

Bonner County Planning Department

"Protecting property rights and enhancing property value"

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BONNER COUNTY COMPREHENSIVE PLAN

COMPONENT: HAZARDOUS AREAS

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Introduction

Bonner County's unique geography contains a variety of hazardous areas. Identifying these areas and implementing measures to mitigate development risk is critical to protecting nature, property, and people. The Bonner County Revised Code (BCRC) requires any development in hazardous areas follow special permitting processes and engineered plans to safeguard the environment, people, and property. This component of the comprehensive land use plan discusses hazardous areas in Bonner County, BCRC developmental standards, and how different public agencies manage and respond to hazards throughout the County.

Bonner County values its residents, nature, and property. The intent of BCRC Title 12 Environmental Standards then, is: "to protect its community from the loss of lives and property and to reduce public and private financial losses due to flood, fire, mass wasting, avalanches and excessive slopes by setting standards for development within hazard areas and discouraging development in high hazard areas."

Chapter 1 - Ground Failure

Section 1.1 - Faults in Bonner County

There are two major faults that run through Bonner County: the Purcell Trench and the Hope fault (Harrison et al 1972, p. 1). The Purcell Trench runs from Bonners Ferry approximately 200 miles north into Canada. It also extends nearly 80 miles down south from Bonners Ferry to at least the southern end of Lake Coeur d'Alene. The Hope fault occupies Clark Fork Valley for about 40 miles of its length, to the southeast of Hope. It intersects the Purcell Trench near the City of Sandpoint, running northward past Bonners Ferry into Canada (Harrison et al 1972, p. 1-2). The U.S. Geological Survey (USGS) defines faults as "a fracture along which the blocks of crust on either side have moved relative to one another parallel to the fracture" (USGS, 2021a). When slippage occurs along a fault, the energy released may result in an earthquake (USGS 2021b). For a more comprehensive list of faults in Bonner County, please visit the Idaho Geological Survey.

Section 1.2 - Slope Hazards

Steep slopes are potentially hazardous for several reasons: faster runoff on steep slopes results in greater erosivity, they are a "prerequisite for landslides to occur" and rockfall is more likely to occur on steeper slopes, etc. (Highland and Bobrowsky 2008, p. 29 & EPA 1992, p. 3-8).

See Figure 1 below.

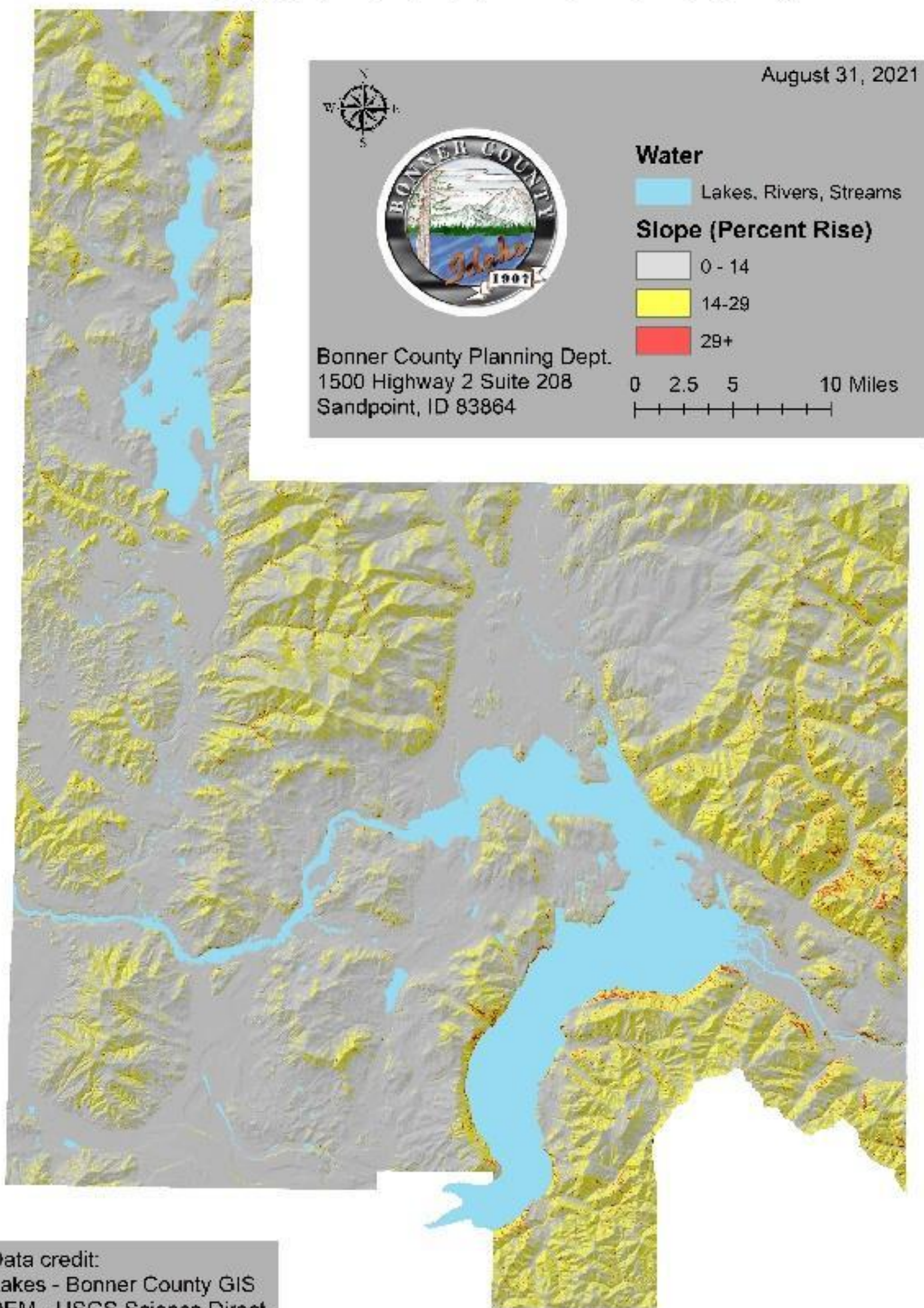
WHAT CAUSES LANDSLIDES?

According to the United States Geological Survey (USGS), steep slopes saturated by water are often the catalyst for landslides (Highland and Bobrowsky 2008, p. 30). Other causal factors for landslides include rapid snowmelt, earthquakes, vegetation removal by logging, fire, etc., and adding excessive weight to slopes with mining waste or rock piles (Lifton, 2021). For a comprehensive list of slope failure and landslides in Idaho, please visit the Idaho Geological Survey.

LANDSLIDES IN BONNER COUNTY

In 1991, a severe flooding event occurred near the City of Sandpoint. Carrying heavy loads of debris, the torrent's velocity damaged the roadway leading up to Schweitzer Mountain Resort, leaving several dozen people stranded (IOEM 2018). The flooding also contaminated the city's water treatment facility, costing taxpayers several hundred thousand dollars in damages (IOEM 2018). More recently, in 2017, a small landslide on Talache Beach on Lake Pend Oreille resulted in a home being displaced and significantly damaged (Viydo, 2017).

Slopes Hazards in Bonner County



Bonner County provides data "as is" with no claim to its accuracy.

Figure 1. The above map was created using a 10m² digital elevation model (DEM) from the USGS Science Base Catalog.

Section 1.3 - Avalanche Hazards

According to the U.S. Forest Service National Avalanche Center, avalanches generally occur on slopes between 30-45° degrees. Avalanches are more likely to occur on convex slopes but may also occur on concave slopes (U.S. Forest Service, 2021). In general, slopes with thicker tree cover and low hanging branches may help anchor snow cover; on the other hand, sparse canopy cover with fewer low-lying branches provide little to no anchor support. Other factors that may increase the likelihood of an avalanche occurring include south facing slopes and mountainous areas with higher elevations as snow will accumulate more and wind gusts may be stronger (American Avalanche Association, 2021; Utah Avalanche Center, 2021).

AVALANCHE RISK ASSESSMENT

Drawing on Leuthold et al (1996), an avalanche risk assessment model was computed for Bonner County. Using a weighted overlay analysis in Environmental Systems Research Institute's (ESRI) ArcMap v10.7, slope, aspect, and elevation were extracted from a 10m² digital elevation model; these components were combined to calculate potential avalanche risk for Bonner County. Areas in the County with higher elevation, and steeper slopes facing south were assigned greater weight value, whereas areas with a lower elevation and gentle slopes facing north were assigned a lower weight value. For a more comprehensive list of the data analysis for avalanche hazards in Bonner County, please see Appendix X.

See Figure 2 below.

Avalanche Hazards in Bonner County

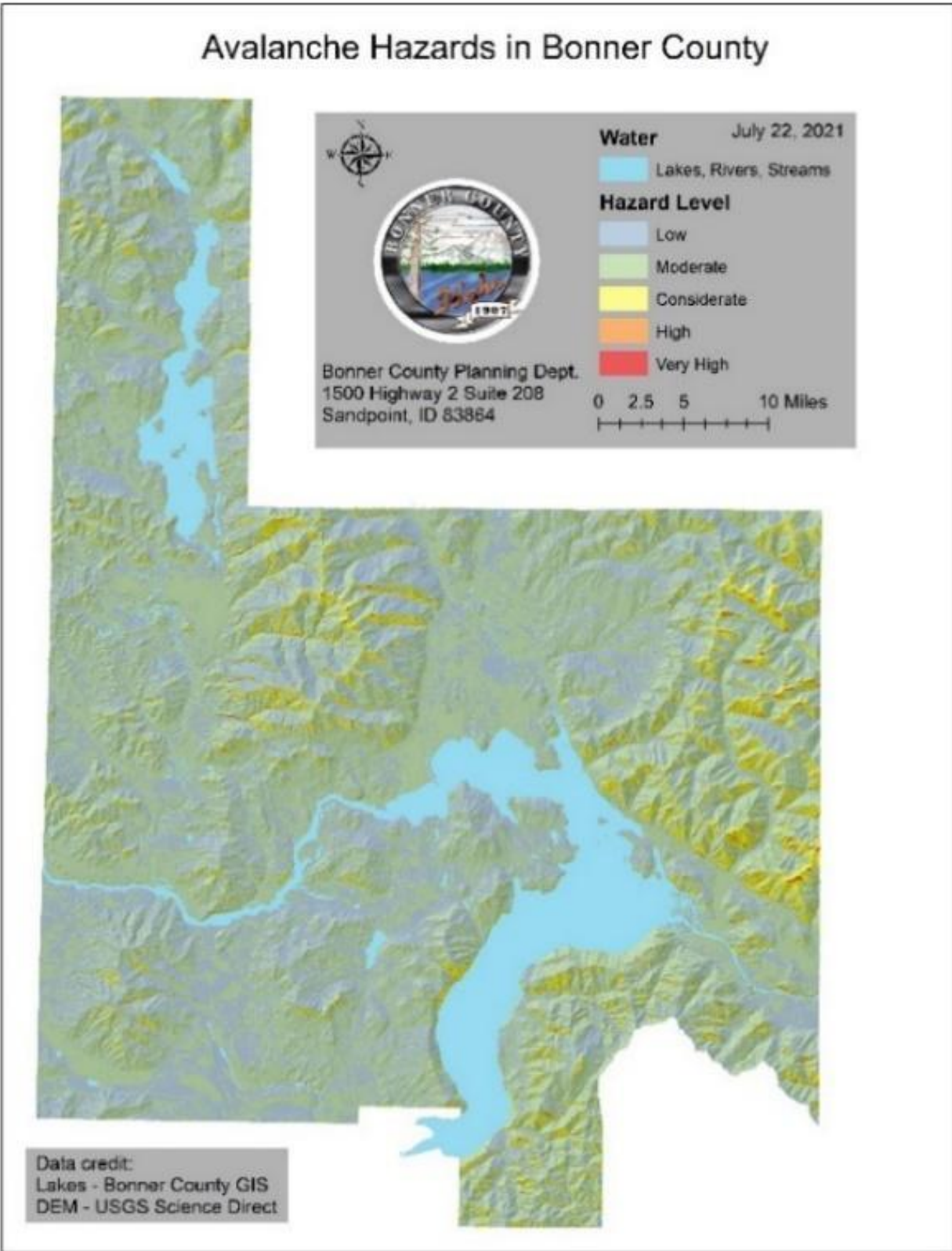


Figure 2. The above map was created using a 10m² digital elevation model (DEM) from the USGS Science Base Catalog.

Section 1.4 - Liquefaction

Liquefaction occurs in saturated soils, that is, soils in which the space between individual particles is completely filled with water. This water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. Prior to an earthquake, the water pressure is relatively low. However, earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other. Because liquefaction only occurs in saturated soil, its effects are most commonly observed in low-lying areas near bodies of water such as rivers, lakes, bays, and oceans. The effects of liquefaction may include major sliding and slumping of soil toward the body of water.

Studies or reports regarding liquefaction information specific to Bonner County is unavailable.

SIGNIFICANCE

When designing and constructing new buildings and structures, including bridges, tunnels, and roads, three options exist to reduce liquefaction hazards: avoiding liquefaction-susceptible soils, building liquefaction-resistant structures, and improving the soil.

AVOID LIQUEFACTION-SUSCEPTIBLE SOILS

The first option is to avoid construction on liquefaction-susceptible soils. There are various criteria to determine the liquefaction susceptibility of a soil. By characterizing the soil at a particular building site according to these criteria, one can decide if the site is susceptible to liquefaction and, therefore, unsuitable for the desired structure.

LIQUEFACTION RESISTANT STRUCTURES

The second option is to make the structures you build liquefaction resistant. If it is necessary to construct on liquefaction-susceptible soil because of space restrictions, favorable location, or other reasons, it may be possible to make the structure liquefaction resistant by designing the foundation elements to resist the effects of liquefaction.

IMPROVE THE SOIL

The third option involves mitigation of the liquefaction hazards by improving the strength, density, and drainage characteristics of the soil. This can be done using a variety of soil improvement techniques (University of Washington).

Chapter 2 - Wildfires in Bonner County

Bonner County's history is one that is riddled with stories of wildfires ravaging the landscape. On August 23, 1967, the Sundance Fire near Priest Lake sparked one of the largest fires in Bonner County. In just one week, the fire burned through nearly 2,000 acres of land. Twelve hours later, high winds carried the fire over 55 thousand acres on September 1st, destroying some "10 million board feet of lumber" (Gunter, 2021). To date, fires continue to plague Bonner County. In late July 2021, the Bonner County Sheriff's Office ordered evacuations for residents in "Saddler Creek, Skunk Cabbage, Mundy, and portions of Bodie Canyon and Slippery Slope roads" as the Pioneer Fire engulfed over 200 acres of land (Portuondo, 2021).

Section 2.1 - Wildfire Catalysts

Wildfires threaten wildlife, ecosystems, residents, and property in Bonner County. According to the Northern Central Idaho Prevention Cooperative, topography (i.e. – slope gradient and aspect), weather, vegetation type (i.e. – tree, shrubs, and grass) and density, and the built environment (i.e. – road design and access, home construction, landscaping, and emergency water availability) all contribute to a greater or lower fire risk matrix. In general, steeper slopes facing south increase the fire risk. Other factors that may contribute to or enhance a fire include dead vegetation, warmer weather, and strong winds (North Central Idaho Fire Prevent Cooperative, 2012).

Section 2.2 - Fire Protection

Bonner County is currently served by 10 fire districts. However, many properties in Bonner County fall outside a fire district protection zone, which means that fire services are not readily available for everyone. That said, per Idaho Title 31, Chapter 14 (31-1431) does allow for individual landowners to sign a contract with a fire district in Idaho or a neighboring state for 1 year, so long as the fire district agrees to serve their property at their expense.

Since most fire districts serve a large area, residents are encouraged to create a defensible space around their dwelling and other covered structures. A defensible space, broadly conceived, is defined by a 100-to-200-foot buffer area around a dwelling and its immediate surroundings (Bonner County Emergency Management, 2020). In a defensible space, zones should be established to create an adequate, protective buffer around a dwelling unit. Bonner County Emergency Management – defensible space zones broadly defined:

No Zone: 0-to-3-foot space where no combustibles should be stored (including firewood, etc.) near the dwelling. Vegetation should be thinned (i.e. – trimmed) and tree limbs kept at least 10 feet from the home, and 10-to-20 feet apart from each other.

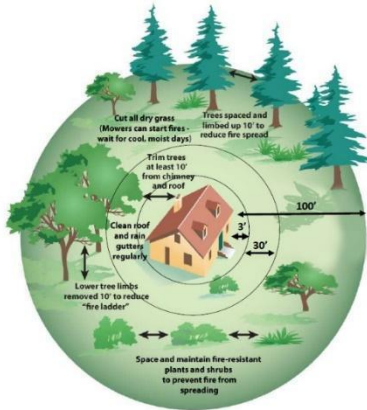


Figure 3. Image credit:

<https://www.bonnercountyid.gov/media/Emergency%20Management/Bonfire%20Brochure.pdf>

Zone 1: 3-to-30-foot space where the grass is regularly maintained (cut and watered regularly), and bushes, shrubs, etc. thinned. Trees should be spread apart at a reasonable distance from each other.

Zone 2: 30-to-100-foot space where vegetation is thinned, maintained, and watered regularly. Overgrowth should be removed on an annual basis, and trees should be spread apart. Any firewood, propane, or other flammable material should be placed on either a gravel or concrete pad at least 30 feet from the dwelling unit.

Zone 3: beyond 100 feet, all vegetation should be thinned, and mature trees should be 10-to-20 feet apart. Tree species that are highly flammable should be replaced with trees that are less-fire-prone.

For more information about how to establish a defensible space, please visit the Bonner County Rural Development Fire Prevention and Resource (BonFire) Guide. A hyperlink to the guide is located on the Bonner County Emergency Management webpage.

Chapter 3 – Floodplains

Anywhere it can rain, it can flood. Flooding is the #1 natural disaster in the United States in terms of cost. Everywhere in the nation is either high, moderate, or low risk for flooding; there is no such thing as no risk for flooding disasters.

In the 1980's, Bonner County Commissioners elected to join the National Flood Insurance Program (NFIP). Established by Congress in 1968, the NFIP was designed to create partnerships between the federal and local governments to implement ordinances which meet or exceed the Federal Emergency Management Agency's (FEMA's) floodplain development requirements found in CFR Title 44. The NFIP was designed to be a win-win; when communities agree to adopt and enforce floodplain management ordinances that meet or exceed FEMA minimum requirements and join the program, they become NFIP participating communities. Enforcing sound floodplain management ordinances results in reducing the likelihood or severity of flood loss and protecting valuable floodplains. In exchange, FEMA makes flood insurance available to homeowners, renters, and business owners within these communities. Most standard insurance policies exclude flooding damage, making it essential that this coverage be offered through the NFIP. It is mandatory that any community in the NFIP must enforce a flood damage prevention ordinance that meets or exceeds the minimum standards of CFR Title 44.

Any development proposed in the FEMA-designated Special Flood Hazard Area (SFHA) of Bonner County necessitates a Floodplain Development Permit (FDP). These permits usually consist of an application form, stamped building plans, a surveyor-prepared elevation certificate, and a stamped site plan. Finished structures require final elevation certificates and inspections by ICC-certified building inspectors to ensure that structures have been built in compliance with the Bonner County Flood Damage Prevention Ordinance. Development in the SFHA generally requires that structures be elevated above the level of anticipated flooding, as well as other design standards like the use of flood-resistant building materials. The Bonner County Flood Damage Prevention Ordinance specifies these requirements in detail.

Implementation of construction and development standards are the most effective way to reduce future flood losses in high risk areas. Zoning, subdivision standards and other special codes can be used to establish special conditions for development in special flood hazard areas. These conditions can include setbacks, additional freeboard or other elevation requirements for building lots, roads, bridges, utilities and other structural features.

Section 3.1 - FEMA Maps

FEMA determines the flood risk for the entire United States and publishes these results on Flood Insurance Rate Maps (FIRMs). FIRMs indicate whether a property is within or outside of the Special Flood Hazard Area (SFHA). In general, FEMA categorizes the risk of flooding by classifying a firm panel into various categories. Not all of these categories are present in Bonner County. Within Bonner County there are generally four (4) risk categories:

Zone A: This zone type is considered to be within the SFHA. Flood insurance is mandatory for federally backed mortgages in this flood zone, though the base flood elevations (BFEs) are unknown

in this zone. Areas in this zone are at a 1-percent risk of flooding annually; this probability is why these areas are also described as being in the “100-year floodplain.”

Zone AE: This zone type is considered to be within the SFHA. Flood insurance is mandatory for federally backed mortgages in this flood zone and the BFEs in this zone are known and published by FEMA Areas in this zone are at a 1-percent risk of flooding annually..

Zone D: This zone type is not considered to be within the SFHA. This zone does not require mandatory flood insurance for federally backed mortgages, but the risk of flooding is unknown and these areas are entirely unstudied for flood risk. For this reason, flood insurance can be prohibitively costly in Zone D.

Zone X: This zone type is not considered to be within the SFHA. The flooding risk is low in this zone (less than 1% annual risk) Flood Insurance buyers in this zone generally qualify for Preferred Risk Rate flood insurance. Most of the nation, as well as most of Bonner County, is within this zone.

For more information about floodplains, and floodplain development permits, please visit [FEMA.gov](https://www.fema.gov) and the Bonner County Floodplain Information Resources webpage.

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