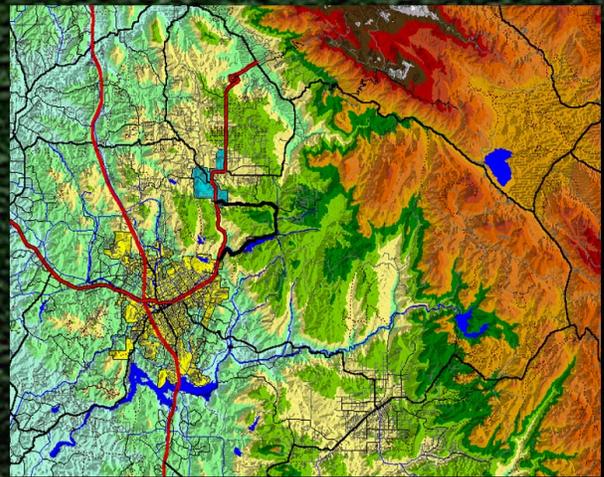
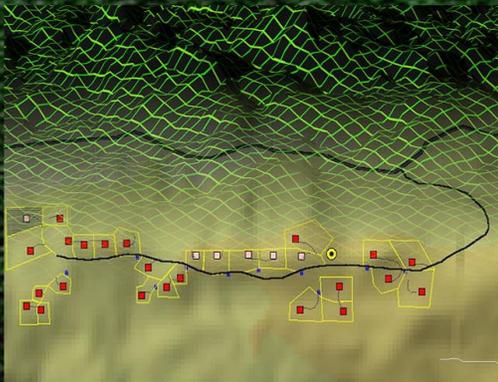
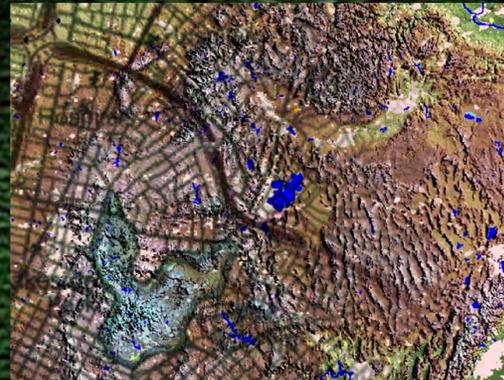


# FIREWISE COMMUNITIES WORKSHOP



## PARTICIPANT WORKBOOK

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making sensible choices in the wildland/urban interface



<http://www.firewise.org/communities>

**FIREWISE COMMUNITIES** is a program developed by the National Wildland/Urban Interface Fire Program.



**Members of the Program include:**

International Association of Fire Chiefs

National Association of State Fire Marshals

National Association of State Foresters

National Emergency Management Association

National Fire Protection Association

United States Department of Agriculture  
Forest Service

United States Department of the Interior  
Bureau of Land Management  
Bureau of Indian Affairs  
National Park Service  
U.S. Fish & Wildlife Service

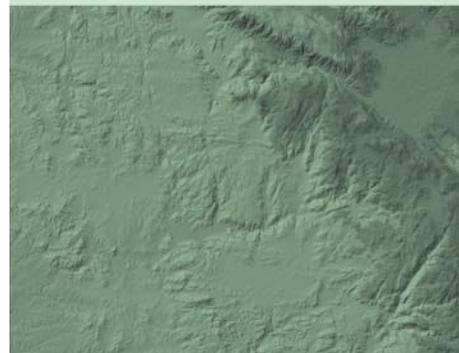
United States Fire Administration

For more information or to order additional copies of this workbook, contact Firewise Communities, 1 Batterymarch Park, Quincy, Massachusetts, 02269

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# INTRODUCTION

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## Welcome to the FIREWISE COMMUNITIES Workshop!



This workshop was developed for people who are interested in creating FIREWISE Communities.

Communities are more than places where people live, work, and raise their children. They are the relationships, partnerships, attitudes, and values that bind people, businesses, organizations and agencies together and motivate them to achieve common goals. A stable community provides a sense of security, serenity, comfort, and neighborhood. Preserving these values with personal commitment and community action is the goal of the FIREWISE Communities Workshop series.

Recognizing the value of collaboration in addressing wildland/urban interface fire problems, the National Wildland/Urban Interface Fire Program developed the series of FIREWISE Communities workshops to bring diverse disciplines and professions together - not in hundreds at large national conferences but in smaller, more intimate groups. This approach promotes networking on a smaller scale, builds a national resource, addresses the differences in interface conditions by region, and demonstrates how and why FIREWISE concepts need to be blended into community planning for all natural disasters.

We will show you why it's important, who can help, how to do it, and what the benefits are. There is something in it for everyone - whether it's preserving a lifestyle, avoiding skyrocketing public costs, increasing corporate visibility and improving image, building a customer base, or just having the confidence to know residents are more secure.



The Goals of the **FIREWISE Communities** Workshop are:

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1. To improve safety in the wildland/urban interface by learning to share responsibility.

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  2. To create and nurture local partnerships for improved decisions in communities.

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  3. To encourage the integration of FIREWISE concepts into community and disaster mitigation planning.

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The overall objective of the workshop series is for individuals and groups to learn how to use the collaborative FIREWISE Community planning process and effectively transfer the knowledge and techniques to their own communities and jurisdictions, regardless of their community size and complexity.

The FIREWISE Communities workshop provides an excellent forum for demonstrating how effective partnerships can be in resolving community growth problems in hazardous wildland/urban interface areas. The benefits of partnership include the sharing of ideas, the combination of expertise and knowledge, and the sharing of responsibilities in fire protection and community development. By the end of this workshop, you'll have the basic knowledge and tools to hold a FIREWISE Communities workshop in your own locale and to begin making collaborative decisions to improve community safety.

## What is the Wildland/Urban Interface Fire Problem?

Over the past century, America's population has nearly tripled, with much of the growth flowing into traditionally natural areas. Cities have grown into suburbs and suburbs have blended into what was once considered rural America. Baby boomers are acquiring secluded homes surrounded by forests, mountain cabins, or sprawling farms. This movement has created an extremely complex landscape that has come to be known as the wildland-urban interface. Encroaching development into forests, grasslands and farms has resulted in numerous infrastructure problems, including catastrophic wildfires which increasingly threaten lives, homes and businesses.

Wildfires have historically occurred in forested or other wildland areas. They now frequently happen in America's backyards, and that risk will increase as the interface is developed. Threats to life and property from wildfires and costs for suppressing them are expanding at an astounding rate. In 1973, 1.9 million acres of private, state and federal lands burned from wildfires. In 1996, with increased expansion into the wildland/urban interface, almost 6.7 million acres were consumed by wildfires. Taxpayer costs exceeded \$689 million (FY1996 est), not including property loss estimates.



To help alleviate these health, safety, and financial risks and achieve a better quality of life, appropriate community-based planning is needed. The process should involve community officials and developers, architects, bankers, fire marshals, insurance representatives, Realtors, emergency management experts, and property owners.

The United States will likely continue to experience damaging wildfires in the wildland/urban interface unless people work together to solve basic community development planning issues at the local level. Interdisciplinary, cooperative problem solving across land ownership is part of the solution.



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## What is a FIREWISE Community?

A disaster can happen in any community. Some have first-hand knowledge of life-threatening flash floods or highly destructive tornadoes, while others may be more aware of earthquakes or damage caused by severe winter storms. Most people do not think of wildfire as a natural disaster they can effectively protect against. But there are things each of us can do to prepare for and lessen the effects of catastrophic wildland fires.



Many towns and neighborhoods have already taken measures to make themselves more resistant to catastrophic wildland fire. Because no place can be totally safe from fire or other natural events, we need to be a little smarter - wiser - in the way things are done. Wider roads, better water supply, improved subdivision planning and so on make these places in which FIREWISE activities become part of daily life.

Communities designed with FIREWISE concepts help preserve homes, a cherished lifestyle, natural settings for wildlife and recreation, and incredible vistas. FIREWISE designs are also good business. Protecting collateral and investments, reducing exposures, and avoiding loss will increase property values and save lives. FIREWISE Communities are safer places for people to live and benefit the landscape and wildlife as well as people. Being FIREWISE means leveraging fire protection and maximizing community and property owners' values.

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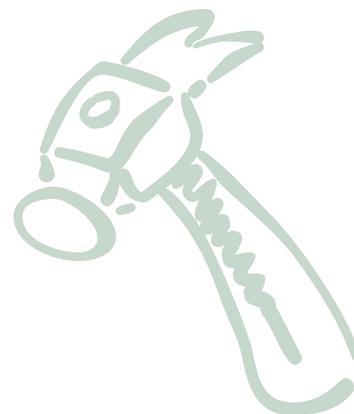
## Where did this idea come from?

Following the devastating wildland fires and the loss of over 1,400 homes in California and Florida in 1985, the National Fire Protection Association (NFPA) and the USDA Forest Service met with professionals from many disciplines to help define the phenomenon that has become known as the wildland/urban interface. The meeting was held in 1986 at the NFPA headquarters in Quincy, Massachusetts, and involved state and national forest service officials, researchers from the USDA Forest Service and major universities, landscape architects, building architects, municipal and volunteer fire department members, elected officials, and many others.

Following the 1986 conference, a cooperative agreement was signed that shaped the National Wildland Urban Interface Fire Protection Initiative. Part of the mission of the Initiative was to sponsor the development and delivery of numerous conferences, workshops, publications, and videotapes to address specific audiences, as recommended by the 1986 conference participants. First, the emphasis was placed on fire fighter safety and actions that interface homeowners could take to protect their homes from wildland fires. Next, several programs were developed for landscape architects, designers and installers. Research and review of major wildland fires indicated that many homes had been spared destruction or damage by good landscaping and the actions that homeowners had taken before the fire.



In the early 1990's, the Initiative was formalized into the National Wildland/Urban Interface Fire Protection Program and a Working Team was placed under the auspices of the National Wildfire Coordinating Group (NWCG). Along with the USDA Forest Service, the National Association of State Foresters, and the NFPA, other agencies and associations have been added. These are the Department of the Interior agencies with wildland fire protection responsibilities (Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and the US Fish and Wildlife Service), the US Fire Administration, the National Emergency Management Association, the National Association of State Fire Marshals, and the International Association of Fire Chiefs. The combined, cooperative efforts of these groups directed the development of an Internet web site where information about the interface is available. It was through the efforts of many that the FIREWISE concepts were developed, based on the conviction that wisdom and knowledge are the prime forces that can help reduce the hazards in the interface.



With the formalized approach, the Program developed a plan to provide information to additional segments of the wildland/urban interface decisionmakers (i.e., builders, architects, insurance, planners, and developers). Highlights of these activities include:

- Architects, builders, and fire protection specialists developed two videotapes and a checklist on Firewise construction for builders and homeowners.
- The American Society of Landscape Architects provided assistance in the development of landscaping principles for wildfire-prone communities, in the form of a series of three videotapes and a number of national workshops.
- Home Depot granted funding to develop additional information about how structures are ignited by wildland fire.
- An internet web site was established to help disseminate the information to homeowners, developers, fire professionals, the media, and many others.
- The Institute for Business and Home Safety, representing many insurance carriers, provides information for homeowners on retrofitting homes for wildland fire protection.
- The Insurance Services Office is currently exploring homeowner incentives for wildland fire mitigation.



The Firewise Communities Workshop series is the first large scale effort to gather select professionals to work toward the goal of FIREWISE planning and mitigation in the wildland/urban interface. Beginning in 2000, a series of regional forums across the country began, bringing together professionals involved in planning, financing, building, sustaining, and protecting communities in wildland/urban interface areas. The workshop's state-of-the-art, interactive approach teaches participants to plan and implement basic fire resistant community development practices. Attendees will also receive all the workshop training materials to start planning and repeat the training in their own communities.



# FIREWISE PLANNING: BREAKING THE CYCLE



Because people and natural elements interact in the wildland/urban interface, expanding development is creating an extremely complex landscape. Although the term wildland/urban interface is often defined to indicate its presence as geographic (*where* natural areas and development meet and create conflict), the interface is actually a set of seasonal conditions that can exist in every community in the US.

*There are risks and costs to a program of action, but they are far less than the long range costs of comfortable inactions.*  
- President John F. Kennedy

With wildland/urban interface development come problems specific to these natural or wildland areas, including catastrophic wildland fires. The threats to life and property, the assets lost, and the costs for fighting fires are escalating dramatically.

## What cycle?

Most people think government (i.e., fire fighting agencies) protects communities from wildland fire. However, attitudes and policies are changing. Some communities are reconsidering the traditional view of fire fighters as “protectors” and homeowners as “victims” of wildland fire. The paradigm is shifting from “protector-victim” to “partner-partner”. Everyone associated with the wildland/urban interface should be prepared for the effects of wildland fire before that fire ever starts.

Others turn their back to the threat saying, “*It won’t happen to me*” or “*I don’t have any control*” or “*I can’t do anything to protect my family and property.*” And still others believe they can’t afford the time or cost of mitigation efforts. Many believe that the fire department is solely responsible for protecting each citizen in time of disaster. These are attitudes of the past.

The truth is that the responsibility for management, preservation, restoration and mitigation rests with everyone in the community. FIREWISE Communities embraces a new vision for stewardship and a way to minimize costly destruction and preserve lifestyles through smart and effective community-wide efforts.

The goal of Firewise Planning is not to stop wildland fires - nor is it to prevent people from living in wildland/urban interface areas. Fire is part of the normal ecosystem of the land. FIREWISE Communities strives to break the traditional attitudes toward fire protection and planning that perpetrates the destructive *cycle* of wildland/urban interface fires.



## The Wildland Fire Disaster Cycle

Observation provides some insight into a dangerous cycle that tends to reflect wildland/urban interface fires and the loss of interface homes.

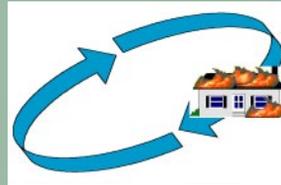
1

The cycle begins with a home built in a wildland/urban interface area, often where wildland fire has occurred before and will again.



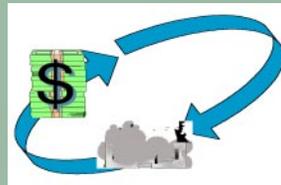
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Wildland fire occurs.



3

In many cases, the home is destroyed. Through low cost loan programs and insurance, funds become available for homeowners to rebuild.

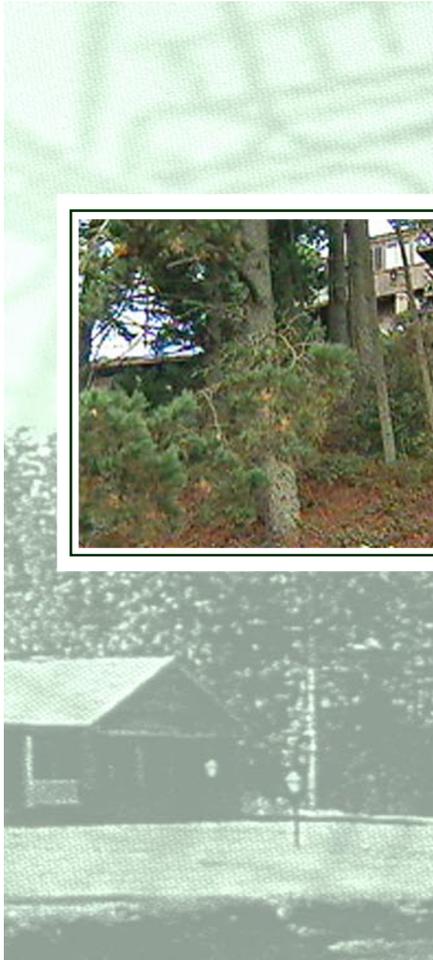


**This cycle is much more costly in nearly every way than planning, preventing and mitigating before a disaster.**

Without FIREWISE planning (through community regulation or volunteer compliance), people rebuild the same home they lost, replace the same vegetation, and thereby recreate the same conditions that led to the loss of the original home.

Not only do many people return to rebuild what was lost without building in mitigation measures, but because of low cost emergency/disaster loans, they often build even larger homes than before. Many of the features that contributed to the original loss are often incorporated into the newly rebuilt structures and surrounding landscapes. The vegetation regrows and sets the stage for the next wildland fire, thus continuing the wildland fire disaster cycle.





Traditional attitudes may actually encourage people maintain *combustible* homes in hazardous areas. Following the 1991 Oakland CA fire in which over 3500 residences were lost, many homes that escaped destruction or damage showed no sign of vegetation cleanup or retrofit construction that would add to the structure's survivability in a future fire. Many of these were directly across the street from the most severely devastated areas. Perhaps the reason was that the homeowners felt that another fire would not occur in the same area, like the common belief that lightning never strikes twice in the same place. However, the area has a long, active wildland fire history, with major devastating fires occurring in the same area in 1923 and 1970.

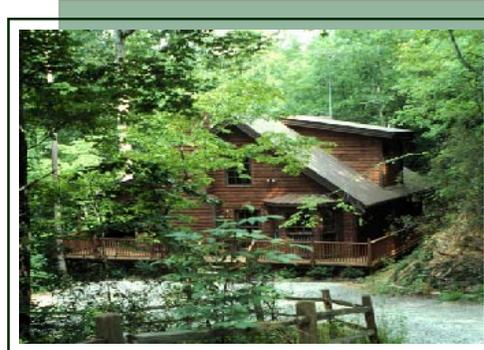
It is also possible that incentives for making homes more fire resistive are misplaced, almost counterproductive - especially for those whose homes narrowly escape destruction by a wildland fire. Why should a homeowner clean up and fix up surviving property when the neighbors are building larger homes with lower interest rate loans, guaranteed insurance, and other benefits? Even the possibility of this argument should be in the consciousness of fire/emergency officials and elected leaders when developing incentives for encouraging homeowners to install mitigation measures. An alternative question is: Are proper and reasonable *disincentives* also included for *not* taking action in these hazardous areas?

## Breaking the Cycle

From examining the results of wildland fires, experts have observed often that trees and other vegetation remain standing between the burned-out remains of wildland/urban interface homes. Further, homes have survived the most severe fire conditions when neighboring homes have been destroyed. Observation, experience, and research indicate that effective measures can be taken to break this costly cycle. While some measures are suitable for new communities and structures, others lend themselves well to homeowner retrofit for little cost. Whether employed in existing homes and developments or within new developments, FIREWISE landscaping, home improvements, structural changes, better fire protection, and smarter community development are but a few strategies that can be employed to effectively break the cycle.

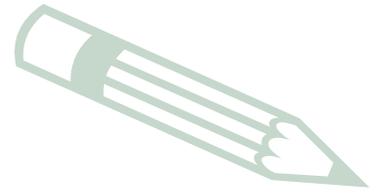
*When we see land as a community to which we belong, we may begin to use it with love and respect.*

-Aldo Leopold 1924

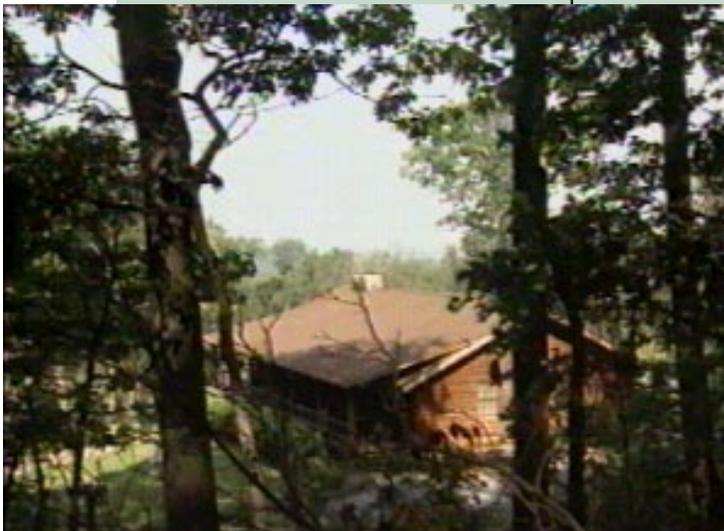




*planning*



*construction*



*landscaping*



# THE USE OF GIS IN FIRE RESEARCH

Traditionally, hard copy maps for geographical areas under consideration have been used to identify fire protection considerations and related land use issues. Well-designed maps with familiar symbols effectively communicate key issues to both the professional planner and layperson. However, complex or highly sensitive planning areas often require an extensive number of maps or overlays to depict all the areas of concern. Evaluation and comparison of issues is difficult, as these maps only reflect statistical snapshots of a defined period of time. Time and cost constraints of production may also limit the extensive use of hard copy maps.



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## A New Approach to Fire Problem Identification

A promising new approach to fire problem identification is the use of the Geographic Information System (GIS) to spatially depict land use and fire protection planning issues in a dynamic format. Hard copy maps can be easily produced for presentation or evaluation purposes, and computers enable more extensive assessment analysis, presentations, and rapid decision-making. The *Firewise Community Planning* process utilizes GIS resulting in a more detailed and dynamic land use planning assessment, while incorporating multiple interests, values, and constraints.

An urban and rural land use GIS view or map is considered the basic purpose map for illustrating how the land area is currently developed. Generally, it is the “here and now” map which is often referenced in the planning profession as the “Base Year Map.” This map illustrates major land use categories including ground area covered by buildings, streets, roads, reservoirs, railways, utility corridors, agriculture, commercial and noncommercial forested areas and undeveloped land.

Fire and other emergency incident data indicate the frequency and severity of incidents by both broad and specific occupancy categories. For instance, high density housing in a city results in higher frequency levels of incidents; correspondingly, the threat of fire injury and death increases in high density residential areas. Therefore, the larger the percentage of land use designated as high density residential, the higher the anticipated fire death problem. The same can be said for use around designated recreational areas. The Land Use map provides a general depiction of residential and recreation density factors.

### EXAMPLE

*The October 1993 Oakland Hills Fire resulted in 25 deaths. The population density of the Oakland, CA area at the time was in excess of 6+ structures per acre (43,560 square feet).*



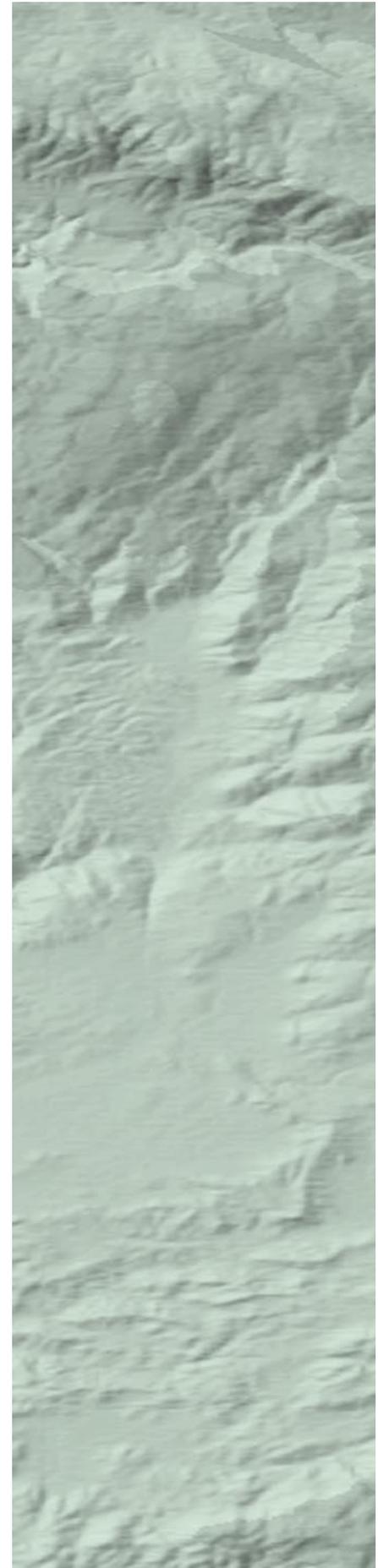
All cities have growth patterns. It is important in the planning process to show the general historical development patterns for a community. Research indicates a correlation between the age of structures and fire safety and severity. In other words, the older the development the greater the potential for a severe fire due to wildland fire. The following relationships have been developed from empirical studies:

- Structures over twenty years of age are generally built of wood frame or brick-wood joist construction and have combustible or slightly resistant roofing. Internal areas are not well separated by fire resistive materials. A developing fire may spread both vertically and horizontally in just a few minutes. Vegetation around the structure is usually mature and somewhat overgrown and decadent.
- Serious losses can be anticipated in structures over 20 years old if a fire is not extinguished in the incipient stage. Buildings in this category may also contribute to multiple structure fires where the buildings are built close to each other.
- Urban conflagration fires –spread from structure to structure (or roof to roof) over one or more city blocks. In the case of wildland fires, the more new development occurring in the highly flammable and hazardous vegetative fuels, the more serious is the potential for loss of life and property.
- Age of the structures usually does not matter if proper survivable space clearance and appropriate FIREWISE building criteria are followed. Structures built during the last twenty years usually have been constructed under some type of local building code; however, these building codes normally do not consider wildland fire occurrence.
- In the case of wildland fires, the more new development occurs in the highly flammable and hazardous vegetative fuels, the more serious is the potential for loss of life and property. Again, appropriate survivable space and noncombustible building materials are the key to protection of structures in this age class from wildland fire.



Typical locations to begin looking for GIS database themes include the internet (USGS, US Census Tiger Data, other federal agencies, state agencies, and regional/county/city governments).

Additional resources include city/county public works, county or state planning, county assessor, state highway departments, utility districts and fire departments.



# FIREWISE PLANNING CASE STUDY: FALLS COUNTY, U.S.A.

## Falls County General Information

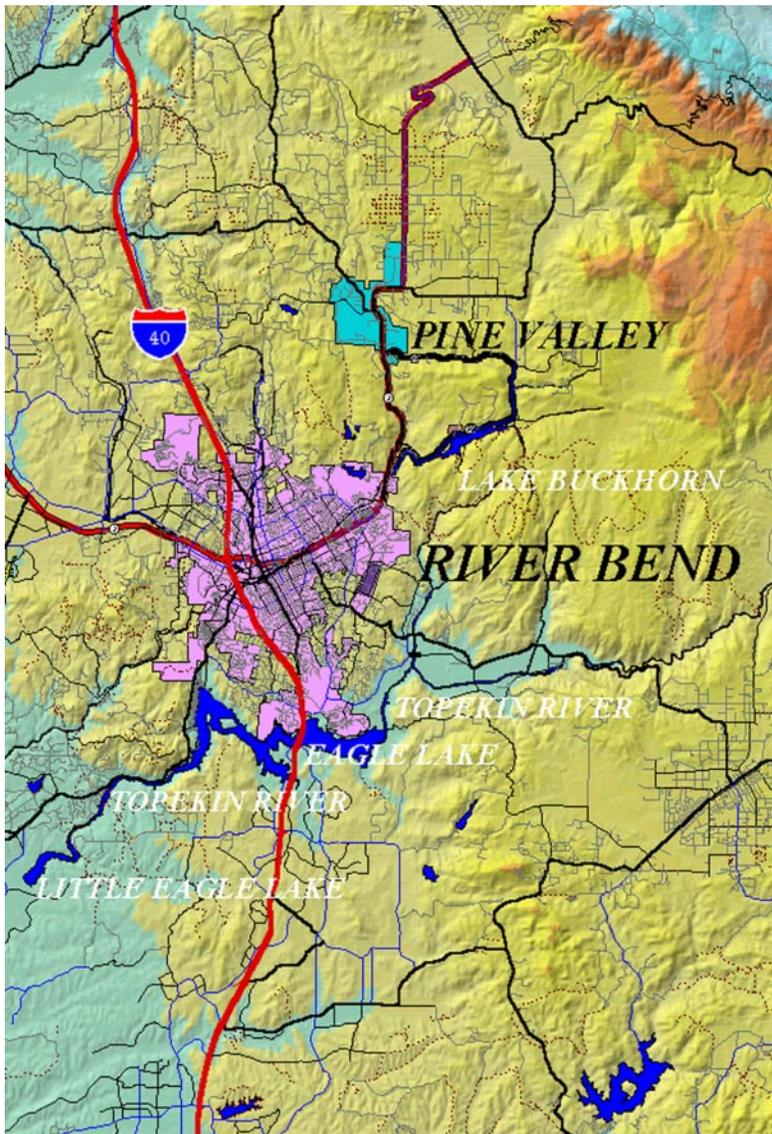
Falls County, a hypothetical place, is patterned after a real county in the United States. Falls County has a population of 250,000. Its largest city is River Bend, the county seat, with a population of 125,000. During the peak summer tourist season, the population of the county can exceed 500,000, due mainly to the county's splendid outdoor recreation opportunities.

The county-city complex of Falls County and River Bend provides both a physical environment and an informational source for a Firewise Community master plan. River Bend is the focal point of government, commerce, industry, entertainment and outdoor recreation in Falls County. The city has a historical pattern of development that can be easily documented and projected. This permits establishing an information database pertaining not only to the geographical environment but also to the historical and current fire problems in both the city and the county. The database can be used to predict land use development and potential fire incident patterns for future consideration.

The following information and data package deals specifically with Falls County, the City of River Bend, and surrounding environs. Care has been taken to make the information sets compatible for Firewise Community master planning process.

Familiarization with the county-city complex is the first step in analyzing development trends and fire hazard patterns. This complex provides a specific reference base for examining rural and urban fire problems, the interface between the urban and the rural environment, and the future development of the city, several unincorporated communities, and the county. By identifying these trends and hazards, specific problem statements can be developed. From these specific problem statements, you will be able to develop alternatives which offer maximum safety from fire for residents and provide the most viable plan for developers, industry, and public officials, while offering environmental protection and improved community infrastructure.





ArcView map 2: Falls County "Firewise" Planning

**TABLE 1: GENERAL STATISTICS FOR FALLS COUNTY**

Fire loss per capita for all fires	\$14.06
Total fire loss for the base year	\$2,110,200.00
Number of building fires per 1,000 population	5.95
Total assessed property value	\$2,475,000,000.00
Insured property value	\$983,000,000.00
The cost of the public fire safety organization in the base year	\$6,740,244.00
Cost of private fire safety in the base year	\$1,640,000.00
Base year insurance premium costs	\$2,495,199.00

**TABLE 2: NUMBER OF BUILDINGS BY CLASSIFICATION**

Mercantile	286
Industrial	24
Institutional and Government	181
Substandard Residential	11,300
Multiple Residential	2,700
Middle Class Residential	13,600
Upper Class Residential	1,980

**TABLE 3: ECONOMIC INFORMATION**

Current assessed valuation increases by 1.3% per year and has done so for the last 5 years.
Salaries for all fire service personnel increases by 5% in the base year +1.
Unemployment is slightly (3.5%) above the national average of 2%, mostly due to the reduction in forest product jobs.
Fire Department operational (equipment, training, vehicle gas, service and maintenance) costs increase by 4.5% in the base year +1. These costs are subsidized by the county.

**TABLE 4: INSURANCE TOWN CLASS PREMIUMS**

Town Class	Estimated Annual Premiums
2	\$2,303,973
3	\$2,364,758
4	\$2,434,047
5	\$2,495,119
6	\$2,556,358
7	\$2,707,159

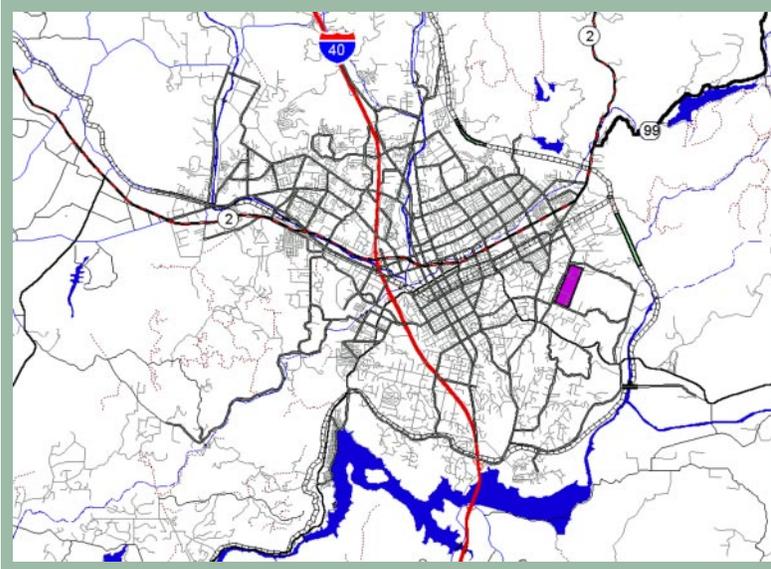
Falls County was incorporated in 1867. Prior to 1995, it experienced a steady growth pattern, increasing about 2.5 percent a year. The present population is 250,000. However, since 1995 the population has been increasing at about 5 percent per year. This population growth is attributed to its regional attractions, the rural forested environment, increased recreational values and its mild winters and warm summer weather.

Falls County, always popular to the tourists due to its rural and quite lifestyle, has recently become a haven for the big city population to seek a better quality lifestyle. The new homes are being purchased by the younger professionals, as well as retiring senior citizens. People are moving out of River Bend and other larger cities from adjoining states in an effort to live in this quiet and rural lifestyle.

The area of Falls County is approximately 500 square miles. The county is a typical rural county with a diversified industrial base of agriculture, medium size industry, commercial timber production, and outdoor recreation tourism.

There is a big demand for public and fire safety services by the new citizens of Falls County. The new influx of homeowners from urban areas expect the same level of public safety and fire services that were provided to them in city. This increased demand for services is causing county budget problems, a need for updated county building and fire codes, and the creation of a progressive county management philosophy.

## RIVER BEND GENERAL INFORMATION



ArcView map 3: River Bend (125,000)

River Bend is multiracial and has several ethnic neighborhood groups. The city is composed of middle-class, single family dwelling units. There are, however, large areas of substandard housing. At the outlying parts of this city are sections of expensive, upper-income housing. In addition to single family dwelling units, sections of the city are composed of apartment buildings, some of which are high-rise buildings ranging up to 10 floors in height.

The new higher valued subdivisions are being developed in the outer rural areas of recently city-annexed land that was previously unincorporated area of Falls County. The residential population proportions are:

River Bend was incorporated in 1880 and became the county seat in 1905. It hosts a commercial airport, a large university, Union Station serving two railroads, an Interstate highway truck service center, a large outlet shopping mall, and multiple commercial electronic and furniture factories.

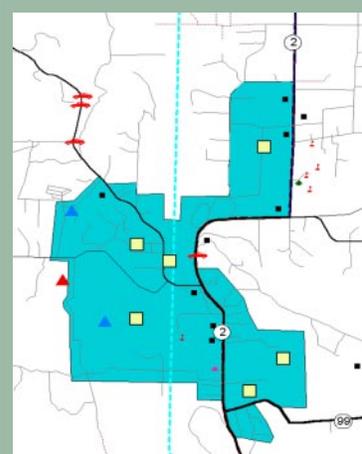
The central business district is somewhat congested. It features a modern shopping mall in the center of the city. Building heights in the central business district reach six to seven stories. One office building is 22 stories high. The Outlet Mall is located in the southwest outer portion of the city. Employment in River Bend includes:

RIVER BEND INDUSTRY	APPROX. JOBS
Tourist, hotels and restaurants	3,000
Retail malls and outlets	1,500
Hospital and health care	1,300
Electronic/computer manufacturers	1,100
Local community services [e.g., gas stations, grocery stores]	1,000
Building construction	1,000
University	600
Airline industry	550
Forest products industry	500
County government	375
Railroads	150

Single family dwellings	60%
Mobile homes	15%
Garden apartments	10%
Duplex and town houses	10%
Multi-story apartments	5%

## PINE VALLEY GENERAL INFORMATION

Pine Valley is the second largest population area of Falls County. The population of this unincorporated community is 15,000. Pine Valley is under the jurisdiction of the Falls County Board of Commissioners and County Administrator. Pine Valley is located in Falls County Commission District Four.



The community of Pine Valley (Falls County) has adopted a regional building code, but has not done substantial updating to it for about 20 years. Enforcement is almost nonexistent. A 1930-installed Gamewell Box alarm system is still used in the main business area of Pine Valley.

Pine Valley is primarily a bedroom community, with most of the higher paying jobs being located in River Bend. Pine Valley's largest single employer is The Knotty Pine furniture factory, which employs 1,500 people. Other employment opportunities within the Community of Pine Valley include:

Community goods and services (e.g., insurance, grocery, clothing, gas stations)	600 jobs
Manufacturing (e.g., electronic, boats, pre-fabricated housing)	500 jobs
Tourism	280 jobs
Schools	100 jobs
Banks, mortgage, insurance and real estate	90 jobs
Doctors, lawyers and professional services	80 jobs
Government (federal, state, and local)	75 jobs

ArcView map 4: Pine Valley

# CURRENT ASSESSMENT OF FALLS COUNTY FIRE PROTECTION

The administrative head of the **River Bend Fire Department (RBFD)** is a fire chief who reports directly to the city manager.

The River Bend Fire Department has five designated Fire Management Response Areas (FMRA) within its area of jurisdiction. Each engine in the department is staffed with a full time captain, engineer and two firefighters per shift (3 shifts).

■ Station #1 is the administrative station where the fire chief and three assistant fire chiefs, each in charge of a department bureau, reside. The three bureaus are: Fire Operations, Fire Marshal and Fire Prevention, and Administration and Training. There are two operational Battalions, each shift staffed by a Battalion Chief (three shifts for a total of six battalion chiefs). The Fire Marshal and Fire Prevention Bureau has three fire inspector-investigators. The Administrative and Training Bureau has a battalion chief for training, three secretaries, and a computer specialist. Station #1 also has a 93-foot aerial ladder truck, staffed by an engineer and three firefighters per shift.

■ Station #2, located at the Colonel Benedict Airport, also houses an aircraft crash and rescue truck. This unit is staffed with a captain, engineer and two firefighters per shift. The crash and rescue truck has a 2,000 gallon water tank and is equipped with an AFFF class B foam unit and crash/rescue tools.

■ Stations #2 and #3 each house a fire department ambulance with two emergency medical technicians per shift. Jones Ambulance Service, a private contractor, is also located within the City of River Bend and provides backup to the fire department, when requested. However, their principal contract coverage is for the unincorporated areas of Falls County.

■ Stations #4 and #5, also have a Type Four (4wd 450 GPM, 200-gallon) engine for quick attack wildland fire suppression responses. The quick attack engines are each staffed by one engineer and two firefighters per shift.

River Bend meets current standards of the American Water-Works Association (AWWA) and the NFPA for municipal water systems and fire hydrants.

River Bend's FMRA's are determined on the basis of the Insurance Services Office (ISO) Fire Suppression Grading Schedule. As the criteria changes, the response area will similarly change. For instance, it may be assumed that the base year structural fire response time for each station FMRA is 3.5 minutes.

If the response time criteria is changed to 5.0 minutes, then a different fire station location pattern could be used to satisfy this new criteria and the boundary lines between areas would change. The latest ISO fire rating for River Bend is 4.

The **Falls County Fire Department (FCFD)** is managed by a fire chief, who reports directly to the county commissioners. The Department has two branches (North and South Branch), each staffed by an assistant fire chief responsible for training, investigation, and volunteer fire department liaison. Other than these three paid county fire chiefs, county fire protection services are provided by seven individual volunteer fire departments.

The Department is responsible for training local volunteer fire district personnel in fire operations, fire prevention, fire inspection and fire investigation. Under the present organization, it is not possible to inspect the thousands of individual properties that exist or are being built in this rapidly expanding county. This responsibility has been transferred to the individual volunteer departments.

Code compliance is varied and re-inspection for compliance is often non-existent. This follow-up to noncompliance is primarily due to lack of volunteer staffing, overall community commitment, and lack of training in what is needed to be a FIREWISE community.

The **Pine Valley Volunteer Fire Department** has a part-time paid chief and two assistants, and three fire stations supported by a 35-person volunteer fire department.

The part-time (paid) fire chief and two assistant chiefs report to a board of directors. The volunteer fire departments receive their funding for equipment and supplies from community donations and a Falls County Fire District tax assessment based upon the property values within their individual district. Other than within the incorporated City of River Bend, Falls County Fire Department has the county-wide fire leadership role.

Each station has one structural engine (1,250 GPM one thousand gallon) and one 2,000-gallon water tender. Both Station #1 and Station #3 house an EMT vehicle. Station #3 also houses a Type 4 quick attack (250 GPM, 200-gallon) engine.

Pine Valley has one 200,000-gallon and two 100,000 gallon water systems with appropriate fire hydrants for the three developed community areas. The more rural areas do not have a community water system or fire hydrants. However, there are 5 dry hydrant installations and multiple private 40,000 gallon water storage tanks within the rural areas of the Community of Pine Valley. Pine Valley's latest ISO rating is 9.

The administrative office and training facility is located at Station #1. Pine Valley Volunteer Fire Protection District has a part-time fire chief and two part-time assistant chiefs, six volunteer captains and 26 firefighters (3 of which are paramedics and 10 are emergency medical technicians).

Jones Ambulance Service provides two ambulance vehicles, with two EMTs 24 hours per day, which are located at Station #1 and Station #3. This service is by contract with Falls County.

The **State Department of Natural Resources (DNR)** is primarily a wildland fire protection agency. Their charter directs the agency to provide structural fire protection only if structures are threatened by wildland fire. The DNR's prime interest is the protection of natural and cultural resources located only on State Responsibility Area (SRA) lands. However, when life and property are threatened by wildland fire they become responsible for the overall management and funding of the entire wildland fire suppression operation, including the protection of structures.

DNR is the agency with jurisdiction over wildland fire fighting in unincorporated areas of the state. DNR has three (3) rural fire stations within the planning area. Station #1 is the Division Headquarters staffed with a division chief and a secretary. Each fire station has:

- One 120 GPM 700-gallon 4 wheel-drive wildland fire engine staffed by a captain and two firefighters,
- One 200 GPM 1,250-gallon water tender staffed by a driver and a firefighter, and
- One 180-horsepower bulldozer/tractor plow module staffed by an operator and a firefighter.

DNR has additional state wildland fire resources within a 2-hour response time and has access to an unlimited number of additional resources through an interagency agreement with its bordering states. However, these mutual assistance resources are normally 4 to 6 hours away.

DNR has two Type 3 (250-gallon bucket and 5 passenger) helicopters and two Type 3 (800 gallon) air tankers under contract statewide. The DNR also has a fire retardant base at the Brownsville Airstrip located in Jefferson City, Lincoln County, approximately 50 miles south of River Bend. This retardant base has the capability to load three medium size air tankers at one time. One helicopter and air tanker are located at this base which is twenty minutes away from the study area. Another helicopter and air tanker are located two hours away at the Jonesville Airport (in the northern part of the state).

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## **A Renewed Interest in Fire Protection**

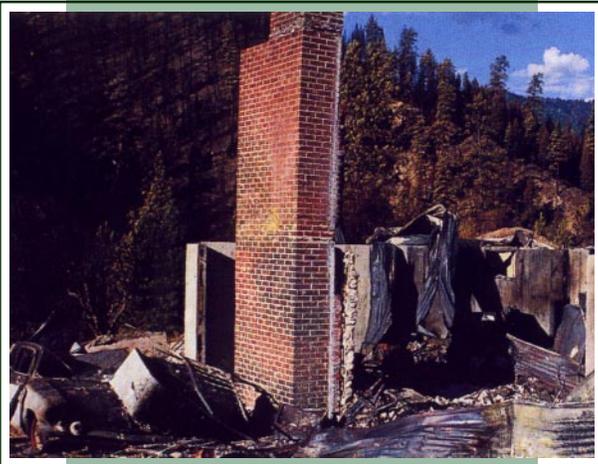
Due to several minor wildland fires and, particularly, the following incident that led to the loss of 10 lives and caused millions of dollars in property damage, the Falls County Board of Commissioners has decided to assess the need for a more appropriate wildland fire protection program in their county. They requested the Governor to provide this leadership role, and he has directed the State DNR to see that this occurs by the end of the calendar year. In the meantime, the Falls County Board of Commissioners became aware of *Firewise Communities Planning* through an insurance representative and several members of a local homeowner association.

Therefore, the Falls County Board of Commissioners requested that their community and business leaders help by either lending financial support, making personal commitments to, and/or participating in a Firewise Communities Planning Program for Falls County.

## Excerpts from the Report of the Great Bend Fire

*We all know that when there is a serious wildland fire around homes built of combustible materials, there will be substantial loss of homes. This point of fact was even more serious than we had ever expected.*

*The fire started when an electrical transformer exploded in dry native vegetation. When the electrical power failed, we lost the Caston Heights water system, including the hydrant system protecting our ridgetop homes and other homes located above our main water storage tanks. Unfortunately, we also lost our ability to communicate with our local citizens by TV or radio. The absence of streetlights, stoplights, and other traffic control devices and signs caused further panic.*



*Narrow dead-end roads hampered evacuation of the citizens and our ability to send in emergency vehicles to fight the fire. The Caston Heights Area is an excellent example of poor road planning that led to the death of a citizen and a firefighter when the fire eliminated their only escape route.*

*Approximately 90% of the homes that were lost in Caston Heights and the Rose Hill area were constructed of either combustible roofing, siding, or other building materials and had no vegetative clearance (survivable space). The other 10% that were either seriously damaged or lost were built with noncombustible materials, but had flammable vegetation (native and ornamental) around the structures.*

*By 6:00 pm on the first day, the fire entered the Norris Nature Reserve and split into two directions, mostly into inaccessible terrain. Large areas of dedicated open space, while an important part of our quality of life, can be the principal fuse (or fuel) that carries the fire right into the structures if not properly planned. These large open space donations may sound beneficial to the citizens, county or city planners, however they do come with some liability.*

*On the other hand, city parks and greenbelts played a major role in helping us contain the Great Bend Fire. Adjacent lands to development were donated by the developer as Reserve without adequate "Firewise Planning." The River Walk Parkway and the Municipal Golf Course were very helpful. The fact that the fire marshal and city planner required these greenbelts as a condition of approval for these three new subdivision tracts in 1997 contributed to the saving of many homes in those areas.*

*We were able to save all homes that had been built with noncombustible roofing, siding, and decking and had at least 100 feet of Firewise Landscaping (survivable space). That is, with the exception of three residences where the homeowners failed to maintain their roofs free of combustible dead leaves and needles.*

*Even in very steep terrain, structures can be protected when there is a combination of defensible space and noncombustible building materials. I can not stress enough the value of building with noncombustible materials and maintaining proper landscaping with continued maintenance in helping us protect homes from wildfire.*

- Submitted by Samuel Jones, Chief  
River Bend Fire Department

## Identifying Fire Problems in the Designated Planning Area

A first step in any planning process is the adequate identification of current problem conditions and the implications of those problems relative to change. This is true for comprehensive urban planning, disaster mitigation planning and fire protection master planning. However, they are most effective when planned together rather than separately. The following analysis process represents one systematic approach to defining the set of wildland and structural fire problems in the geographic area being considered.

The problem analysis is to be conducted for the unincorporated community of Pine Valley and the adjacent rural lands of Falls County, including the Eagle Lakes Region Recreational Area (includes Eagle, Little Eagle, and Lake Buckhorn). While the county-city complex is hypothetical in scope and content, it should be noted that actual data and information for a real city and unincorporated areas of a county were used to develop both the historical and current database.

### Analyzing the WUI Problem(s) in Bear Heights

Using the Wildland Fire Risk and Hazard Severity Form on the following pages will provide a framework for analyzing the fire risk and hazard severity in a community. The examination of the information is designed to lead to the development of a list of problem statements that profile the wildland/urban interface problems in Bear Heights and ultimately lead to the assignment of a hazard severity rating for the entire subdivision. The Evaluation Team should consider the different viewpoints represented by the diverse disciplines involved (or will likely be involved) in the decision-making.

### Examine the Wildland Fire Risk and Hazard Severity Rating Form

In rating the wildland fire risk and hazard severity for a community, there are several key areas for consideration. These include:

- The historical development of the community
- The vegetation types, locations, and densities relative to structures
- The transportation and access routes to and from the area under study
- The land use information of the area
- The fire protection capabilities provided by organized fire departments

## The “Falls County’ FIREWISE’ Planning” Views

The specific purpose and application for each view or theme is discussed in the final section of this workbook. Some themes may be more useful than others. Planning team members should consider the type and purpose of each theme relative to their home environments. The availability of similar GIS databases, maps, the cost and time to prepare maps, and the use of each map has to be an important consideration for each local planning team. Often, one department in your local or county jurisdiction already has one or more of the GIS database themes prepared.

The spatial depiction of data for the FIREWISE Planning exercise is organized into a single project, with views and themes. In this exercise, the project is the Firewise Community Planning area of Falls County. Six views will be depicted in the project representing specific areas within Falls County. Each view will contain a number of themes depicting typical land use planning issues or geographic features. With a minimum of orientation concerning the type and use of urban or wildland reference maps, planning teams should be able to use this set of computer-generated spatial maps for fire protection considerations during the *Firewise Communities Planning* process.

The six views for the Falls County project include: 1) the Great Bend Fire Area, 2) Falls County Planning Area, 3) the City of River Bend, 4) the unincorporated community of Pine Valley, 5) Bear Heights and 6) Lake Heights. The latter two views will be utilized for specific assessment exercises in this workshop.

# EXERCISE TASKS

## Task 1 Determine the Wildfire Severity Rating for the existing Bear Heights Subdivision

Using the Wildland Fire Risk and Hazard Severity Assessment worksheet on the following pages, your team is to rate the Bear Heights subdivision as a development and discuss its wildfire severity rating. By using the provided GIS theme information and associated photos:

1) Look at selected homes and other factors using the hazard rating checklist to determine their individual hazard ratings.

2) Based on the predominant hazard ratings for the homes plus additional conditions you find, determine a hazard severity rating for the entire subdivision.

Evaluation teams will be asked to complete and present their hazard severity rating for the Bear Heights subdivision to the full conference group.

### Resources for completing this task:

#### **Bear Heights GIS Map:**

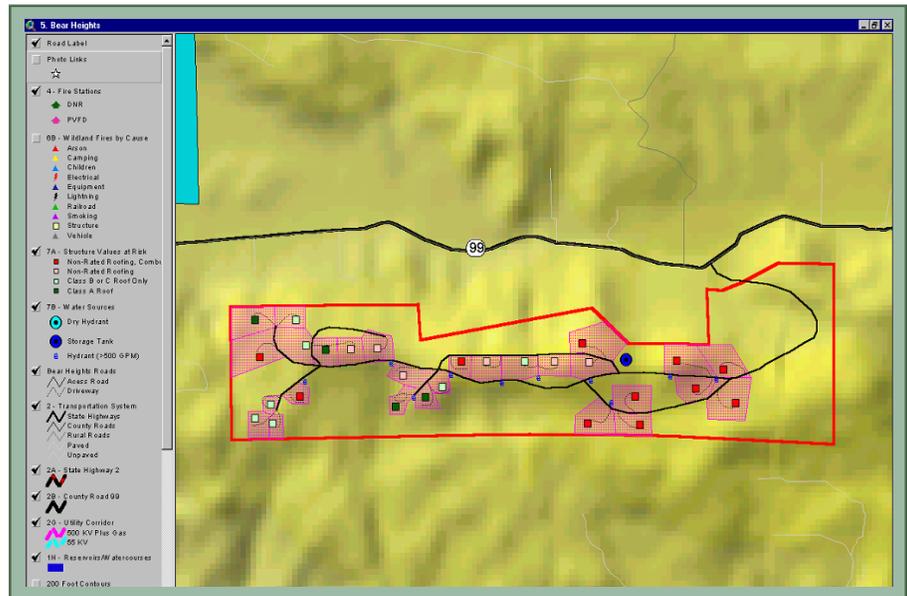
Subdivision base topography map, including all access roads and subdivision roads and streets.

#### **Subdivision Themes:**

Refer to inside back cover and tear out legend page.

#### **Subdivision Photos:**

Vegetation and photos of several residential properties linked to GIS data themes.



*ArcView map 5: Bear Heights*

### ADDITIONAL INFORMATION for Bear Heights:

- The primary ingress and egress road to the entrance of the subdivision is a county-maintained 22 ft. wide, paved two-lane road (9-foot wide lanes and 2-foot wide shoulders).
- Access to the subdivision is via a steep 16-foot wide road with no shoulders. All interior subdivision roads are 18 feet wide. The average grades of the subdivision roads are greater than 8%. Road surfacing is chipseal (oil and crushed fine rock).
- All residential driveways are gravel surfaced and the majority are greater than 500 feet in length.
- Existing cul-de-sacs have outside radii of less than 50 feet.
- Average lot size is 2 to 10 acres (low density lots).
- Street signs are almost nonexistent, and those that are in place are routed wood signs with 4-inch lettering.
- Principal water source is a 150,000 gallon storage tank combined with a subdivision fire hydrant system. Hydrants are placed 1,000 feet apart.
- Hydrant water flow is 800 gallons per minute.
- Replacement water must be electrically booster pumped uphill for 2,000 feet from the Pine Valley water system mainline to the 150,000 gallon water storage tank.
- All other water sources are available within a 35-minute round trip by a water tender.
- All utilities (electrical, cable TV and telephone) are above ground.
- The closest structural fire engine is located at PVFD Station #2 approximately 5 minutes away.
- The closest wildland fire engine is located at DNR Station #1 approximately 12 minutes away.

# Wildland Fire Risk and Hazard Severity Assessment Form

(Assign a value to the most appropriate element in each category and add the point totals)

The hazard assessment rating form was developed by the NFPA Technical Committee for Forest & Rural Fire Protection for inclusion in the NFPA *Standard for Protection of Life and Property from Wildland Fire*. The process reflected in this rating form serves as the principal methodology used to assess the wildland fire risks and hazards in the Firewise Communities Workshops. Some states and jurisdictions may have developed a similar method to assess hazards that are peculiar to their region. You may use this form as is, modify this assessment form to suit your local needs, adopt an existing one, or develop a new one following the guidelines in the publication *Wildland/Urban Interface Fire Hazard Assessment Methodology*. Workshop participants are encouraged to review both these publications for specific fire protection and mitigation measures that may be incorporated into community planning.

Element	Points	NOTES
<b>A. Means of Access</b>		
1. Ingress and egress		
a. Two or more roads in/out	0	
b. One road in/out	7	
2. Road width		
a. ≥ 6.1m (24 ft.)	0	
b. ≥ 6.1m (20 ft.) and < 7.3m (24 ft.)	2	
c. < 6.1m (20 ft.)	4	
3. All-season road condition		
a. Surfaced road, grade < 5%	0	
b. Surfaced road, grade > 5%	2	
c. Non-surfaced road, grade < 5%	2	
d. Non-surfaced road, grade > 5%	5	
e. Other than all-season	7	
4. Fire Service Access		
a. ≤ 91.4m (300 feet) with turnaround	0	
b. > 91.4m (300 feet) with turnaround	2	
c. < 91.4m (300 feet) with no turnaround	4	
d. ≥ 91.4m (300 feet) with no turnaround	5	
5. Street signs		
a. Present [10.2cm (4 in.) in size and reflectorized]	0	
b. Not present	5	
<b>B. Vegetation (Fuel Models)</b>		
1. Characteristics of predominate vegetation within 91.4m (300 ft.) - see photos on page 29		
a. Light (e.g., grasses, forbs, sawgrasses, and tundra) NFDRS Fuel models A, C, L, N, S, and T	5	
b. Medium (e.g., light brush and small trees) NFDRS Fuel models D, E, F, H, P, Q, and U	10	
c. Heavy (e.g., dense brush, timber, and hardwoods) NFDRS Fuel models B, G, and O	20	
d. Slash (e.g., timber harvesting residue) NFDRS Fuel models J, K, and L	25	
2. Defensible space		
a. > 30.48m (100 ft.) of vegetation treatment from the structure(s)	1	
b. 21.6 - 30.48m (71 - 100 ft.) of vegetation treatment from the structure(s)	3	
c. 9.1 - 21.3m (30 - 70 ft.) of vegetation treatment from the structure(s)	10	
d. < 9.1m (30 ft.) of vegetation treatment from the structure(s)	25	

Element	Points	NOTES
<b>C. Topography within 91.4m (300 ft.) of structure(s)</b>		
1. Slope < 9%	1	
2. Slope 10% to 20%	4	
3. Slope 21% to 30%	7	
4. Slope 31% to 40%	8	
5. Slope > 41%	10	
<b>D. Additional Rating Factors (rate all that apply)</b>		
1. Topographical features that adversely affect wildland fire behavior	0-5	
2. Areas with a history of higher fire occurrence than surrounding areas due to special situations (e.g., heavy lightning, railroads, escaped debris burning, arson)	0-5	
3. Areas that are periodically exposed to unusually severe fire weather and strong dry winds	0-5	
4. Separation of adjacent structures that may contribute to fire spread	0-5	
<b>E. Roofing Assembly</b>		
1. Class A roof	0	
2. Class B roof	3	
3. Class C roof	15	
4. Nonrated	25	
<b>F. Building Construction</b>		
1. Materials (predominate)		
a. Noncombustible/fire resistive siding, eaves & deck	0	
b. Noncombustible/fire resistive siding, combustible deck	5	
c. Combustible siding and deck	10	
2. Building setback relative to slopes of 30% or more		
a. ≥ 9.1m (30 ft.) to slope	1	
b. < 9.1m (30 ft.) to slope	5	
<b>G. Available Fire Protection</b>		
1. Water Source Availability		
a. Pressurized water source availability		
1892.7 lpm (500 gpm) hydrants ≤ 304.8m (1000 ft.) apart	0	
946.4 lpm (250 gpm) hydrants ≤ 304.8m (1000 ft.) apart	1	
b. Non-pressurized water source availability (off site)		
≥ 946.4 lpm (250 gpm) continuous for 2 hours	3	
< 946.4 lpm (250 gpm) continuous for 2 hours	5	
c. Water unavailable	10	
2. Organized Response Resources		
a. Station ≤ 8 km (5 mi.) from structure	1	
b. Station > 8 km (5 mi.) from structure	3	
3. Fixed Fire Protection		
a. NFPA 13, 13R, 13D sprinkler system	0	
b. None	5	
<b>H. Placement of Gas and Electric Utilities</b>		
1. Both utilities underground	0	
2. One underground, one above ground	3	
3. Both above ground	5	
<b>I. Totals for Home or Subdivision (Total for all above points)</b>		

Hazard Assessment

Total Points

1. Low hazard:

< 40

2. Moderate hazard:

40 - 69

3. High hazard:

70 - 112

4. Extreme hazard:

> 112

## Task 2 Reduce the current Bear Heights Subdivision Hazard Rating to MODERATE

Using the information compiled in Task 1, your team is to develop several recommendations for the Falls County Board of Commissioners that will reduce the hazard rating of Bear Heights to MODERATE in the following phases:

- Phase 1.** Develop short-range (within the next two years) recommendations that reduce the hazard rating in Bear Heights to moderate without significant economic/environmental impact.
- Phase 2.** Develop medium-range (2 to 5 years) recommendations and long-range (more than 5 years) recommendations with estimates for economic/environmental impact.

Discuss how each discipline’s input helped to make the necessary changes. Give each member a chance to explain how these reductions may impact (negative or positive) on his/her specific interest or discipline.

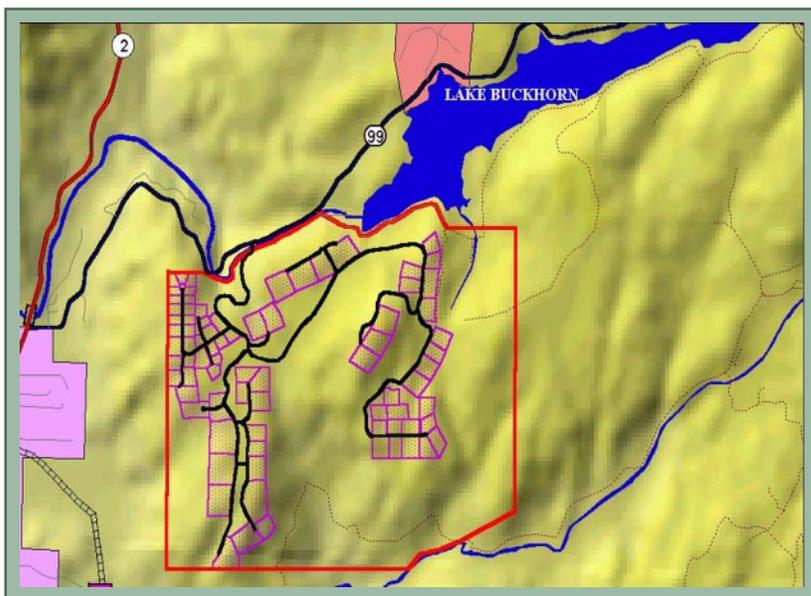
**Evaluation Teams will report their findings and recommendations to the full conference.**

## Task 3A Proposal for the Lake Heights Subdivision

The Falls County Board of Commissioners has received a new subdivision plan for the Lake Heights Area.

Mid State Engineering, representing Knotty Pine Timber Company (KPTC), has submitted a proposed plan to develop an 80-unit single family residential estates tract on the 1,273 acre KPTC property overlooking Lake Buckhorn. This proposed project consists of 80 individual ridgetop view lots ranging in size from 1 to 10 acres. The total area proposed for development is 306 acres, consisting of homes, yards, driveways, streets and roads. The remaining 967 acres is designated as open space to be left in its natural state as a wildlife sanctuary. Falls County has acquired the land to the east and south of the proposed development to be maintained as open space.

Before the county commissioners approve or reject this proposal, the Evaluation Team is requested to prepare an overall conceptual fire and fuels management plan recommending the appropriate actions to be taken to make this proposed subdivision Firewise and to ensure the safety of its future residents from wildfire.



ArcView map 6: Lake Heights

### ADDITIONAL INFORMATION for Subdivision

- Average individual estate lot size is 5 to 10 acres in size.
- The developer proposes a 200,000 gallon water storage tank with a supporting fire hydrant system.
- The DNR has the primarily wildland fire protection responsibility for the unincorporated areas within the State, including the Pine Valley Fire Protection District. DNR does not provide any structural fire protection; however, it will provide exterior structure protection within unincorporated areas during a wildland fire incident.
- Pine Valley Fire Department (PVFD) is the primary Local Responsibility Agency (LRA) for structural fire protection within its designated Fire Protection District. PVFD has mutual aid agreements with both River Bend Fire Department (Rbfd) and DNR. The mutual aid agreement with Rbfd covers both structure and wildland incidents. Agreement with DNR is only for wildland fire protection assistance. PVFD is normally the first responder to all incidents within the Pine Valley Fire Protection District and may often provide the second response to DNR and Rbfd.

**Prepare the minimum acceptable standards for:**

**Structural Hazards**

1. Structure Location
  - Setback
  - Located away from dangerous topographic features
2. Building Materials and Design
  - Roof
  - Walls
  - Windows
  - Eaves and overhangs
  - Vents
  - Attachments

**Vegetative Fuel Hazards**

1. Fuel types and models
2. Immediate vicinity fuels (survivable space)
3. Beyond the immediate vicinity fuels

**Miscellaneous Hazards**

1. Structure density
2. Slope
3. Dangerous topography (chimneys and canyons)
4. Weather
5. Fire occurrence

**Additional considerations**

1. Road access (ingress and egress)
  - Road widths
  - Grades
  - Type of road surface
  - One way or two way, dead-end and turnarounds
2. Bridges
  - Weight limitations
  - Widths
3. Structural and Wildland Fire Protection Issues and Agency Response Times
4. Water Supply
5. Utilities
  - Electrical, gas and propane
  - Located above or below ground

Discuss how each discipline's input helped to make the necessary changes. Give each member a chance to explain how these reductions may impact (negative or positive) on his/her specific interest or discipline. Team interaction is expected to produce sound, economically accepted Firewise Community Planning mitigation techniques.

The Evaluation Team also is to address the PVFD structural and wildland fire protection capabilities based upon past and current growth patterns within the district. Consideration should be given to current fire station locations and response times and possible relocation and/or additional stations.

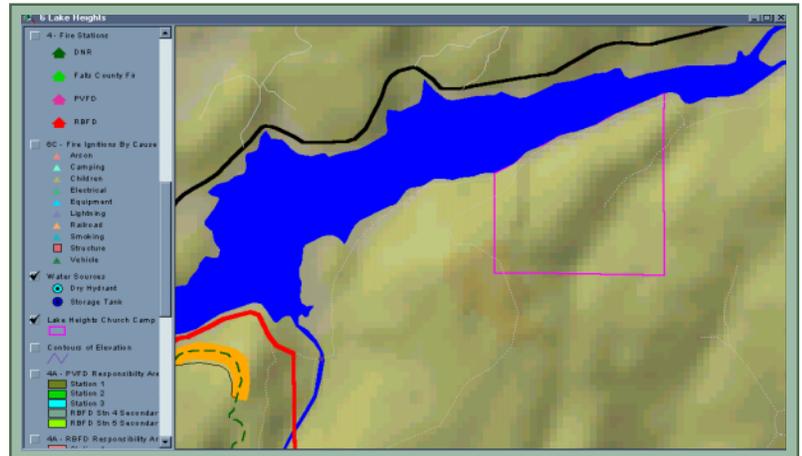
**Task 3B Lake Buckhorn Church Retreat Conference Center**

As a condition of approval of the Lake Heights Subdivision, the proponent has donated 130 acres of a recently logged over area just south of Lake Buckhorn to the Central Region Non-Denominational Church Organization for a church camp. The church organization plans to build a Lake Heights Church Retreat Conference Center on this property next year. The conference center will have a 350-person meeting hall, kitchen and mess facility, crafts building, outdoor amphitheater for 300 participants, a swimming pool and dressing area, boat launching area, two large shower and restroom facilities and forty 8-person tent platform sleeping units.

The Evaluation Team is requested to assess the cumulative effects this conference center will have on the overall Firewise Communities planning process, especially in regard to wildfire threat to future conference participants, Lake Buckhorn recreational users and the residents of Lake Heights subdivision.

Evaluation Teams are to prepare their evaluations and Firewise Community recommendations for the Board of Commissioners' approval of the proposed Lake Heights Subdivision and the Retreat Conference Center.

**Evaluation Teams will report their findings and recommendations to the full conference.**



ArcView map 7: Lake Heights Church Camp Property

## -a-

**Arson fire** - A wildfire willfully ignited by anyone to burn, or spread to, vegetation or property without consent of the owner or his/her agent.

**Attack a fire** - Limit the spread of fire by any appropriate means.

## -b-

**Brush** - A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low-growing trees, usually of a type undesirable for livestock or timber management.

**Brush fire** - A fire burning in vegetation that is predominantly shrubs, brush, and scrub growth.

**Burning ban** - A declared ban on open air burning within a specified area, usually due to sustained high fire danger.

**Burning conditions** - The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

## -c-

**Canopy** - The stratum containing the crowns of the tallest vegetation present (living or dead), usually above 20 feet.

**Class A foam** - Foam intended for use on Class A or woody fuels; made from hydrocarbon-based surfactant, therefore lacking the strong filming properties of Class B foam, but possessing excellent wetting properties.

**Closure** - Legal restriction, but not necessarily elimination, of specified activities such as smoking, camping or entry that might cause fires in a given area.

**Combustible** - Any material that, in the form in which it is used and under the conditions anticipated, will ignite and burn.

**Condition of vegetation** - Stage of growth or degree of flammability of vegetation that forms part of a fuel complex.

**Conflagration** - A raging, destructive fire. Often used to describe a fire burning under extreme fire weather. The term is also used when a wildland fire burns into a wildland/urban interface, destroying many structures.

**Control a fire** - To complete control line around a fire, any spot fire therefrom, and any interior island to be saved.

**Crown fire** - A fire that advances from top to top of trees or shrubs more or less independent of a surface fire.

## -d-

**Debris burning fire** - In fire suppression, a fire spreading from any fire originally ignited to clear land or burn rubbish, garbage, crop stubble, or meadows (excluding incendiary fires).

**Defensible space** - An area, typically a width of 30 feet or more, between an improved property and a potential wildfire where the combustibles have been removed or modified.

**Dry hydrant** - An arrangement of pipe permanently connected to a water source other than a piped, pressurized water supply system that provides a ready means of water supply for firefighting purposes and that utilizes the suction capability of fire department pumpers.

**Duff** - The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles and leaves and immediately above the mineral soil.

## -e-

**Escape route** - Route away from dangerous areas on a fire; should be preplanned.

**Evacuation** - The temporary movement of people and their possessions from locations threatened by wildfire.

**Exposure** - (1) Property that may be endangered by a fire burning in another structure or by a wildfire. (2) Direction in which a slope faces, usually with respect to cardinal directions. (3) The general surroundings of a site with special reference to its openness to winds.

**Extreme fire behavior** - A level of fire behavior characteristics that ordinarily precludes methods of direct control. One or more of the following is usually involved: high rates of speed, prolific crowning and/or spotting, presence of fire whirls, a strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environments and behave erratically, sometimes dangerously.

## -f-

**Fine fuels** - Fast-drying dead fuels, generally characterized by a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry.

**Fire behavior** - The manner in which a fire reacts to the influences of fuel, weather, and topography.

**Fire danger index** - A relative number indicating the severity of wildland fire danger as determined from burning conditions and other variable factors of fire danger.

**Fire department** - Any regularly organized fire department, fire protection district or fire company regularly charged with the responsibility of providing fire protection to the jurisdiction.

**Fire front** - That part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified it is assumed to be the leading edge of the fire perimeter.

**Fire hazard** - A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control.

**Fire hydrant** - A valved connection on a piped water supply system having one or more outlets that is used to supply hose and fire department pumpers with water.

**Fire prevention** - Activities, including education, engineering, enforcement and administration, that are directed at reducing the number of wildfires, the costs of suppression, and fire-caused damage to resources and property.

**Fire-proofing** - Removing or treating fuel with fire retardant to reduce the danger of fires igniting or spreading (e.g., fire-proofing roadsides, campsites, structural timber). Protection is relative, not absolute.

**Fire protection** - The actions taken to limit the adverse environmental, social, political and economical effects of fire.

**Fire regime** - Periodicity and pattern of naturally-occurring fires in a particular area or vegetative type, described in terms of frequency, biological severity, and area extent. For example, frequent, low-intensity surface fires with one to 25-year return intervals occur in the southern pine forests of the Southeastern United States, the sawgrass everglades of Florida, the mixed conifer forests of the western Sierras of California, and so forth.

**Fire resistant roofing** - The classification of roofing assemblies A, B or C as defined in the Standard for Safety 790, *Tests for Fire Resistance of Roof Covering Materials* 1997 edition.

**Fire resistant tree** - A species with compact, resin-free, thick corky bark and less flammable foliage that has a relatively lower probability of being killed or scarred by a fire than a fire sensitive tree.

**Fire retardant** - Any substance except plain water that by chemical or physical action reduces flammability of fuels or slows their rate of combustion.

**Fire season** - (1) Period(s) of the year during which wildland fires are likely to occur, spread, and affect resources values sufficient to warrant organized fire management activities. (2) A legally enacted time during which burning activities are regulated by State or local authority.

**Fire storm** - Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

**Fire suppressant** - Any agent used to extinguish the flaming and glowing phases of combustion by direct application to the burning fuel.

**Fire triangle** - Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

**Fire weather** - Weather conditions which influence fire starts, fire behavior or fire suppression.

**Fire whirl** - Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to over 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

**Firebrand** - Any source of heat, natural or human made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels. Examples include leaves, pine cones, glowing charcoal, and sparks.

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**Firebreak** - A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

**Firefighter** - A person who is trained and proficient in the components of structural or wildland fire.

**Fire-resistive rating** - The time that the material or construction will withstand fire exposure as determined by a fire test made in conformity with the standard methods of fire tests of building, construction and materials.

**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 a building or structure and the spread of fire to or from buildings or structures to the wildland/urban interface area.

**Firewise landscaping** - Vegetative management that removes flammable fuels from around a structure to reduce exposure to radiant heat. The flammable fuels may be replaced with green lawn, gardens, certain individually spaced green, ornamental shrubs, individually spaced and pruned trees, decorative stone or other non-flammable or flame-resistant materials.

**Flame** - A mass of gas undergoing rapid combustion, generally accompanied by evolution of sensible heat and incandescence.

**Flammability** - The relative ease with which fuels ignite and burn regardless of the quantity of the fuels.

**Foam** - The aerated solution created by forcing air into, or entraining air in water containing a foam concentrate by means of suitably designed equipment or by cascading it through the air at a high velocity. Foam reduces combustion by cooling, moistening and excluding oxygen.

**Fuel condition** - Relative flammability of fuel as determined by fuel type and environmental conditions.

**Fuel loading** - The volume of fuel in a given area generally expressed in tons per acre.

**Fuel modification** - Any manipulation or removal of fuels to reduce the likelihood of ignition or the resistance to fire control.

**Fuels** - All combustible material within the wildland/urban interface or intermix, including vegetation and structures.

**Fuel break** - An area, strategically located for fighting anticipated fires, where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. Fuel breaks divide fire-prone areas into smaller areas for easier fire control and to provide access for fire fighting.

## -g-

**Greenbelt** - A fuel break designated for use other than fire protection.

**Ground fuels** - All combustible materials such as grass, duff, loose surface litter, tree or shrub roots, rotting wood, leaves, peat or sawdust that typically support combustion.

## -h-

**Hazard** - The degree of flammability of the fuels once a fire starts. This includes the fuel (type, arrangement, volume and condition), topography and weather.

**Hazardous areas** - Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems.

**Hazard reduction** - Any treatment of living and dead fuels that reduces the threat of ignition and spread of fire.

**Human-caused fire** - Any fire caused directly or indirectly by person(s).

**Hydrant** - A discharge pipe with three valve and fittings at which water can be drawn from a water main or other source for the purpose of fighting fires.

**-i-**

**Ignition probability** - Chance that a firebrand will cause an ignition when it lands on receptive fuels.

**Ignition time** - Time between application of an ignition source and self-sustained combustion of a fuel.

**Initial attack** - The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire.

**I-Zone** - The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

**-l-**

**Ladder fuels** - Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.

**-m-**

**Mitigation** - Action that moderates the severity of a fire hazard or risk.

**-n-**

**National Fire Danger Rating System** - A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

**Natural barrier** - Any area where lack of flammable material obstructs the spread of wildfires.

**Noncombustible** - A material that, in the form in which it is used and under the conditions anticipated, will not aid combustion or add appreciable heat to an ambient fire.

**-o-**

**Open burning** - Uncontrolled burning of wastes in the open or in an open dump.

**Overstory** - That portion of the trees in a forest which forms the upper or uppermost layer.

**-p-**

**Peak fire season** - That period of the fire season during which fires are expected to ignite most readily, to burn with greater than average intensity, and to create damages at an unacceptable level.

**Preparedness** - (1) Condition or degree of being ready to cope with a potential fire situation. (2) Mental readiness to recognize changes in fire danger and act promptly when action is appropriate.

**Prescribed burning** - Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, which allows the fire to be confined to a predetermined area, and to produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

**Prescribed fire** - A fire burning within prescription. This fire may result from either planned or unplanned ignitions.

**Property protection** - To protect structures from damage by fire, whether the fire is inside the structure, or is threatening the structure from an exterior source. The municipal firefighter is trained and equipped for this mission and not usually trained and equipped to suppress wildland fires. Wildland fire protection agencies are not normally trained or charged with the responsibility to provide structural fire protection but will act within their training and capabilities to safely prevent a wildland fire from igniting structures.

**Protection area** - That area for which a particular fire protection organization has the primary responsibility for attacking an uncontrolled fire and for directing the suppression action. Such responsibility may develop through law, contract, or personal interest of the fire protection agent. Several agencies or entities may have some basic responsibilities without being known as the fire organization having direct protection responsibility.

**-r-**

**Response** - Movement of an individual fire fighting resource from its assigned standby location to another location or to an incident in reaction to dispatch orders or to a reported alarm.

**Retardant** - A substance or chemical agent which reduces the flammability of combustibles.

**Risk** - The chance of a fire starting from any cause.

**Rural fire district (RFD)** - An organization established to provide fire protection to a designated geographic area outside of areas under municipal fire protection. Usually has some taxing authority and officials may be appointed or elected.

**Rural fire protection** - Fire protection and firefighting problems that are outside of areas under municipal fire prevention and building regulations and that are usually remote from public water supplies.

**-s-**

**Slope** - The variation of terrain from the horizontal; the number of feet rise or fall per 100 feet measured horizontally, expressed as a percentage.

**Smoke** - (1) The visible products of combustion rising above a fire. (2) Term used when reporting a fire or probable fire in its initial stages.

**Structure fire** - Fire originating in and burning any part of all of any building, shelter, or other structure.

**Structural fire protection** - The protection of a structure from interior and exterior fire ignition sources. This fire protection service is normally provided by municipal fire departments, with trained and equipped personnel. After life safety, the agency's priority is to keep the fire from leaving the structure of origin and to protect the structure from an advancing wildland fire. (The equipment and training required to conduct structural fire protection is not normally provided to the wildland firefighter.) Various taxing authorities fund this service.

**Suppression** - The most aggressive fire protection strategy, it leads to the total extinguishment of a fire.

**Surface fuel** - Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.

**Survivable space** - The characteristics of a home, its materials and design, in concert with the flammable materials in a home's immediate surroundings that result in high ignition resistance from flames and firebrands (burning embers). Survivable space characteristics relate to the ignitability of a home without necessarily including the higher thermal vulnerability of firefighters.

**-t-**

**Tree crown** - The primary and secondary branches growing out from the main stem, together with twigs and foliage.

**-U-**

**Uncontrolled fire** - Any fire which threatens to destroy life, property, or natural resources, and (a) is not burning within the confines of firebreaks, or (b) is burning with such intensity that it could not be readily extinguished with ordinary, commonly available tools.

**Understory** - Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

**Urban interface** - Any area where wildland fuels threaten to ignite combustible homes and structures.

**-V-**

**Volunteer fire department (VFD)** - A fire department of which some or all members are unpaid.

**Volunteer firefighter** - Legally enrolled firefighter under the fire department organization laws who devotes time and energy to community fire service without compensation other than Worker's Compensation or other similar death and injury benefits.

**-W-**

**Water supply** - A source of water for fire fighting activities.

**Wildfire** - An unplanned and uncontrolled fire spreading through vegetative fuels, at times involving structures.

**Wildfire Causes** - The general causes of wildland fires are (1) natural (such as lightning), (2) accidental (debris burning, children with matches, and so forth), and (3) intentional (arson).

**Wildland** - An area in which development is essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.

**Wildland fire** - Any fire occurring on the wildlands, regardless of ignition source, damages or benefits.

**Wildland fire protection** - The protection of natural resources and watersheds from damage by wildland fires. State and Federal forestry or land management agencies normally provide wildland fire protection with trained and equipped personnel. (The equipment and training required to conduct wildland fire protection is not normally provided to the structural fire protection firefighter.) Various taxing authorities and fees fund this service.

**Wildland/Urban Interface** - Any area where wildland fuels threaten to ignite combustible homes and structures.

# FUEL MODELS



## Light Fuels

grasses, forbs



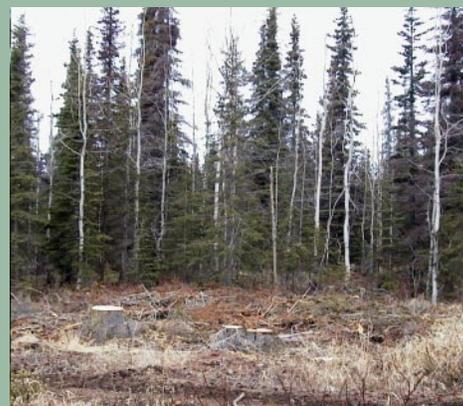
## Medium Fuels

short light brush and small trees



## Heavy Fuels

tall dense brush, timber and hardwoods



## Slash Fuels

logs, chunks, bark, branches, stumps, and broken understory trees and brush.

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## Acronyms:

**AWWA** –American Water Works Association, 6666 West Quincy Ave., Denver, CO 80235: an international nonprofit scientific and educational society dedicated to the improvement of drinking water quality and supply. Its more than 50,000 members represent the full spectrum of the drinking water community: treatment plant operators and managers, scientists, environmentalists, manufacturers, academicians, regulators, and others who hold genuine interest in water supply and public health. Membership includes more than 4,000 utilities that supply water to roughly 180 million people in North America.

**CFFDRS** –Canadian Forest Fire Danger Rating System: Similar to the National Fire Danger Rating System, the Canadian Forest Fire Weather Index (FWI) System consists of six components that account for the effects of fuel moisture and wind on fire behavior. The first three components are fuel moisture codes and are numerical ratings of the moisture content of litter and other fine fuels, the average moisture content of loosely compacted organic layers of moderate depth, and the average moisture content of deep, compact organic layers. The remaining three components are fire behavior indexes which represent the rate of fire spread, the fuel available for combustion, and the frontal fire intensity; their values rise as the fire danger increases.

**ISO** –Insurance Services Office: ISO collects information on a community's public fire protection and analyzes the data using our Fire Suppression Rating Schedule (FSRS). It then assigns a Public Protection Classification from 1 to 10. Class 1 represents the best public protection, and Class 10 indicates less than the minimum recognized protection.

**NASF** –National Association of State Foresters, 444 N. Capitol St., NW - Suite 540 - Washington, DC 20001: a non-profit organization that represents the directors of the State Forestry agencies from all fifty states, eight U.S. territories (American Samoa, the Federated States of Micronesia, Guam, the Northern Marianas Islands, Palau, Puerto Rico, Republic of the Marshall Islands, and the U.S. Virgin Islands), and the District of Columbia.

**NFDRS** –National Fire Danger Rating System: Wildland fire fuels are described in two basic fuel model classifications, the National Forest Fire Laboratory (NFFL) or Fire Behavior Fuel Models and National Fire Danger Rating System (NFDRS). The National Fire Danger Rating System is a set of computer programs and algorithms that allow land management agencies to estimate today's or tomorrow's fire danger for a given rating area. NFDRS characterizes fire danger by evaluating the approximate upper limit of fire behavior in a fire danger rating area during a 24-hour period. Calculations of fire behavior are based on fuels, topography and weather, or what is commonly called the fire triangle. NFDRS output give relative ratings of the potential growth and behavior of any wildfire. Fire danger ratings are guides for initiating presuppression activities and selecting the appropriate level of initial response to a reported wildfire in

lieu of detailed, site- and time-specific information. They link an organization's readiness level (or pre-planned fire suppression actions) to the fire problems of the day.

**NFFL** - National Forest Fire Laboratory: Wildland fire fuels are described in two basic fuel model classifications, the National Forest Fire Laboratory (NFFL) or Fire Behavior Fuel Models and National Fire Danger Rating System (NFDRS).

**NFPA** - National Fire Protection Association, 1 Batterymarch Park, Quincy MA 02269: a non-profit membership association which produces the National Fire Codes and fire and life safety educational materials and programs.

**NWCG** –National Wildfire Coordinating Group—a federal interagency group comprised of those federal agencies with land management and fire management responsibilities (see USDA and USDI)

**RFD** –Rural fire department or district

**USDA** –United States Department of Agriculture: parent agency of the US Forest Service, which has responsibilities for forest management and fire protection on national forest lands

**USDI** –United States Department of the Interior: parent agency of the Bureau of Land Management, Bureau of Indian Affairs, the National Park Service and the Fish and Wildlife Service, all of which have responsibilities in land/fire management on their respective lands.

**VFD** –Volunteer fire department

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## References:

- Development Strategies in the Wildland/Urban Interface*, Western Fire Chiefs Association, July 1991.
- Glossary of Wildland Fire Management Terms Used in the United States*, Society of American Foresters, SAF 90-05, July 1990.
- Glossary of Wildland Fire Terminology*, National Wildfire Coordinating Group, Publication PMS 205, NFES 1832, Nov 1996
- Standard 299 *Standard for Protection of Life and Property from Wildfire*, 1997 edition, National Fire Protection Association.
- Urban-Wildland Interface Code*, International Fire Code Institute, 1997.

FIREWISE THEME CHART		2	3	4	5	6
<i>Points/Lines/Small Polygons</i>		<i>Falls County</i>	<i>River Bend</i>	<i>Pine Valley</i>	<i>Bear Heights</i>	<i>Lake Heights</i>
1E	Government and other Public Buildings	County	River Bend	Pine Valley		
1F	Green Belts	River Bend/Pine Valley	River Bend	Pine Valley		
1H	Reservoirs / Watercourses	County	River Bend		Bear Heights	Lake Heights
2	Transportation System	County	River Bend	Pine Valley	Bear Heights	Lake Heights
2A	State Highway 2	County	River Bend	Pine Valley	Bear Heights	Lake Heights
2B	County Road 99	County	River Bend	Pine Valley	Bear Heights	Lake Heights
2C	River Bend Streets	River Bend	River Bend			Lake Heights
2D	River Bend Airport	River Bend	River Bend			
2E	Railroad	County	River Bend			Lake Heights
2F	Railroad Tunnels	County	River Bend			Lake Heights
2G	Utility Corridors	County	River Bend	Pine Valley	Bear Heights	Lake Heights
2H	Bridges	County	River Bend			Lake Heights
4	Fire station	County	River Bend	Pine Valley	Bear Heights	Lake Heights
6A	Total Working Fires	Study Area		Pine Valley		
6B	Wildland Fires By Cause	Study Area		Pine Valley	Bear Heights	Lake Heights
7A	Structure Values at Risk				Bear Heights	
7B	Water Sources				Bear Heights	
7C	Cultural, Archaeological and Paleontology	Lake Heights				Lake Heights
7D	Sensitive Natural Resources	Lake Heights				Lake Heights
7E	High Value Recreation/Scenic	River Bend/Lake Heights				Lake Heights
7F	Historic Flood Zone	River Bend/Lake Heights				Lake Heights
7G	Unstable Soil Areas	Lake Heights	Lake Heights			Lake Heights
	Contours				Bear Heights	Lake Heights
	Dams	County	River Bend			Lake Heights
	Photo Link				Bear Heights	Lake Heights
	Property Boundary				Bear Heights	Lake Heights
	Roads (Development)				Bear Heights	Lake Heights
	Lot Alignment				Bear Heights	Lake Heights
	Church Camp					Lake Heights
<b><i>Polygons (Large Area)</i></b>						
1A	Residential Classification	River Bend/Pine Valley	River Bend	Pine Valley		
1B	Commercial Retail Business	River Bend/Pine Valley	River Bend	Pine Valley		
1C	Transportation, Utilities and Communications	River Bend/Pine Valley	River Bend			
1D	Industrial	River Bend/Pine Valley	River Bend	Pine Valley		
1G	Vacant Land and Non-Urban	County	River Bend	Pine Valley		
3A	Income Classification	River Bend/Pine Valley	River Bend	Pine Valley		
4A	PVFD Responsibility Areas	County	River Bend	Pine Valley	Bear Heights	Lake Heights
4B	RBFD Responsibility Areas	River Bend	River Bend			Lake Heights
4B	RBFD Responsibility Areas (Secondary)	County	River Bend	Pine Valley		
4C	DNR Responsibility Areas	County	River Bend	Pine Valley	Bear Heights	Lake Heights
5A	Vegetation Classification	County	River Bend	Pine Valley	Bear Heights	Lake Heights
5B	Slope Classification	County			Bear Heights	Lake Heights
7H	Commercial Forest Lands	County		Pine Valley		Lake Heights
	Jurisdictions	County		Pine Valley	Bear Heights	Lake Heights
	Aspect	County				
	Elevation	County			Bear Heights	Lake Heights
	Road Labels	County	River Bend	Pine Valley	Bear Heights	Lake Heights

## LAND USE CLASSIFICATION THEMES

The following themes depict various land use classifications for specific areas within Falls County.

### THEME 1A RESIDENTIAL CLASSIFICATION

	10 or more residential units per 5 acres; classified as high density
	6-10 residential units per 5 acres; classified as medium density
	1-5 residential units per 5 acres; classified as low density

### THEME 1B COMMERCIAL RETAIL BUSINESS

	Large Shopping Facilities (outlet malls, Wal-Mart, Target, etc.)
	Rural Commercial Services; a general store with mail services, gasoline (auto & boat), groceries, fishing tackle & bait, restaurant & bar, and overnight lodging.
	Urban Commercial (retail grocery, clothing, furniture, electronic, banks, insurance, hotels, gas stations, etc.)

### THEME 1C TRANSPORTATION, UTILITIES AND COMMUNICATIONS

	Electric Power Station		Radio/TV Tower
	Radio/TV Station		Railroad Station

### THEME 1D URBAN AND RURAL INDUSTRIAL FACILITIES

	Cement and concrete facilities; industrial warehouses; furniture, mattress, publisher/printer or electronic facilities; truck service centers; bottling plants, lumber yards and mills; and gasoline & chemical distributors
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### THEME 1E GOVERNMENT AND OTHER PUBLIC BUILDINGS

	Govt Bldg	Government buildings include jails, civic halls, library and administration offices. Theme also includes public and private schools and a university.
	Schools	
	University	

### THEME 1F GREEN BELTS AND OPEN SPACE

	Developed	Green belts are developed areas including city/county parks, state parks, sports complexes/ball fields, cemetery and developed picnic or campground areas.
	Undeveloped	Open space represents undeveloped lands or parks and community reserves where native vegetation is predominate.

### THEME 1G VACANT AND NON-URBAN

	Example includes vacant lots and undeveloped tracts
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### THEME 1H WATER COURSE/RESERVOIRS

	Typically reservoirs, lakes, ponds, rivers, streams, swamps and deltas. Dry stream beds and other seasonal water courses are depicted with broken lines.
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## SOCIAL-ECONOMIC INFORMATION THEMES

### INCOME LEVEL CLASSIFICATION

	Low Income	People tend to cluster according to their economic means. Theme 3A shows distinct economic regions in the Falls County planning area. Theme was prepared with the use of recent census data. Most cities report that the number of fire and emergency incidents and the severity of those incidents have a direct relationship to the socio-economic level of the neighborhood. Any disproportion in the requirement for emergency services by economic regions needs to be evaluated. The type and nature of emergency services required by different regions of the planning area may be important in predicting future service level requirements. This concept may be especially true where population shifts are predicted. New subdivisions, whether they are built in the city or in rural areas, tend to be at the middle or higher end of the socioeconomic scale.
	Middle Income	
	High Income	

## WILDLAND FIRE HAZARD THEMES

### VEGETATION CLASSIFICATION (FUEL MODELS)

	Light Fuels (grasses, forbs)	NFDRS Fuel Models A, C, L, N, S & T NFFL Fuel Modles 1, 2 & 3
	Medium Fuels (short light brush and small trees)	NFDRS Fuel Models D, E, F, H, P, Q, R & U NFFL Fuel Models 5, 6, 7, 8 & 9
	Heavy Fuels (tall dense brush, timber and hardwoods)	NFDRS Fuel Models B, G & O NFFL Fuel Models 4 & 10
	Slash Fuel Areas	NFDRS Fuel Models L, K & J NFFL Fuel Models 11, 12 & 13
	Water	

## FALLS COUNTY TRANSPORTATION THEMES

There are several themes that can be displayed to identify the primary transportation networks for Falls County and the unincorporated community of Pine Valley. Road and street networks are very important for emergency ingress/egress and in the planning process for urban, rural and wildland fire protection. Themes also include other transportation facilities such as railroads, airports, and high country roads. Public access and travel along these corridors may contribute both to the cause and risk of fires, fire problem identification and the response capability of the fire service to cope with fire problems.

### THEME 2 TRANSPORTATION SYSTEM

	Interstate 40	Interstate 40 runs from north to south through the City of River Bend and the western portion of the Falls County planning area. Also included in this theme: freeway ramps, state highways, county roads, rural roads, other paved roads and unpaved routes. Restricted transportation routes for the typical fire response apparatus need to be carefully evaluated. The restriction of response routes due to road widths and grades, narrow bridges over waterways, locked gates, road smoothness (paved or gravel), access points to Interstate highways, and possible interruption of travel due to railroad crossing present problems that should be considered in the service delivery capability of emergency vehicles. Each of these conditions could significantly delay the response of emergency equipment to a given location. The "Level of Service" evaluation for access roads should include ratings for emergency egress/ingress effectiveness.
	Freeway Ramps	
	State Highways	
	County Roads	
	Rural Roads	
	Paved	
	Unpaved	

### STATE HIGHWAY 2

	The principal route from the City of River Bend to the unincorporated area of Pine Valley
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### COUNTY ROAD 99

	A two-lane road which provides an eastern loop from State Highway 2 to the Lake Buckhorn resort and Bear Heights communities
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### RIVER BEND STREETS

	Major Streets		Streets
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### BRIDGES

	Depicts bridges in the planning area
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### RIVER BEND AIRPORT

	The only airport in Falls County is Colonel Benedict Field, which is located near the eastern boundary of the River Bend city limits. The airport has two runways exceeding 7,000 feet in length. This airport serves medium-size commercial jet aircraft, as well as corporate and small civilian aircraft. Major airlines such as Delta, American, Alaska, Southwest and US Sir have terminals at this airport. Airport records indicate that there are more than two hundred aircraft landings a day based upon a five-year study. The airport is closed to commercial jet aircraft from 11:00 p.m. to 6:30 a.m. seven days a week.
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### RAILROADS & RAILROAD TUNNELS

	Railroad	Transportation corridors may also present some special fire risk conditions for Falls County. Freight train fires and/or derailments could present a serious problem throughout Falls County and the City of River Bend. A fire situation on a rail line could quickly overtax the capability of the local fire department. A series of multiple fire ignitions spread along the track and/or derailment with fire and personnel injuries are examples of this fire risk. Falls County has a rather extensive network of railroad lines. Therefore, the railroad system in this county could present a rather severe exposure problem to local rural commercial and residential neighborhoods. A twenty-year historical record indicates railroad fires occur 15 days a year and often 4 or more starts occur at one time.
	Railroad Tunnels	

### UTILITY CORRIDORS

	500 KV Plus Gas	Interstate Electrical and Gas Company's 500 Kilovolt (KV) electrical transmission line and their interstate underground natural gas line both cross the Falls County Planning Area. Additional local 55KV and 33KV electrical transmission lines are located within the planning area. These electrical transmission lines can be a key fire risk component and if a wildfire should occur within these corridors, they will need to be de-energized for firefighter safety. The 1991 Spokane, Washington fire began as high winds severed electrical lines which started a series of small fires. The resulting wildland fires burned 35,000 acres and destroyed 114 homes. Underground gas line locations must be pre-planned by fire departments/agencies and well-marked above ground to prevent rupture during wildland fire suppression activities (bulldozer lines).
	55 KV	

Wildland fire hazard is usually measured by three general assessments:

- 1) type of vegetative fuels
- 2) steepness of slope and
- 3) the frequency of serious fire weather conditions

### SLOPE CLASSIFICATIONS

	Slope less than 10%		Slope 31 - 40%
	Slope 10 to 20%		Slope greater than 40%
	Slope 21 - 30%		No Data

# FIRE PROTECTION MANAGEMENT THEMES

## FIRE STATIONS

	DNR - State Department of Natural Resources is primarily a wildland fire protection agency operating three fire stations in the planning area.
	Falls County Fire Agency operates an administrative building in the planning area.
	PVFD - Pine Valley Fire Department operates three fire stations supported by a 35-person volunteer staff.
	RBFD - River Bend Fire Department has five stations all within the City of River Bend City Limits.

## RBFD FIRE RESPONSIBILITY AREA

	Station 1		Station 2		Station 3
	Station 4		Station 5		
Depicts the Fire Management Responsibility Area (structural) for each of the five River Bend Fire Department stations.					

## RBFD SECONDARY RESPONSIBILITY AREA

	RBFD Stn 4 Secondary		RBFD Stn 5 Secondary
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## DNR RESPONSIBILITY AREA

	DNR Station 1		DNR Station 2		DNR Station 3
Depicts the Fire Management Responsibility Areas (wildland) for each of the three Department of Natural Resources stations.					

# FIRE INCIDENTS (RISKS) THEMES

The "Values at Risk" themes depict all values, land use planning objectives, and constraints relating to the planning area. Typical values include life and property (structures), natural and cultural resources, soil stability, flood plains, water quality, air quality, wildlife habitat and other environmental or land use concerns.

The following themes were utilized for this Firewise Community Planning exercise:

## STRUCTURES VALUES AT RISK TO WILDLAND FIRE

	Non-Rated Roofing, Combustible Siding and Building Materials	For siding classifications, refer to the photos and/or tabular data.
	Non-Rated Roofing	
	Class B or C Roof Only	
	Class A Roof	

## WATER SOURCES/DRY HYDRANTS

	Hydrant (>500 GPM)		Dry Hydrant		Storage Tank
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## CULTURAL, ARCHAEOLOGICAL, AND PALEONTOLOGY RESOURCE VALUES

	Cultural, archaeological and paleontology resource values at risk to wildland fire, County & state archaeological recorded sites and local Native American historical sites.
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## SENSITIVE NATURAL RESOURCES

	Animal		Plant
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## HIGH VALUE RECREATION/SCENIC

	State & county parks, scenic rivers and scenic roadways
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## FLOOD PLAIN ZONE

	Historic 100-Year flood plain zone for Buckhorn/Reidy Creek Stream profile prior to construction of Lake Buckhorn Dam.
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## UNSTABLE SOIL AREAS

	Unstable soil areas (county & state geological surveys and subdivision proponent surveys)
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## COMMERCIAL FORESTED LAND

	Commercial Conifer (Pine) Stand Values
	Commercial Hardwood Stand Value
	Other Commercial Forest Products Value

## PVFD FIRE MANAGEMENT RESPONSIBILITY AREA (FMRA)

	Station 1		Station 2		Station 3
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Depicts the Fire Management Responsibility Areas (structural) for each of the three Pine Valley Fire department stations. The term Fire Management Responsibility Area (FMRA) has been used to designate a geographic area and which emergency unit has primary responsibility or mutual aid response for that designated area. A FMRA designation has a broader meaning than just the words 'first due' response area (the fire apparatus expected to arrive at the emergency scene).

Traditionally, fire stations have been located to provide an adequate response to emergency conditions in a given geographic area. Where the geographic area is large for one political jurisdiction, it may be necessary to provide two or more fire stations for adequate response coverage. This is especially true where wildland fire has become a serious threat to a community. Legal boundary lines are drawn to represent the "responsible" area for each fire agency/department and each fire station.

The responsibility area for an individual fire station is usually determined by some distance rule or response time criteria and closest forces concept. Often, another jurisdiction resource may be closer than the unit of jurisdiction, especially in a backup or second and third unit response. In other words the fire unit(s) that can provide the fastest response time(s), or the shortest response route to a potential emergency should be assigned to cover the emergency location.

The FMRA concept will require mutual aid agreements between the various jurisdictions and/or departments. (e.g. state, county and local departments and/or jurisdictions). A total management concept is being applied to the designated response areas as determined by the community. This means managing the fire problem in a given area to meet the combined expectations of the citizens and the professional fire service. A typical FMRA might include prevention (inspection and public education) activities, building surveys, emergency citizen evacuation, fire and law enforcement investigations, pre-fire planning and development of common public codes and regulations.

FMRA's are designated as both primary and secondary responsibility area coverage. Primary is the legal coverage and secondary is the most logical cooperative (closest) unit response capability.

Planning and managing area-wide fire problems requires; 1) a united fire prevention and education program; 2) common building codes and surveys; 3) a community based pre-fire planning concept; 4) a joint fire and law enforcement investigation and public relation effort, plus the obvious joint direct fire suppression service. The management function may also include both emergency disaster and emergency medical services. The value of a united and common approach fire protection service within a county or state jurisdiction, is that the citizens receive the same message and less duplication of services from all fire and emergency service jurisdictions in that county.

# "VALUES AT RISK" THEMES

Fire incident data may be compiled in different ways to illustrate meaningful relationships about categories of events (i.e. the number of fires in a given year). Plotting of fire incidents provides a visual and spatial tool to assess locations, trends and types of areas where fires are most likely to occur.

Plotting the total number of fire incidents within a location grid cell index shows the frequency of those incidents within specific and common size geographical areas. Randomness or clustering is easy to observe on a grid map that has been prepared in this manner. These special maps are classified as pattern recognition maps: Visually one can determine where there is a pattern of events. Pattern recognition maps may be even more useful when they are prepared as transparent overlays to specific land use maps. In this manner, the pattern recognition profiles can be used to visually analyze the relationship of incidents to land use patterns, fire management areas, socioeconomic development, etc. This permits the identification of specific problem conditions such as the high frequency of events in a certain area of the planning area.

Fire incidents can also be plotted as points with an attached database table compiling all relevant fire incident data including; ignition cause, date, acres burned, structures threatened/lost, relative humidity, fuel moisture, temperature, wind direction/velocity, fuel model, responding resources, etc. Plotted points allow for a more specific analysis of incidents relationship to transportation corridors, land use activities, location and socioeconomic areas. High fire frequency areas can be clustered into polygons that more accurately depict potential fire risk. The Firewise Community Planning exercise utilizes the point plotting approach. The following two (2) pattern recognition profiles are provided:

## TOTAL WORKING FIRES

	Theme depicts the total number and location of fire related incidents responded to by either the City of River Bend Fire Department, Pine Valley Volunteer Fire Department or Department of Natural Resources for a designated period. This profile distinguishes fire incidents from other non-fire responses which include vehicle accidents, emergency medical events, rescues and fire department service calls.
	Working Fire Incidents: The Total Fire Incidents theme can also be utilized to identify the number and location of working fire incidents (structure and wildland) inside the planning area. A working fire presents a situation where at least one 1-1/2 inch tactical line is required for fire control.
	Note: For this Firewise Community Planning exercise only working (wildland) fires for a typical base year surrounding the assessment areas of Bear Heights and Lake Heights were plotted. Traditionally, a period of 10 years or greater is necessary to adequately determine historical patterns.

## WILDLAND FIRES BY CAUSE

	Arson		Equipment		Smoking
	Camping		Lightning		Structure
	Children		Railroad		Vehicle
	Electrical				
Theme depicts the total number and location of wildland fire incidents by individual Incident Cause Class for the base year. Each fire cause is given a unique symbol to differentiate between causes.					

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