

Overview

Clackamas County features several large rivers and smaller tributaries, or streams, that are susceptible to annual flooding events that pose threats to life and safety and cause significant property damage. Large rivers include the Clackamas, Tualatin, Molalla / Pudding, Salmon, Sandy, Willamette and Zig Zag, while streams include Johnson Creek, Abernethy Creek, Beaver Creek, Milk Creek, and Cedar Creek.

Excluding the Mount Hood Corridor, Clackamas County has close to 20,000 acres of floodplain and nearly 10,000 individual parcels that are partially or entirely located within the floodplain, each of which can potentially flood within any given year. Snow melt from the Cascade Mountain range located in eastern Clackamas County contributes substantially to the occurrence and magnitude of flooding, and ongoing development within the County continues to displace natural areas that have historically functioned as flood storage, thereby continually increasing the overall potential for flooding in developing areas of the County.

Recent Flooding Events

While some sort of seasonal flood-related damage occurs nearly every year, the flooding and associated landslide events of February and November 1996 represent the most recent significant flooding. In February 1996, prolonged precipitation accompanied by an early snowmelt, caused by a warm-weather trend known as a “Pineapple Express,” caused many rivers and creeks throughout the Willamette River watershed to rise to 100-year flood levels, causing flooding in both rural and urban areas. At the confluence of these two rivers, located just north of Oregon City, floodwaters caused significant damage to a large portion of the business district in Oregon City.

Damage to Clackamas County businesses, residences and infrastructure was estimated to be roughly \$50 million — 20 percent of the County’s annual budget. The County received a Presidential Disaster Declaration to obtain federal assistance for its flood recovery effort. The Clackamas County Risk Management Office estimated that the flood of February 1996 affected three quarters of the County’s 342,861 residents. Claims filed under the Federal Emergency Management Agency (FEMA)’s National Flood Insurance Program (NFIP) from Clackamas County residences and businesses accounted for almost one third of the entire claims throughout the state in 1996.

Still recovering from the February floods, a major storm struck the County for two days in mid-November, delivering nearly 3 inches of rain in one night in a weather event that occurs, on average, every 205 years, resulting in a second significant flooding event. While the damage was not as severe as that from the February event, the flooding rendered many roads impassable and necessitated the evacuation of numerous residents living in the floodplain.

Statewide, the 1996 floods resulted in \$400 million in damages, as 26 major rivers rose to flood stage. More than 100 Red Cross and Salvation Army shelters were opened, and 23,000 residents fled their homes. Seven casualties were reported, and 50 people were injured, while an estimated 1,700 Oregonians lost their jobs. The Small Business Association (SBA) loaned Oregon businesses over \$40.5 million to assist with recovery efforts.

Although the floods of 1996 represented a large-scale disaster, they are not unprecedented within the recent past. The Christmas Flood of 1964 caused \$157 million in damage, and 20 Oregonians lost their lives. County records dating back to the mid-1800s indicate that the Willamette River has caused significant flooding to the County at least seven times, while flooding from the Clackamas River has dramatically affected the County at least five times. County records report that in 1861 Willamette River floodwaters inundated the streets of Oregon City with about 4 feet of water, and while the 1996 events were devastating to the entire region, the floods of 1861, 1890, and 1964 exceeded the 1996 events in

terms of velocity and volume of water. All four floods have been estimated to exceed the so-called “100-year flood,” or Base Flood, and all within a time frame of about 130 years.

Causes of Flooding in Clackamas County

Flooding occurs when climate (or weather patterns), geology, and hydrology combine to create conditions where river and stream waters flow outside of their usual course and “overspill” beyond their banks. In Clackamas County, the combination of these factors, augmented by ongoing development, create chronic seasonal flooding conditions.

Clackamas County spans a wide range of climatic and geologic regions that results in considerable variation in precipitation, the primary factor of which is elevation. Moving east from Oregon City at 55 feet above sea level to Mt Hood at 11,235 feet above sea level, annual precipitation averages range from 47.06 inches to over 124.51 inches, respectively. As elevation rises, precipitation, in the form of both rain and snow, increases, and while much of the County enjoys a fairly mild winter, with less than 5-10 inches of snow per year, the higher elevations surrounding Mt. Hood are covered with snow for the majority of the winter months. Mt. Hood’s snowmelt provides a continuous water source throughout the year, and can contribute significantly to the development of flooding.

A large portion of Clackamas County sits within the lower Willamette River basin, within which lies a broad floodplain of the Willamette Valley that can be easily inundated by floodwaters. The surface material includes poorly drained, unconsolidated, fine-grained deposits of Willamette silt, sand, and gravel. Torrential flood events can introduce large deposits of sand and gravel that assist in the drainage of the otherwise poorly drained soils.

Flooding is most common from October through April, when storms from the Pacific Ocean, 60 miles away, bring intense rainfall to the area. Clackamas County receives approximately 40 inches of rain on average each year. During the rainy season, monthly rainfall totals average far higher than other months of the year, resulting in high water, particularly in December and January. Larger floods result from heavy rains that continue over the course of several days, augmented by snowmelt at a time when the soil is near saturation from previous rains. Frozen topsoil also contributes to the frequency of floods.

Riverine flooding and urban flooding are the two types of flooding that primarily affect Clackamas County. Riverine flooding is the overbank flooding of rivers and streams, the natural processes of which add sediment and nutrients to fertile floodplain areas. Urban flooding results from the conversion of land from fields or woodlands to parking lots and roads, through which the land loses its ability to absorb rainfall. Urbanization of a watershed changes the hydrologic systems of the basin, such that during periods of heavy rainfall, floodwaters can rise very rapidly and peak with violent force. In addition, any low-lying area has the potential to flood. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system’s capabilities or backs up the system with debris. Streets can develop into swift moving rivers, and basements can fill with water.

Flood Insurance

Clackamas County participates in the National Flood Insurance Program (NFIP) that makes available federally backed flood insurance for all structures, whether or not they are located within the floodplain. More than 25 percent of NFIP claims are filed by properties located outside the 100-year floodplain, also known as the Special Flood Hazard Area (SFHA). Following the purchase of flood insurance, NFIP imposes a 30-day waiting period, so residents should purchase insurance before the onset of the rainy season to ensure coverage during the flooding season.

Membership within NFIP — and the availability to County residents of flood insurance — requires the County to manage its floodplain in ways that meet or exceed standards set by FEMA. NFIP insures building with two types of coverage: structural and contents. Structural coverage includes walls, floors,

insulation, furnace and other items permanently attached to the structure. Contents coverage may be purchased separately to cover the contents of an insurable building. Flood insurance also pays a portion of the costs of actions taken to prevent flood damage.

Since July 1, 1997, all NFIP policies include Increased Cost of Compliance coverage that assists with bringing structures into compliance with current building standards, such as elevating structures 1 foot or more above the height of the 100-year flood. The limit of this coverage is \$20,000.

Federal financial assistance requires the purchase of flood insurance for buildings located within the SFHA — a requirement that affects nearly all mortgages financed through commercial lending institutions. This mandatory requirement stipulates that structural coverage be purchased equal to the amount of the loan, or other financial assistance, or for the maximum amount available, which is currently \$250,000 for a single family residence. While the mandatory flood insurance purchase requirement has been in effect for many years, not all lending institutions required flood insurance in the past. Today, however, most institutions are now requiring the flood insurance purchase, and some are reviewing all mortgage loans to determine whether flood insurance is required and should have been required in the past. Upon refinancing a loan, nearly all lending institutions will enforce the flood insurance requirement. It is the lender's responsibility to check the Flood Insurance Rate Map (FIRM) to determine whether a structure is within the SFHA.

The mandatory flood insurance purchase requirement does not apply to loans or financial assistance for items that are not eligible for flood insurance coverage, such as vehicles, business expenses, landscaping and vacant lots. The requirement also does not apply to loans for structures not located in a SFHA, even though a portion of the lot may be within a SFHA. Persons located within SFHAs who received disaster assistance after Sept. 23, 1994 for flood losses to real or personal property must purchase and maintain flood insurance coverage, otherwise future disaster assistance will be denied.

Floodplain Understanding and Regulation

Maintaining the flow capacity in streams that cross County properties requires cooperation and assistance to prevent flooding and bank erosion. Following are some suggestions and information for understanding the ways that floodplains function and how the County regulates the floodplain in order to protect property and lives, while affording County citizens the ability to obtain floodplain insurance.

Do not dump or throw anything into ditches or streams: A plugged channel cannot carry water, and when it rains, the excess water must go somewhere. Trash and vegetation dumped into a stream degrades water quality of both the stream itself and its receiving waters, and every piece of trash contributes to flooding. Please report any observations of the dumping of debris or other objects into streams, drainage ways, or rivers to the Clackamas County Code Enforcement Department at (503) 353-4474.

Remove debris, trash, loose branches and vegetation: Keep banks clear of brush and debris to help maintain an unobstructed flow of water in stream channels. Do not, however, remove vegetation that is actively growing on a stream bank. Streamside vegetation is tightly regulated by local, state and federal regulations. Before undertaking any removal of streamside vegetation, contact the Clackamas County Planning Department at (503) 353-4500 or (503) 353-4501 and the Division of State Lands at (503) 378-3805. Please report any observations of the clearing of vegetation or trees on stream banks to the Clackamas County Code Enforcement Department at (503) 353-4474.

Obtain a floodplain development permit and / or building permit, if required: To minimize damage to structures during flood events, the County requires all new construction in the floodplain to be anchored against movement by floodwaters, resistant to flood forces, constructed with flood-resistant materials and flood-proofed or elevated so that the first floor of living space, as well as all mechanical and services, is at least 1 foot above the elevation of the 100-year flood. These standards apply to new structures and to substantial improvements of existing structures. The County defines a Substantial Improvement as any

reconstruction, rehabilitation, or addition to an existing structure, the cost of which exceeds 50 percent of the structure's appraised or market value (whichever the builder chooses to use). Additionally, most other types of development within the floodplain also require a floodplain development permit, such as grading, cut and fill, installation of riprap and other bank stabilization techniques. Contact the Clackamas County Planning Department at (503) 353-4500 or (503) 353-4501 for further information and prior to undertaking any activity within the floodplain.

Recognize the natural and beneficial functions of floodplains to help reduce flooding: Floodplains are a natural component of the Clackamas County environment. Understanding and protecting the natural functions of floodplains helps reduce flood damage and protect resources. When flooding spreads out across the floodplain, its energy is dissipated, which results in lower flood flows downstream, reduced erosion of the streambank and channel, deposition of sediments higher in the watershed and improved groundwater recharge. Floodplains are scenic, valued wildlife habitat, and suitable for farming. Poorly planned development in floodplains can lead to streambank erosion, loss of valuable property, increased risk of flooding to downstream properties and degradation of water quality.

Reduce risk of damage to homes: Practical and cost-effective methods for reducing or eliminating the risk of flooding are available to property owners whose homes have experienced damage from flooding in the past, or may experience damage in the future. Such techniques include elevation of the home, relocating the home to higher ground, constructing floodwalls or berms, flood-proofing and protecting utilities. Contact the Clackamas County Planning Department at (503) 353-4500 or (503) 353-4501 for further information and the Federal Emergency Management Agency, Region X at (425) 487-4600.

County Floodplain Information Services: The County can determine the relationship of a particular property to the floodplain, including: 1) whether the property is located within the Special Flood Hazard Area; 2) Flood Insurance Rate Map (FIRM) Zone for property; 3) Base Flood Elevation for property, if available; and 4) whether the property is located within the Floodway. Contact the Clackamas County Planning Department at (503) 353-4500 or (503) 353-4501 for further information.

Flood Safety Tips

Do not walk through flowing water: Drowning is the number one cause of flood deaths, mostly during flash floods. Currents can be deceptive; six inches of moving water can knock you off your feet. If you walk in standing water, use a pole or stick to ensure that the ground is still there.

Do not drive through a flooded area: More people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.

Stay away from power lines and electrical wires: The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines to the Portland General Electric or the County Emergency Management Office.

Shut off gas and electricity and move valuable contents upstairs: Be prepared in advance with a detailed checklist because warning of an impending flood may provide little time for preparation prior to evacuation.

Look out for animals, especially snakes: Small animals that have been flooded out of their homes may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals.

Look before you step: After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.

Be alert for gas leaks: Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns or open flames unless you know that the gas has been turned off and the area has been ventilated.