

# Appendix E

## Flood Profile

Floods are Oregon’s most frequently occurring natural disasters. The consequences of flooding have been severe in Oregon, including loss of life, economic loss and property damage.<sup>1</sup> Floods occur at various times throughout the year and occur in almost every Oregon county. The causes of floods are numerous, ranging from large amounts of rainfall to snow melts.

Eugene does not get a lot of snow – snowfall represents only 2 percent of the Eugene’s annual precipitation. The snow does not accumulate but it melts quickly, which can contribute to flooding. The average annual precipitation in Eugene is 46 inches, with 86 percent falling between the months of October and May.<sup>2</sup>

Floods can have devastating impacts on almost every aspect of the University community, including building and infrastructure damage, and economic loss from business interruption. The university community must be aware of flooding impacts and assess its level of risk to flooding and the corresponding impacts.

## Characteristics & Terminology

### Types of Floods

The university’s urban setting and its proximity to the Willamette River and Amazon Creek make it susceptible to three types of floods: urban flooding, riverine flooding and flash flooding.

### Urban Flooding

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. This transition from pervious to impervious surfaces results in more water running off instead of filtering into the ground. Heavy rainfall collects and flows faster on impervious concrete and asphalt surfaces. During urban flooding, streets can become swift moving rivers and basements can fill with water. Storm drains often back up with fallen leaves causing additional, localized flooding.<sup>3</sup>

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<sup>1</sup> George H. Taylor, Raymond R. Hatton. The Oregon Weather Book, Oregon State University Press, September 2000. p. 77.

<sup>2</sup> City of Eugene, “Stormwater Basin Master Plan: Amazon Basin,” August 2002. p.18.

<sup>3</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. 2000. P. 9

## **Riverine Flooding**

Riverine floods are the one of the most common of all floods. They occur when rivers and streams overflow their banks and inundate low-lying areas. This type of flooding usually occurs after spring rains, heavy thunderstorms, or snowmelt. These floods can be slow or fast-rising, and generally develop over a period of days. The most severe flooding conditions usually occur when direct rainfall is augmented by snowmelt. If the soil is saturated or frozen, stream flow may increase due to the inability of the soil to absorb additional precipitation.<sup>4</sup>

## **Flash Flooding**

Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods occur with little or no warning and can reach full peak in only a few minutes.<sup>5</sup> They normally occur in the summer during the thunderstorm season. Flash flooding is relatively rare in Eugene and on campus.

## **Flood Terminology**

### **Floodplain**

A floodplain is an area of land adjacent to a river, stream, lake estuary or other water body that is subject to flooding. These areas, if left undisturbed, store excess floodwater. The floodplain is made up of two sections: the flood fringe and the floodway.<sup>6</sup>

### **Floodway**

A floodway is one of two main sections that make up the floodplain. Floodways are defined as the channel of a river or stream and the adjacent overbank areas. The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. The National Flood Insurance Program (NFIP) requires that the floodway be kept open and free from development or other structures, so that floods are not obstructed or diverted onto other properties.<sup>7</sup>

### **Flood Fringe**

The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward. This is area where

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<sup>4</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. 2000. P. 8

<sup>5</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. 2000. P. 8

<sup>6</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. 2000. P. 10

<sup>7</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. 2000. P. 10

development is most likely to occur, and where precautions to protect life and property need to be taken.<sup>8</sup>

## Location and Extent of Flood Hazard

Despite Oregon’s history of floods and the university’s proximity to the Willamette River, the University of Oregon has not sustained severe damages or loss from riverine flooding. In fact, the university campus is not located in Eugene’s 100-year floodplain. A 100-year flood is the flood that has “a 1 percent chance of being equaled or exceeded in any given year.”<sup>9</sup> They are not frequent events.

With regard to urban flooding, the City of Eugene conducted a storm water assessment, drawing up master plans for storm water management for 6 different basins, including the Amazon Basin and the Willamette River Basin. The main university campus is located within the Willamette Basin, which according to the Eugene Stormwater Management Basin Plan, does not have a “significant problem [for localized flooding] under existing or future land use conditions.”<sup>10</sup> The university has two family housing developments that are located in the Amazon Basin – Westmoreland Apartments between 13<sup>th</sup> and 18<sup>th</sup> streets on Garfield and Spencerview apartments between 21<sup>st</sup> and 24<sup>th</sup> on Patterson. The flooding in these areas has been minimal due to the city of Eugene’s drainage and storm water management system.

## Previous Occurrences of Flood Events

The areas surrounding the University of Oregon have experienced many floods over the past hundred years, from 1890 through the present. Of these floods, few impacted the university, or resulted in damages. The floods listed in Table E.1 do not represent a comprehensive flooding history of Eugene. They represent flooding that directly impacted the University. In addition, this list does not include water damage that was not caused by natural occurrences, such as a break in a water main.

The table below lists the naturally occurring floods that have been documented at the University over the past one hundred years. (The university experienced flooding and water damage in Feb. 2006. This event is not included in this table.) Insurance claims amounts are the amount the University claimed to recover damages from flooding. This data is only available for dates after 1977.

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<sup>8</sup> Planning for Natural Hazards: Oregon Technical Resource Guide. 2000. P. 11

<sup>9</sup> Community Planning Workshop & Oregon Department of Land Conservation and Development. “Planning for Natural Hazards: Flood TRG,” July 2000. p.11

<sup>10</sup> City of Eugene, “Stormwater Basin Master Plan: Willamette Basin.” August 2002, p. 7

**Table E.1. University of Oregon Flooding History**

<b>Date</b>	<b>Location</b>	<b>Type of Flood</b>	<b>Details</b>	<b>Insurance Claims</b>
January 28, 1954	Amazon Creek	Riverine and Urban	Streets and yard at Amazon flats inundated by rising water after 2 inches of rain in 24 hours. No one forced to vacate.	
January 4, 1956	Amazon Creek	Riverine and Urban	Amazon slough flooded yard and streets in Amazon flats. Major items of expense: pumping of floodwaters and labor expenses for the clean up of the residue.	
December 1964 - January 1965	Willamette Basin, Amazon Creek	Riverine and Urban	Record flooding throughout Willamette Basin. Two intense storms. Near-record early season snow depths. Largest flood in Oregon since dam construction on upper Willamette ('40s-50s). \$34 million in damages. Dams on tributaries of the Willamette were calculated to have reduced flood levels at Eugene from 39 to 24.2 feet.	
December, 1978	Western Oregon	Urban	Intense heavy rain, snowmelt, saturated ground.	\$9,786.19
February, 5-8, 1996	Willamette Valley	Urban	4-day total inches: 9.14". Record breaking rain, warm temperatures and a deep snowpack	\$9,491.70
November 19, 1996	Lane County	Urban	Basement flooding in Hendricks Hall, Gilbert Hall and parts of the Law School.	\$8,387.61
Nov 21, 1998	University Campus	Urban	Flooding in utility tunnels, Gerlinger Hall, PLC	\$8,687.50
January 18, 2000	University Campus	Urban	Flood damage to the basement of McMorran House	\$2,000.00
Nov 22, 2001	University Campus	Urban	Flood damage to Cascade Hall, Friendly Hall	\$7,419.80
Dec 13, 2003	University Campus	Urban	Basement and first floor flooding in the Knight Law Center and Susan Campbell due to clogged storm drains. Floors replaced.	\$33,136.83