

## GENERAL QUESTIONS

### 1. What is “flooding”?

Generally, “flooding” means that there is a temporary depth of water over a land area that is normally dry. The National Flood Insurance Program has established a legal definition that includes a size threshold based on area or the number of flooded properties:

*“A flood is a general and temporary condition where two or more acres of normally dry land or two or more properties are inundated by water or mudflow.”*

### 2. Why does flooding occur?

There are three main ways flooding occurs in the Mid-Willamette Valley:

- High River Levels.** Widespread rainfall runoff and/or snowmelt raise the level of the Willamette River. This causes the creeks that flow into the river to backup and overtop their banks. Flooding of this type tends to be extensive, occurs throughout the Willamette Valley and impacts many communities. The flooding that occurred in **1996** is an example of this kind of flood.
- High Creek Levels.** Cloudbursts with high intensity, high volume rainfall can occur over relatively small areas, generating runoff that overwhelms creeks, their tributaries, and drainage systems, resulting in localized flooding. Flooding in south Salem in January **2012** was of this type.
- Blocked System.** Flooding can occur when the runoff exceeds the capacity of a component of the drainage system—such as an inlet, pipe, pond, ditch, or culvert—because the component is either too small for the flow or it is blocked by an obstruction.

### 3. Why can’t flooding be prevented?

Flooding can occur wherever it rains. Rather than “preventing” flooding, actions taken by property owners and agencies can only **reduce the risks** of flooding and **lessen the impacts** when flooding does occur. Property owners can purchase insurance on their buildings and contents. Government agencies can build projects to hold floodwaters back and route flows away from flood-prone properties.

#### 4. Does this area have a history of flooding?

There has been flooding in this region since before recorded time.

Much of the rich soil of the Willamette Valley originated in eastern Washington, Idaho, and western Montana, arriving here as a result of cataclysmic floods approximately **15,000 years ago**.

There have been no fewer than eight major flooding events in the past 200 years, including “The Great Flood” of **November 1861 to January 1862** inundated the town of Champoeg under as much as 30 feet of water. One of the worst floods in the Willamette Valley occurred from **December 1964 to January 1965**. This flood has been rated by the National Weather Service as one of the most destructive weather events in Oregon in the 20th century.

In **February 1996**, the region experienced a major flooding event caused by a combination of powerful rains, warm temperatures, and a deep snowpack. The Willamette River crested in Salem at 35.09 feet on February 8, a level comparable in magnitude to the December 1964 flood crest at the same location.

In **January 2012**, areas of south Salem received over nine inches of rain within a five-day period, causing flooding in the Battle Creek, Mill Creek, Pringle Creek, and Croisan Creek basins.

#### 5. What is a 100-year flood event and why can more than one occur in a year?

The term "100-year flood" refers to a flood that has a **one percent chance**—or a one chance in one hundred—of occurring **in any given year**. Likewise, the term "100-year storm" is used to define a rainfall event that statistically has a one percent chance of occurring in any given year.

The accuracy of the estimate depends on the amount of data available, the length of time the data have been collected, the accuracy of those data, land-use and climate changes over time, and how well the data fit into a statistical probability distribution.

It’s all about probability because flooding does not occur at regular intervals. If it did, you would see a 100-year event occur only once every 100 years. This is not true. In a very wet year, it is possible to experience more than one 100-year flood event. During a long drought, it is possible to go through many years and never see an extreme flooding event.

## WHAT IS THE GOVERNMENT DOING?

### 1. What is being done by agencies to reduce the risks of flooding?

The U.S. Army Corps of Engineers operates 13 dams in the Willamette River basin that help control high flows from rain and snowmelt. Since their completion, these dams have cumulatively prevented more than \$20 billion in flood damages in the Willamette Valley. Additionally, a network of weather stations and stream gauges located throughout the region help predict the location and severity of storm events which, in turn, aid in forecasting where potential flooding may occur. Near real-time information on flooding hazards *may* provide additional time for property owners and residents to prepare before the floodwaters arrives.

### 2. What are floodplain boundaries and how are they determined?

To identify a community's flood risk, the Federal Emergency Management Agency (FEMA) conducts a Flood Insurance Study. The study includes statistical data for creek and river flows, storm events, computer analyses, rainfall, and topographic surveys. FEMA uses this data to create the flood hazard maps that outline a community's different flood risk areas.

### 3. What is the City of Salem doing to address flooding risks?

The list below only highlights some of the many actions taken by the City of Salem to reduce flooding risks to residents and businesses.

**Projects.**

Over the years, millions of dollars have been invested in projects designed to reduce risks of flooding. These include constructing or replacing bridges, pipes, culverts, and detention ponds, as well as making improvements in local creeks that increase the capacity of the channel to carry storm flows.

**Programs.**

Salem residents and businesses are eligible for significant cost savings on their flood insurance premiums. This is because the City participates in the National Flood Insurance Program and receives credit for various programs, regulations, and planning activities.

**Maintenance.**

To help keep drainage facilities operating properly, Salem Public Works conducts routine and corrective maintenance

on many miles of pipes and ditches, hundreds of detention basins, and thousands of inlets.

**Early Warning.**

Salem Public Works operates a series of gauging stations and provides near real-time levels of local creeks. This information, made freely available to the public, can provide advance warning to residents and property owners of potential high water events.

**Regulations.**

The City of Salem implements land use regulations, including requirements specific to developments in the floodplain. Regulations for development in the floodplain can require, for example, a building to be constructed at an elevated height. Additionally, stormwater regulations require developers to limit runoff from their properties, which reduces stormwater impacts to areas downstream.

**Master Planning.**

Stormwater master planning is a tool for identifying and prioritizing actions designed to reduce the risks of flooding. By extensive data collection and computer analysis, master planning can evaluate both upstream and downstream impacts of potential structural projects before a project is built.

**Emergency Response.**

When flooding happens, the City of Salem establishes an emergency operating center and, in coordination with other agencies, takes action to protect life and property. These actions can include evacuating people in harm's way, closing roads, providing emergency shelters, making sand and sandbags available, and making available important information to Salem area residents and businesses.

**4. What is the City of Salem doing to lower my costs for flood insurance?**

The City of Salem participates in the Community Rating System, or CRS. This is a voluntary, incentive-based community program that recognizes, encourages, and rewards local jurisdictions whose floodplain management activities exceed the minimum standards of the National Flood Insurance Program (NFIP). Salem is currently one of only three CRS Class 5 communities in Oregon, which reduces flood insurance premiums for all residents and businesses in Salem by 25 percent.

## WHAT DOES THE STORMWATER MASTER PLAN DO?

### 1. What is in Salem's *Stormwater Master Plan*?

Salem's *Stormwater Master Plan* characterizes current *and* future problem areas and recommends projects to reduce flooding risks and other adverse impacts related to stormwater runoff. The plan also contains goals and policies that can be used to guide decisions regarding stormwater programs and projects, and the plan provides a summary of the main sources of funding for stormwater activities.

### 2. What kind of projects are included in the *Stormwater Master Plan*?

The *Stormwater Master Plan* lists over 300 projects that are located in nine creek basins in Salem. These projects vary cost, ranging from about \$10,000 to nearly \$20 million, and the total for all 300-plus projects is over \$300 million. In general, the projects are intended to safely and efficiently convey stormwater runoff in the City's pipes, ditches, culverts, and creeks, and into the Willamette River. Some projects improve the capacity of the drainage system by replacing undersized pipes or by improving channel habitats of our creeks. Some projects reduce the risks of flooding by constructing detention ponds to temporarily store runoff volumes during large storm events. Every project has a preferred timeframe to be completed: short-term (within five years); intermediate term (five to ten years); and long-term (over ten years).

### 3. What kinds of policies are included in the *Stormwater Master Plan*?

The goals and policies presented in the *Stormwater Master Plan* will guide how Salem should address challenges associated with urban stormwater runoff and constitute the foundational principles for determining how investments in stormwater projects and programs are to be made. The goals and policies are organized in eight categories: Planning; Capital Improvement Projects; Flood Risk Reduction; Operations and Maintenance; Quantity and Quality; Regulations and Standards; Intergovernmental Coordination; and Financing.

### 4. Are there any policies that impact me as a resident or business owner?

There are several policies under the category of Flood Risk Reduction that relate to how the City identifies flood-related hazards. This can have a direct impact on residents and business owners. For example, Policy 3.1 (Floodplain Regulation) states that the City will use the floodplain management standards of the Federal Emergency Management Agency (FEMA) and Policy 3.2 (Flood Insurance Rate Maps) requires the City to adopt FEMA's Flood Insurance Rate Maps. Together,

these policies reflect how individual properties located in the floodplain will be regulated. Policy 3.15 (Updating Floodplain Maps) is important in that it establishes how the City will update its floodplain maps as new information is made available. More specifically, the City will not use the FEMA-approved methodology for delineating floodplains that essentially removes from consideration all non-accredited levees. Instead, the City will use a methodology that applies best professional judgement regarding whether non-accredited levee systems should be credited for reducing risks of flooding.

**5. Why not have a policy that simply requires all new development and redevelopment projects to retain 100% of all stormwater on the property?**

Fundamentally, all properties will produce some runoff regardless of the level of development. Consider, for example, that the mid-Willamette Valley periodically experienced severe flooding well before towns were built and roadways paved. The degree to which stormwater can be retained on a property varies with the amount of rainfall, the size of the property, and the property's characteristics such as slope, soil, depth of groundwater, vegetation, and impervious surface area. Salem already has regulations and standards specifically designed to reduce runoff from new projects, and these regulations could be changed by City Council. However, any actions by Council to make the regulations more stringent—or less so—will require careful considerations of the costs, risks, impacts, and practicability of implementation. At issue here is how best to balance the regulatory relationship between Salem's growth as new properties are developed for homes and businesses, and the impacts this growth will have on existing properties and the environment.

**6. Having completed detailed basin plans for Battle Creek, Mill Creek, and Pringle Creek, what creek basins are next?**

Amendments to the *Stormwater Master Plan* will occur as basin plans are revised following a rotating planning cycle as shown in Table 1.4 of the plan:

- 1 Battle Creek Basin
- 2 Pringle Creek Basin
- 3 Mill Creek Basin
- 4 Glen-Gibson Basin
- 5 Little Pudding Basin
- 6 Upper Clagget Basin
- 7 Croisan Creek Basin
- 8 West Bank Basin
- 9 East Bank Basin

## WHAT CAN I DO?

### 1. How can I be better prepared for flooding?

Here are just a few specific actions you can take to be better prepared:

- Review your current homeowner's insurance policy. Become familiar with what is and *is not* covered. Be aware that damage to property and possessions caused by flooding are typically not covered.
- If you are at risk of flooding, call your insurance agent and purchase flood insurance for your home and business and their contents.
- Make a plan. Identify evacuation routes. Share your plan with others.
- Itemize and take pictures of your important and valuable possessions.
- Keep valuable items and family heirlooms on the upper floors of your home or building.
- Learn about your community's emergency plans and how to get information during an emergency.  
See: <https://www.cityofsalem.net/Pages/emergencies.aspx>.
- Identify potential hazards and know how to secure or protect them before the flood strikes. Know how to turn off electrical power when there is standing water, fallen power lines, or before you evacuate.

### 2. Who do I contact if I have a problem with stormwater on my property?

Please call Public Works Dispatch at **503-588-6333** if you are having problems with flooding on your property.

### 3. How can I find out if I'm at risk of flooding?

The City of Salem provides free information regarding flood hazards within our community. Public Works Development Services staff are available at City Hall, 555 Liberty Street SE, Room 325, Salem, Oregon, or by phone at **503-588-6211**.

Additionally, the Flood Map Service Center of the Federal Emergency Management Agency is the official public source for flood hazard information and information on the National Flood Insurance Program. You can find your official flood map, access a range of other flood hazard products, and take advantage of tools for better understanding flood risks.

<https://msc.fema.gov/portal/home>

**4. My lender tells me I need flood insurance...what should I do?**

Locate an insurance agent in your area and purchase a flood insurance policy.

**5. My property is just outside of the 100-year mapped floodplain...so I don't have to do anything, right?**

If you are near a mapped floodplain, you should strongly consider investing in a flood insurance policy.

Predicting flooding is an inexact science. Rising floodwaters do not stay within with the theoretical flood boundary lines drawn on maps.

According to the Federal Emergency Management Agency, more than 20 percent of all flood claims are for properties located outside the mapped 100-year floodplain.

**HERE IS AN INTERESTING STATISTICAL CONCEPT:**

If you are in a 100-year mapped floodplain, that means that *each year* you have a **1-in-100 probability** of experiencing a 100-year flooding event.

Based on the laws of statistics, this also means that over a *30-year period* you have a **1-in-4 probability** of experiencing a 100-year flooding event.



## HOW CAN I LEARN MORE?

### 1. Local Information during a Flooding Emergency or other Emergencies

In times of emergency, go to this webpage for the latest information regarding flooding, road closures, evacuations, shelters, sandbag locations, and other important information.

<http://www.cityofsalem.net/Emergency-Information/Pages/default.aspx>

### 2. Mid-Willamette Valley High Water Watch

To see near real-time information on area streams and rainfall to help understand current and potential flood risks, go to:

<https://hww.onerain.com/home.php>

### 3. Salem Community Alert System

Be informed about emergencies or important community alerts by signing up for the Salem Community Alert System. This system enables us to quickly provide you with critical information for a variety of situations such as flooding, police activity requesting resident action, evacuations, hazardous materials releases and other situations where action on your part is desired for life safety reasons.

<http://www.cityofsalem.net/Pages/SalemCommunityAlertSystem.aspx>

### 4. Salem Community Emergency Response Team

The Community Emergency Response Team (CERT) program teaches volunteers how to prepare for a disaster and deal effectively and safely with minor emergencies that can occur in neighborhoods during a disaster.

<http://www.cityofsalem.net/Departments/Fire/EmergencyManagement/>

<http://www.cityofsalem.net/Departments/Fire/EmergencyManagement/Documents/CERTBrochure.pdf>

### 5. General Information on Flooding, Flood Risks, and Insurance

The Federal Emergency Management Agency maintains a comprehensive website that contains information on flooding, flood risks, flood insurance, preparation for flooding, recovery from flooding, and much more.

<https://www.floodsmart.gov/floodsmart/>

### 6. The Facts about Flood Risks and Insurance

A one-page document that summarizes key points regarding flooding and flood insurance.

<https://www.floodsmart.gov/toolkits/flood/downloads/FloodRiskAndInsurance-KnowTheFacts.pdf>

## 7. Floodproofing Non-Residential Buildings

This document, published by FEMA, provides guidance on various floodproofing technologies for non-residential buildings, including information about regulatory requirements, design considerations, and descriptions of floodproofing methods and equipment.

<http://www.fema.gov/media-library/assets/documents/34270>

## 8. Flood Readiness

This website by the Centers for Disease Control and Prevention provides key facts about flood readiness, emergency supplies, and actions to be taken during a flood.

<http://emergency.cdc.gov/disasters/floods/readiness.asp>

## 9. Floods: Recurrence Intervals and 100-Year Floods

This fact sheet from the United States Geological Survey describes what is meant by the term “100-year flood” and provides additional information and definitions about flooding.

<http://pubs.usgs.gov/fs/FS-229-96/>

## 10. How to Properly Use Sandbags

There are many online information sheets and videos that illustrate how to properly use sandbags during a flooding emergency.

*Fact Sheet: Proper Use of Sandbags (District of Columbia)*

<http://www.dinobags.com/usr/products/small-sandbags/how-to-use-sandbags.pdf>

*Sandbagging Techniques (US Army Corps of Engineers)*

[http://www.nws.usace.army.mil/Portals/27/docs/emergency/NWD\\_Sandbag\\_Pamphlet.pdf](http://www.nws.usace.army.mil/Portals/27/docs/emergency/NWD_Sandbag_Pamphlet.pdf)

*Flood Fighting: How to Use Sandbags (US Army Corps of Engineers)*

<http://www.ocem.org/docs/how-to-use-sandbags-usace.pdf>

*Video: How to Properly Fill and Stack a Sandbag (Lake County, IL)*

<https://www.youtube.com/watch?v=4jN85pz9J9k>