reduction projects and the criteria will be based on structure density, hazardous topography, conifer canopy condition and proximity to state and federal treatment areas on federal and non-federal property.

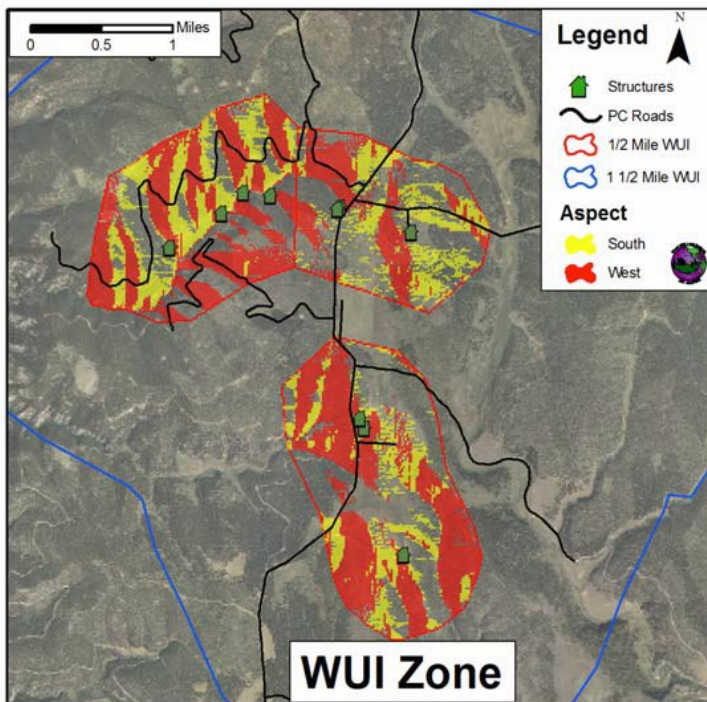
½ mile WUI zones will be prioritized for treatments based on structure density within these areas. The WUI data has been developed with priority ratings to reflect the order of precedence. Areas within the ½ mile buffers that are thinned, open or do not contain hazardous fuels will be excluded from required treatments. These areas must not contain fuel loads which will support sustained crown fire.

Hazardous topography will be identified as areas greater than 8% slope on a south or west aspect. The areas which classify as hazardous topography will require more aggressive treatment. Conifer crown spacing should be maintained greater than the average 20 foot spacing to reduce the risk of crowning and torching on steeper slopes with south and west aspect. Property ownership will determine who is responsible for treatments. This plan will encourage private landowners to treat their land also to improve the continuity of the fuels reduction efforts in timbered areas in Pennington County.

The 1½-mile buffer zones will have a target prescription of 10-feet between conifer canopies. Stands may be stocked at higher levels if they do not threaten WUI values during a fire event from radiant, convective heat or lofted firebrands. 30 1½-mile buffer zones have been identified that account for approximately 248,025 acres.

The 3-mile WUI buffer zones will be treated to reduce uncontrolled high intensity wildfire such as the Battle Creek Fire, West Berry Trails Fire or the Jasper Fire. The identified 3-mile buffer zones consist of approximately 161,491 acres and enable land managers to design projects at a landscape level. Large areas of slash may require the creation of fuel breaks where slash will be piled and burned or chipped. The homogeneity of the forest will be diversified at a landscape level to provide strategic protections emphasizing safety and survivability for homeowners and landowners to escape a fire event. Additionally, they will reduce the hazardous fuels and increase the survivability of the forest environment surrounding private property. Firefighters will then have opportunities to engage in firefighting activities in an environment where their life safety is not compromised and the probability of success is greatly increased.

Slopes with south or west aspect, “hot slopes”, that are situated with a southerly orientation from communities or that are below communities on a slope may need more aggressive treatments. South and west slope areas may require thinning to provide greater open spaces, which would significantly lower fuel loads that would influence fire behavior in these critical topographic areas from fast moving fires spreading from dry southerly winds. Under story and ladder fuels should be managed to reduce the risk of crowning and torching.



Prescribed fire may be used to manage fuel levels and maintain historical fire scars where appropriate. Burned areas may need future fuel treatments because of fuels that were not completely consumed during the initial fire event. At the minimum, all slash will be lopped and scattered and will not exceed a depth of more than 18-inches.

Logging slash is debris consisting of treetops, limbs, cull logs and other separate vegetation remaining after harvest, which has no commercial value. Generally, forest thinning or logging slash should be removed, chipped, ground, or piled and burned in such a manner that would minimize the potential for residual forest stands to be damaged if the resulting residue was consumed during a fire event. Slash created by forest operations should be managed according to federal, state and local requirements. Forested areas should be managed in such a manner that will minimize the chances of a catastrophic crown fire from threatening WUI values, forest health and aesthetics. Not all forest stands will be required to be thinned. There are areas in the Black Hills that are not conducive to landscape treatments due to topography and terrain features.

The intent of these treatment guidelines is to reduce the risk to values in the Wildland Urban Interface. Interagency collaboration by all interested stakeholders will help reduce the conflict with other land management programs and forest management objectives. Areas of endangered species, critical wildlife habitat or areas with mandated special requirements would require special considerations. Various treatments across the landscape should be developed to dovetail together to reduce risk from uncontrolled wildfire. Prescribed burning, mechanical thinning and slash treatment activities are very important for reducing hazardous fuel conditions. Fire and fuel management through above described methods will help protect biological and aesthetic values, but reducing the risk to the values in the Wildland Urban Interface will take precedence not only to protect structures but also aesthetics and valuation of property and resources.



*Battle Creek Fire 2002. Courtesy of the USFS.*

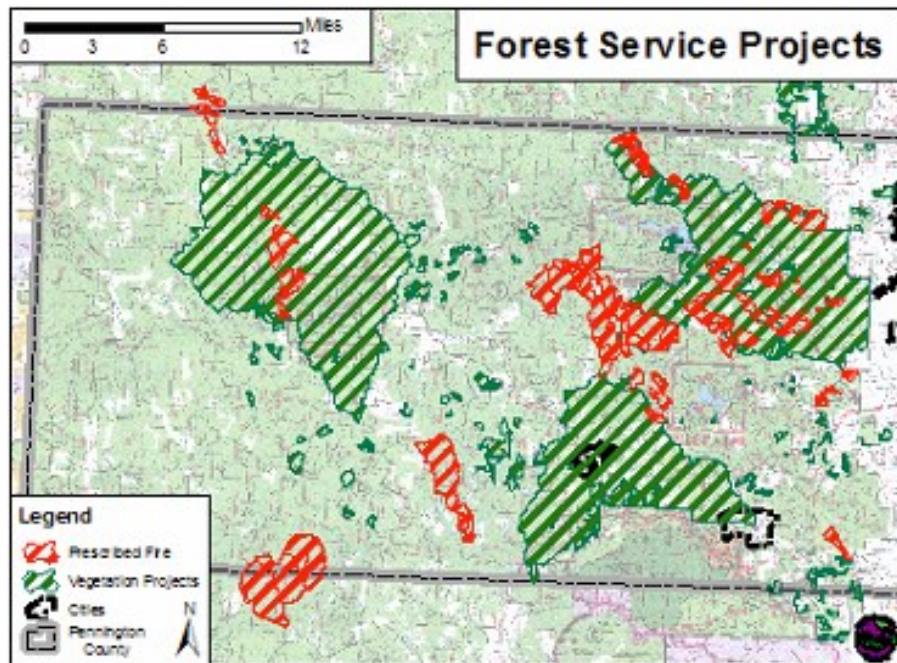
Access is an important consideration for emergency response whether it is fire, ambulance or law enforcement vehicles. All of these agencies may be responding into an incident area. Another consideration would be the public trying to evacuate during a wildfire incident and emergency service personnel responding into the area; properly planned access would provide a safer and more efficient environment. Primary access roads should be built to county specifications. Design loads for bridges on driveways longer than 200-feet should be rated to support the maximum weight of the responding apparatus.

Primary ingress/egress roads associated with the WUI access in Pennington County have been identified and should be treated to provide for safe access during a fire event. GIS buffers have been developed to identify treatment areas for primary roads at 180-feet on either side; with the last 30-feet tapering into a natural forest habitat creating a shaded fuel break. These shaded fuel breaks provide a more pleasing aesthetic appearance because the treatments do not end abruptly at the edge of the treatment area. The forested areas of these buffered escape-ways need to be managed in such a manner that will minimize the chances of a catastrophic crown fire from threatening the use of these travel routes during a fire event. Ladder fuels and timber litter would be greatly reduced or eliminated within these fuel breaks. Conifer canopy separation of 10 to 30-feet between individual crowns is desirable with small clusters of trees allowable to create diversity. These fuel breaks will

also provide fire crews opportunities to conduct tactical suppression activities and possibly reduce spread of an active crown fire.

## Agency Projects

The USDA Forest Service has several treatment projects in progress or planned for Pennington County. A major focus of these projects is vegetative treatment for hazardous fuels reduction and to reduce the impact from insects, such as the Mountain Pine Beetle on a landscape scale. The



objective is to reduce the potential for uncontrollable severe wildfire occurring over a broad area. The Mitchell project, at approximately 25,000 acres, is in the vicinity of Hill City and Keystone. The Deerfield project at, approximately 41,400 acres, is in the vicinity of Deerfield Lake in western Pennington County. The Prairie project, which is between Rapid City and the Pactola Reservoir, encompasses approximately 35,300 acres. In 2005, approximately 4,000 acres were treated to provide timber stand improvement. The Rockerville Bugs project encompasses approximately 250 acres and is focused on reducing Mountain Pine Beetle infestation

and to reduce hazardous fuels. There are timber stand improvement treatments planned for 2006 totaling approximately 4,800 acres. There have been approximately 1,700 acres treated in the Black Hawk area in previous years. The USDA Forest Service has treated approximately 10,400 acres with prescribed fire in Pennington County. Current prescribed fire planning has identified an additional 11,200 acres for future prescribed burning. Fuels reduction projects on Federal and Non-Federal lands, in the vicinity of these treatment areas, will provide more effective fire mitigation by continuing fuels reduction programs and developing continuity of fuel treatments across the landscape to reduce fire spread and intensity.

## Community Action Plan

The public shall be provided with important information pertaining to maintaining a safe Fire-wise property. Building construction and fuel modification are the key factors in preventing initial ignition. Fire resistive building materials need to be used to keep a wildfire from igniting a structure from direct flame impingement or from radiant or convective heat transfer.

Developments require two routes in and out. Properly designed access will provide adequate ingress/egress and evacuation routes. Proper assessment and planning is required for new subdivisions, see the Fire Hazard Severity Form 502, and page 26, for more information.

All structures will be marked with the appropriate address signage. If a structure is not visible from the road, the structures address should be posted at the primary road and at all subsequent intersections. This signage will be clearly visible and constructed with fire resistant material.

Fire resistive vegetation should be used in the home ignition zone of a structure to help reduce fire intensity. Survivable space is very important when mitigating for wildfire. Building materials, types of vegetation and fuel loads are key considerations when determining how much survivable space is required. Effective survivable space may be anywhere from 30-200 feet. Structures that are built on steeper slopes require more survivable space on the down slope side. Buildings that are lo-

cated closer than 30 feet to a slope with hazardous fuels shall require special mitigation measures based on site-specific conditions. There is documented scientific research that indicates structures that are 100 feet, or farther, from high intensity crown fire, normally do not ignite from radiant or convective heat.

Privately owned parcels shall be maintained so that they will not support high intensity crown fire by maintaining adequate conifer canopy spacing. An average of 20-foot spacing is typically required but site-specific conditions may require different treatments. Ladder fuels need to be removed to lower the possibility of the fire spreading up into the canopy from the ground. Not only is there a danger of a fire approaching from outside an area but there is also the danger of a fire starting within the survivable space and spreading outward. Surface fuels need to be significantly reduced or eliminated to reduce surface fire intensity. See page 21 for fuel treatment requirements. Hardwoods and deciduous types of vegetation are good ways to provide safety, while providing pleasing aesthetic value. See page 24, Fire Resistive Plant Species for the Great Plains, for a complete list of fire resistive vegetation.

Structures situated in the open areas also need to give consideration to the hazards associated with fuels such as cured grasses. Mitigation efforts could include graveled driveways and/or disking fuel brakes. This may interrupt the continuity of the natural fuels that threaten a structure.

Subdivisions are required to install a central water system that can provide adequate fire suppression capability for the subdivision.

Firewood, combustible materials and other fuel sources should not be stored in unenclosed spaces beneath structures, on decks, under eaves, canopies or overhangs. These materials should be a minimum of 30-feet from the structure. These items should, however, be within the survivable space of the structure so they can be protected but situated so they do not present a hazard during a fire event. See page 22 & 23 for fire resistive building construction requirements.

A fire resistive roof covering is needed to protect a structure from initial ignition from firebrands. Windows and skylights should be double paned or tempered glass. No vinyl or plastic windows, door assemblies or siding. All structure openings need 1/8-inch metal screen to keep out embers and wind-blown fuels. Eaves should be enclosed and not vented. All external walls and decks should have a minimum of a 20-minute fire rating. Debris needs to be kept off roofs and out of gutters. These areas should be rechecked throughout fire season. Heavy timber or log construction is acceptable; these materials have a lot of mass and possess high heat absorbency characteristics prior to ignition.

Home fire sprinkler systems should be installed in new construction. Home fire sprinklers can contain and may even extinguish a fire in less time than it would take the fire department to arrive on the scene. Installation of home sprinkler systems with smoke alarms reduces the risk of death in a home fire by 82%. By installing a home sprinkler system, the homeowner can save lives, reduce property loss and can even help cut homeowner insurance premiums.

Usually, it is the small things that people overlook that cause initial ignition of the structure. See page 25, Firewise Landscaping for more details.

Developers are required to develop a fire mitigation plan for subdivisions during the planning process. Plans will include: topography, slope/ aspect, flammable vegetation, climatic conditions, fire history, water sources (which may include a central water systems), access, fire resistive building construction, residential fire sprinkler systems, survivable space and vegetation management. Residents should also be encouraged to develop individual fire protection plans that address the above specific details to be more prepared from wildfire.

Pennington County Fire may give consideration to developers who provide central water systems and residential sprinkler systems during building construction.

Encouraging people to live Firewise lives is crucial to protecting life and property. This also provides fire fighters a safer and more effective working environment to conduct suppression activities. Living Fire Wise cannot be achieved easily but will require the shared responsibility of everyone that has a stake in its success.

Pennington County advertised and held 3 public meetings to allow comments pertaining to the Community Wildfire Protection Plan. The meetings were held on February 13, 2007, at Johnson Siding Fire Department, February 15, 2007, at the Keystone Fire Department and February 20, 2007 at the Black Hawk Fire Department. Draft copies of the Pennington County Community Wildfire Protection Plan were made available to the public at these meetings. Also available were public education materials such as; National Firewise pamphlet, the Pennington County Firewise pamphlet and the state publication "Living With Fire: A Guide for the Black Hills Homeowner." Public participation was sparse at 2 of the 3 meetings. Public comments that were received as a result of these meetings have been noted and are addressed in the plan. Other concerns will be addressed as the program moves forward with sight specific program management. There will be many special circumstances that will need to be addressed as plans and treatments are identified and developed.

This Community Wildfire Protection Plan was updated in the fall of 2010 to provide the residents of Pennington County with the most updated and important information for comprehensive land use planning. NFPA 1144 Standard For Reducing Structure Ignition Hazards from Wildland Fire was updated in 2008 and the updates are reflected in this document. NFPA 1144 focuses on individual structure hazards. This new edition also focuses on a new spatial approach to assessing and mitigating wildfire hazards around existing structures and includes improved ignition resistant requirements for new construction. Reducing the risk to the residents of Pennington County from wildland fire is the primary goal. Minimizing the chance of initial ignition of structures during a wildfire event will reduce loss to life and property.

### **Community Action Items**

- Firewise forums may be held as the need arises.
- Information may be provided to inform landowners about the hazardous fuels reduction and Mountain Pine Beetle mitigation cost share programs.
- Advertisements will be placed in local publishing.
- Firewise public service announcements may be broadcast on local radio stations.
- Fire departments should participate in public activities to promote Firewise.
- Additional funding opportunities should be explored to provide fuels reduction to protect values in Pennington County.

## Fuel Treatment Requirements

1. For the entire project area (e.g. ½ mile WUI zones):
  - A. Conifer canopy spacing shall be separated by an average of 20 feet depending on forest conditions. Additional fire precaution measures may be required because of fire hazard in the following area:
    1. Where slopes in or adjacent to proposed developments are in excess of 20 percent;  
or
    2. Where a specific fire danger is identified.
  - B. All surface fuels must be removed or treated.
  - C. Ladder fuels under trees within the fuel modification area shall be maintained at a height that will preclude ground fire from spreading vertically into the conifer canopy.
2. In the survivable space of the home site:
  - A. All conifer canopy spacing shall be maintained at an average of 20 feet.
  - B. All surface fuels must be removed or treated.
  - C. Ladder fuels under trees within the fuel modification area shall be maintained at a height that will preclude ground fire from spreading vertically into the conifer canopy.
3. In the area extending to the road right-of-way from a road:
  - A. All conifer canopy spacing shall be maintained at an average of 20 feet.
  - B. All surface fuels must be removed or treated.
  - C. Ladder fuels shall be trimmed up a minimum of 6 feet above the ground to the interrupt vertical fuel continuity.

## Fire Resistive Building Requirements

Requirements addressing building design, location and construction are set forth as below; according to NFPA 1144:

- A. Shingles shall be Class A, B, or C fire resistant material.
- B. No wooden shake shingles are allowed.
- C. Vents shall be screened with a corrosion resistant, noncombustible wire mesh with the mesh opening not to exceed nominal 1/8 inch in size.
- D. Eaves shall be boxed in with 5/8 inch nominal sheathing or noncombustible materials.
- E. Where the roof profile allows space between the roof covering and the roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be fire stopped with approved materials, or have additional assembly components of noncombustible materials to prevent ignition.
- F. Attic or foundation ventilation louvers or ventilation openings in vertical walls shall be covered with nominal 1/8 inch mesh corrosion-resistant metal screen or other noncombustible and approved material that offers equivalent protection.
- G. No attic ventilation openings or ventilation louvers shall be permitted in soffits, in eave overhangs, between rafters at eaves, or in other overhanging areas on those exposures facing hazardous vegetation.
- H. Attic spaces shall be ventilated as approved for the building configuration, the climatological conditions of the site, and the moisture and temperature conditions associated with the occupancy and use of the building.
- I. All overhanging projections and overhanging buildings shall be of heavy timber construction; be constructed of noncombustible material, fire retardant treated wood, or other ignition resistant material; or be 1-hour fire-rated assembly.
- J. Exterior vertical walls shall meet the requirements for heavy timber construction, ignition-resistive material, fire-retardants-treated wood, or a minimum 20-minute fire-rated assembly where walls are potentially exposed to a wildland fire.
- K. All exterior walls shall be protected with 2 inch nominal solid blocking between exposed rafters at all roof overhangs, under the exterior wall covering on all sides exposed to native vegetation.
- L. When appendages and projections are attached to exterior fire resistive walls, they shall be constructed to maintain the fire resistive integrity of the wall.
- M. Structural elements that result in or could result in the collection of combustible materials proximal to the structure shall be protected.
- N. Exterior windows, windows within exterior doors, and skylights shall be tempered glass, multi-layered glazed panels, glass block, or have a fire-resistance rating of no less than 20 minutes.
- O. Window screening shall be noncombustible mesh and installed to prevent the collection of firebrands and embers or their entry into open windows.
- P. Exterior doors shall be solid core wood no less than 1<sup>3</sup>/<sub>4</sub>-inch thick, approved noncombustible construction, or have a fire protection rating of no less than 20 minutes.
- Q. Vents for attic and sub-floor ventilation shall be screened with a corrosion-resistant wire mesh, with the mesh opening not exceeding nominal 1/8 inch in size.
- R. No vents shall be installed in a location that faces heavy vegetative fuels.
- S. Every fireplace and wood stove chimney and flue shall be provided with an approved spark arrester constructed of a minimum 12-gauge welded wire or woven wire mesh, with openings not exceeding 1/2 inch.
- T. Vegetation shall not be allowed within 10 ft of a chimney outlet.
- U. Accessory structures shall meet all of the requirements of this section or shall be separated from the main structure by a minimum of 30 feet.
- V. Permanently located mobile and manufactured homes with an open space beneath shall have a skirt of noncombustible material or material that has a minimum fire-resistive rating of 20 minutes.
- W. Any enclosed space beneath the mobile or manufactured home shall be vented according to C. above.



## Fire Resistive Plant Species for the Great Plains

All plant material will burn, but the following is a list of plants that are more fire resistive.

<u>TREES</u>	<u>Common name</u>	<u>PERENNIALS</u>	<u>Common name</u>
<b><i>Deciduous:</i></b>		Achillea spp.	Yarrow
Betula	Birch	Allium schoenoprasum	Chives
Acer spp.	Maple amur and silver	Bergenia spp.	Bergenia
Alnus spp.	Alder	Brodiaea spp.	Lilies
Catalpa speciosa	Northern Catalpa	Coreopsis spp.	Coreopsis
Cornus florida	Flowing Dogwood	Erysimum linifolium	Wall flower
Fraxinus spp.	Ash green	Eschscholzia spp.	California poppy
Gleditsia tricanthos	Honeylocust	Fragaria sp.	Wild Strawberries
Malus spp.	Apple siberian crab	Geranium spp.	Geranium
Populus spp.	Aspen, Cottonwood, Popular	Heuchera spp.	Daylillies
Prunus spp.	Cherry common chokecherry	Iris spp.	Coral bells
Quercus spp.	Oak (bur)	Kniphofia uvaria	Iris
Robinia pseudoacacia	Black locust	Lupinus spp.	Red hot poker
Salix spp.	Willow golden and white	Oenothera spp.	Lupine
	Siberian elm	Penstemon spp.	Evening primrose
	Harbin pear	Solidago spp.	Beard tongue
		Strachys bysantina	Goldenrod
			Lamb's ear

<u>SHRUBS</u>	<u>Common name</u>	<u>GROUNDCOVERS</u>	<u>Common name</u>
Amelanchier spp.	Serviceberry	<b><i>Succulents:</i></b>	
Atriplex canescens	Four Wing Saltbush	Delospema nubigenum	Hardest ice plant
Buddilia davidi	Butterfly Bush	Echeveria spp.	Hens & Chicks
Caryopteris x clandonensis	Blue-Mist Spirea	Sudem spp.	Stone crops
Cornus serica	Red Osier Dogwood		
Cotoneaster spp.	Cotoneaster	<b><i>Non-succulents:</i></b>	
Liqustrum spp.	Privet	Schillea tomentosa	Wolly yarrow
Mahonia spp.	Creeping Grape Holly	Ajuga reptans	Carpet bugle
Pachistima canbyi	Dqarf Mountain Lover	Arctostaphylois uva-ursi	Kinnikinnick
Philadelphus spp.	Mock Orange; Syringa	Armeria meritima	Sea pink; thrift
Rhamnus fragula	Buckthorn	Cerastium tomentosa	Snow in summer
Rhododendron spp.	Azalaes, Rhododendrons	Cotoneaster dammeri	Bearberry cotoneaster
Ribes spp.	Currant	Euonymus fortunei	Winter creeper
Sheperdia argentea	Silver buffaloberry	Potentilla tabernaemontanii	Spring cinquefoil
Symphoricarpos albus	Snowberry	Senecio cineraria	Dusty miller
Viburnum trilobum	Cranberry bush	Thymus praecox articus	Mother of thyme
Yucca spp.	Yucca	Verbenia bipinnatifida	Verbenia
	Common lilac		



*Photo courtesy of U.S. Fish and Wildlife Service. Battle Creek fire of 2002.*

## **Firewise Landscaping**

The following guidelines can help to reduce the risk from wildfire:

- Make sure your house number is visible.
- Keep grass and lawns cut short and well irrigated
- Use fire resistive vegetation in close proximity to structures
- Separate natural fuels from combustible structure materials
- Provide survivable space for structures
- Keep dead organic material maintained
- Keep trees a minimum of 15 feet away from chimneys
- Combustible materials attached to the house may be a concern
- Topography will influence the amount of survivable space required
- Provide a hose and ladder for fire service personnel
- Keep firewood and other fuels at least 30 feet from structures

## Fire Hazard Severity Form Form 502

### A. Subdivision Design Points

- |  |  |          |
|--|--|----------|
| 1. Ingress/Egress  |  | 1 _____  |
| Two or more primary roads  |  | 3 _____  |
| One road   |  | 5 _____  |
| One-way road in, one-way road out  |  | 5 _____  |
| 2. Width of Primary Road   |  |          |
| 24 feet or more  |  | 1 _____  |
| Less than 24 feet  |  | 3 _____  |
| 3. Accessibility Road grade  |  |          |
| 5% or less   |  | 1 _____  |
| 5% to 10%  |  | 5 _____  |
| 10% or more  |  | 10 _____ |
| 4. Secondary Road Terminus,  |  |          |
| Loop roads, cul-de-sacs with an outside turning radius of 45' or greater |  | 1 _____  |
| Cul-de-sac turnaround or dead end roads 200 feet or less in length       |  | 3 _____  |
| Dead-end roads greater than 200 feet in length                           |  | 5 _____  |
| 5. Street Signs  |  |          |
| Present  |  | 1 _____  |
| Not present  |  | 5 _____  |

### B. Vegetation

- |  |  |          |
|--|--|----------|
| 1. Grass   |  | 1 _____  |
| Light – Only grass/forbs less than 2 feet tall   |  | 3 _____  |
| Medium – Grass greater than 2 feet tall  |  | 5 _____  |
| Heavy – Grass with conifer reproduction covering 25% or more ground area                                 |  | 5 _____  |
| 2. Conifer: Ponderosa pine or pine spruce mix  |  |          |
| Light – Open well space conifers greater than 10 feet tall with grass/forbs                              |  | 3 _____  |
| Medium light – Conifers more than 50% of vegetation, crowns not touching w/ no ladder fuels              |  | 5 _____  |
| Medium – Conifers more than 50% of the vegetation, crowns not touching, with under story or ladder fuels |  | 7 _____  |
| Heavy – Dense conifers with crowns touching  |  | 10 _____ |
| Extreme – Dense conifers w/ crowns touching & thick dead and down fuels and ladder fuels                 |  | 12 _____ |
| 3. Aspen/birch   |  |          |
| Light – Sparse or mature aspen with grass/forbs under story  |  | 1 _____  |
| Medium – Aspen/birch intermixed with scattered conifers  |  | 3 _____  |
| Heavy – Decadent aspen/birch with standing and fallen dead and intermixed conifers                       |  | 5 _____  |
| 4. Oak/hardwood brush  |  |          |
| Light – Patchy oak with less than 25% of the area covered with grass                                     |  | 1 _____  |
| Medium – Mature oak with scattered (less than 10%) conifer   |  | 3 _____  |
| Heavy – Continuous oak brush covering more than 50% of area with grass                                   |  | 5 _____  |

### C. Topography (Slope Hazard Rating)

- |                                 |  |          |
|---------------------------------|--|----------|
| 8% or less                      |  | 1 _____  |
| More than 8%, but less than 20% |  | 4 _____  |
| 20% or more, but less than 30%  |  | 7 _____  |
| 30% or more                     |  | 10 _____ |

**D. Fire Protection-Water Source**

- 1000 GPM hydrant within 500 feet 1 \_\_\_\_\_
- Hydrant farther than 500 feet or draft site 2 \_\_\_\_\_
- Water source 20 min. or less, round trip 5 \_\_\_\_\_
- Water source farther than 20 min., and 7 \_\_\_\_\_
- 45 min. or less, round trip 10 \_\_\_\_\_
- Water source farther than 45 min., round trip

**E. Fire Department Response Time (Type I Engine)**

- Less than 15 minutes 1 \_\_\_\_\_
- 15 to 30 minutes 5 \_\_\_\_\_
- More than 30 minutes 10 \_\_\_\_\_

**F. Survivable Space**

- 70% or more of the site 1 \_\_\_\_\_
- 30% or more, but less than 70% of site 10 \_\_\_\_\_
- Less than 30% of site 20 \_\_\_\_\_

**G. Existing Building Roofing Material**

- Fire Proof 1 \_\_\_\_\_
- Resistive 5 \_\_\_\_\_
- Non-Fire Rated 20 \_\_\_\_\_

**H. Existing Building Construction Materials**

- Noncombustible siding/deck 1 \_\_\_\_\_
- Noncombustible Siding/combustible deck 5 \_\_\_\_\_
- Combustible siding and deck 10 \_\_\_\_\_

**I. Utilities (gas and/or electric)**

- All underground utilities 1 \_\_\_\_\_
- One underground, one aboveground 3 \_\_\_\_\_
- All aboveground 5 \_\_\_\_\_

**Total** \_\_\_\_\_

**Individual Structure Rating  
(Sum of B, C, F) Total \_\_\_\_\_**

- Low 4 – 20
- High 21 – 28
- Extreme 29 – 42

**Overall Community Rating**

- Low Hazard 32-39
- Moderate Hazard 40-59
- High Hazard 60-74
- Extreme Hazard 75-150

This plan has been reviewed and met the approval of by local agencies that enter into collaborative efforts to reduce the risk from wildfire for non-federal and federal land in Pennington County.

	<b>Representative</b>	<b>Date</b>
USDI Bureau of Land Management	_____	_____
USDA Forest Service	_____	_____
South Dakota Department of Agriculture:		
Wildland Fire Suppression Division	_____	_____
Resource Conservation & Forestry Division	_____	_____
<b>Approved By:</b>		
Pennington County Commission	_____	_____
Pennington County Fire Administrator	_____	_____

## Glossary

**CAR**— Community at Risk.

**Community**—A group of people living in the same locality and under the same government.

**Community At Risk**— A group of homes and other structures with basic infrastructure in an area that is at risk from uncontrolled wildfire.

**Community Wildfire Protection Plan**—A document that addresses the needs of the people involved in its development. Issues such as wildfire response, hazard mitigation, community preparedness, and structure protection may be covered topics.

**Crown Fire**—A wildfire that spreads across the tops, (crowns), of trees, more or less independent of any fire on the ground.

**HFRA**— Healthy Forest Restoration Act; 2003.

**Fire Regime Condition Class 3** —This term means the condition class description developed by the USDA Forest Service Rocky Mountain Research Station in the Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management (RMRS-GTR-87, [http://www.fs.fed.us/rm/pubs/rmrs\\_gtr87.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr87.html)), dated April 2000 (including any subsequent revisions). Fire regimes on the land have been significantly altered from historical ranges. A high risk exists of losing key ecosystem components from fire. Fire frequencies have departed from historical frequencies by multiple return intervals, resulting in dramatic changes to the size, frequency, intensity, or severity of fires or landscape patterns. Values of vegetation attributes have been significantly altered from their historical ranges.

**Fire Regime I**—This term means an area that historically has had low-severity fires every 0 to 35 years that is located primarily in low-elevation forests of pine, oak, and pinyon-juniper.

**Fire Regime II**—This term means an area that historically has had stand-replacement-severity fires every 0 to 35 years that is located primarily in low- to mid-elevation rangeland, grassland, or shrub land.

**Fire Regime III**—This term means an area that historically has had mixed-severity fires every 35 to 100 years that is located primarily in forests of mixed conifer, dry Douglas-fir, or wet ponderosa pine.

**Hazard**—A fuel complex defined by kind arrangement volume, condition and location that forms a special threat of ignition or of suppression difficulty.

**Firewise Construction**—The use of materials and systems in the design and construction of a building or structure to safeguard against the spread of fire within the building or structure as well as the spread of fire to other buildings or structures or to adjacent natural areas.

**Firewise Landscaping**—Vegetation placed around a home or other structure in a manner so as to reduce the exposure of the building to an encroaching wildfire, or slow/inhibit the spread of fire from an adjacent wildland area to the building or from the building to the wildland area.

**Fuel**—Native vegetation that is available to burn in a wildfire.

**Home Ignition Zone**—See Survivable Space.

**Infrastructure**—The physical support systems of a subdivision, including roads, power lines and central water and sewage.

**Ladder Fuels**—Fuels that provide vertical continuity between strata, thereby allowing fire to move from surface fuels to the crowns of trees, (or to structures), with relative ease.

**Municipal Watershed**—A community water system “that serves at least 15 service connections used by year-round residents of the area served by the system; or regularly serves at least 25 year-round residents” (Safe Drinking Water Act, Section 1401, 42 U.S.C.A. 300f.(15)).

**Municipal Water Supply System**—This term means the:

Reservoirs, canals, ditches, flumes, laterals, pipes, pipelines, and other surface facilities and systems constructed or installed for the collection, impoundment, storage, transportation, or distribution of drinking water.

**NFP**—National Fire Plan; August 2000.

**Prescribed Burning/Prescribed Fires**—Carefully controlled fires set by land managers to reduce hazardous accumulations of wildland vegetation, (fuel), control forest insect and diseases, improve

forage for livestock, improve wildlife habitat and maintain healthy ecosystems.

**Risk**—Activities or things that provide a source of heat sufficient to result in a fire ignition.

**Survivable Space**—The area between wildland fuels and structures, (typically a width of 30 feet or more), that allows firefighters to protect the structure from wildfire. In the absence of firefighters, this safety zone increases the likelihood that the structure will survive on its own.

**Shelterbelt**—A barrier of trees and shrubs that protects against the wind and reduces erosion.

**Value**—Natural resources, improvements, or other values that may be jeopardized or lost if a fire occurs.

**Wildfire**—A fire that burns out of control in forest or wildland areas damaging or destroying natural resources and sometimes threatening or destroying life and property.

**Wildland-Urban Interface**—A zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels.

**Wildland-Urban Interface Buffer Zones (½, 1½ and 3-mile)** —Geographic areas centered around values at risk that help develop mitigation strategies to reduce the risk from wildfire.

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