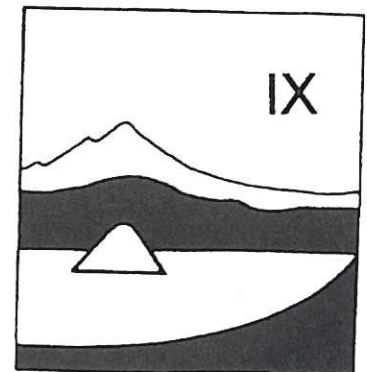


## AREAS SUBJECT TO NATURAL DISASTERS & HAZARDS

Detroit  
comprehensive plan



## **IX: AREAS SUBJECT TO NATURAL DISASTERS AND HAZARDS**

Oregon's statewide planning goals and guidelines include a goal to protect life and property from natural disasters and hazards. Identifying and inventorying the types of potential natural disasters and hazards that might affect the community accomplish this goal. Inventory information is the basis of subsequent planning and implementation activities. The purpose of this section is to identify the types and locations of natural disasters and hazards within the Detroit UGB, based on existing information.

### **SEISMIC HAZARDS**

Recent earthquakes in the northern Willamette Valley area and studies of estuaries on the Oregon Coast suggest that damaging earthquakes are likely to occur in Oregon. The Scotts Mills quake of 1993 (Maldin and others, 1993) had a Richter magnitude of 5.7 (moment magnitude of 5.6), and caused widespread, though generally minor, damage in the central and northern Willamette Valley. The preliminary damage estimate for this quake was 28.4 million dollars, and fortunately included no loss of life (Black, 1996). Quake damage was most intense in a northwest-southeast trending area that included Newberg, Woodburn, Mt. Angel, and Molalla (Madin and others, 1993). The Scotts Mills event indicated that faults in this area are still active. Great subduction earthquakes are the most powerful types ever recorded and recent investigations have found evidence that quakes along the Cascadia subduction zone affect Oregon every 400 to 600 years (Wang, 1997).

Due to increased awareness of potentially damaging earthquakes in Oregon, the Oregon Building Codes Division changed construction standards for western Oregon. Prior to 1993, all of Oregon was in Seismic Zone 2b. In 1993, the western half of Oregon (west of the Cascades) was upgraded to Seismic Zone 3. This increased the structural standards for buildings constructed in this zone. For example, masonry and concrete structures require additional construction provisions and wood walls require additional bracing in Seismic Zone 3.

Because there are no known fault lines nearby, the greatest risk of damage to the Detroit area is most likely from a large-scale earthquake on the Cascadia subduction zone. There are three factors that can affect the severity of damages that occur during an earthquake: ground shaking amplification, liquefaction and landslides. Detroit has not been specifically evaluated for risks from these types of damage, but it is possible to draw some general conclusions based on geomorphic information about the area.

Ground shaking amplification can be determined by examining the types of soils and rocks near the surface. These materials can increase or decrease the strength or frequency of shaking experienced at the surface. In general the softer the soils or rock are at the surface, the greater amplification of shaking.

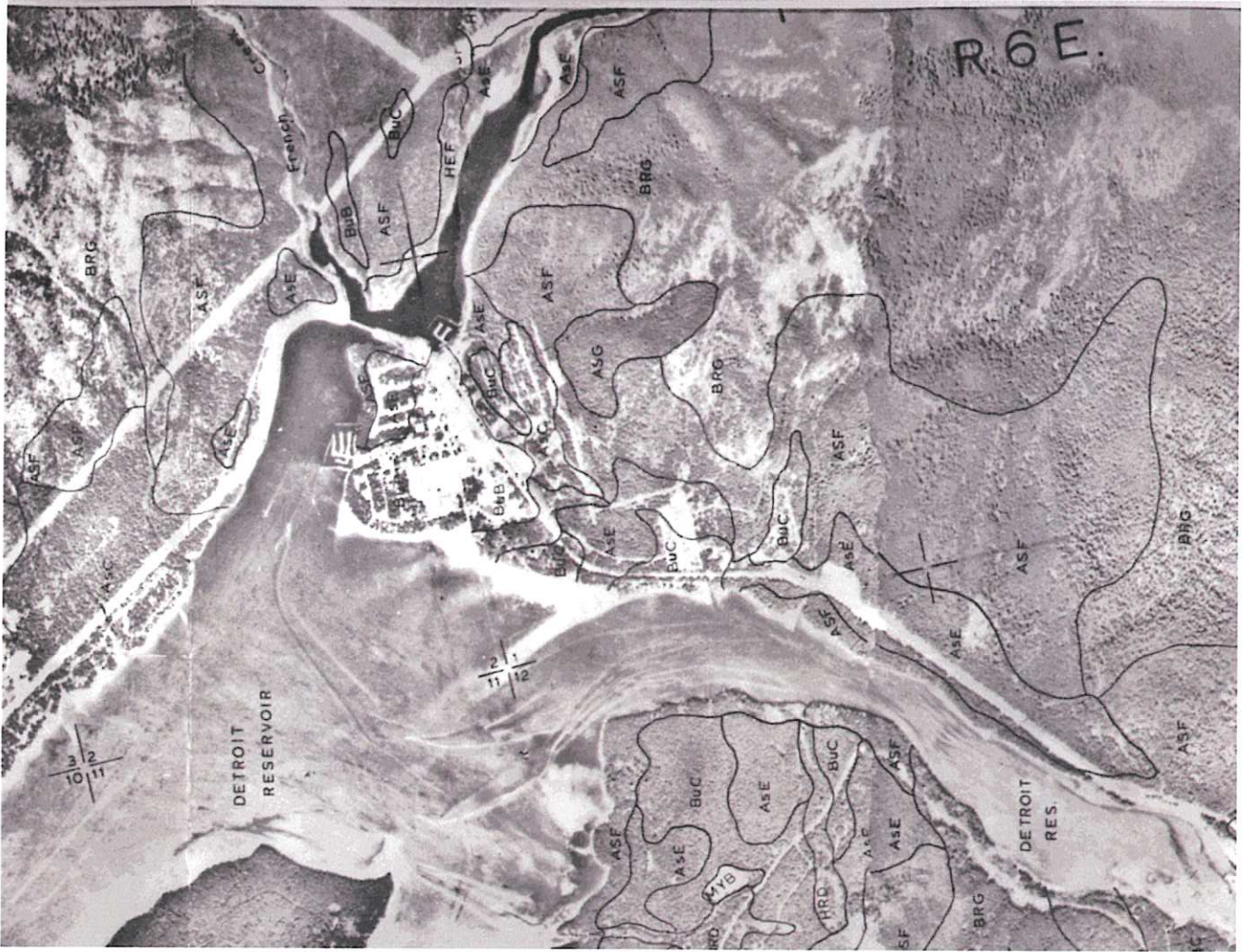
Liquefaction occurs during an earthquake when shaking causes a saturated soil to act as a liquid instead of a solid. Potential damages include differential vertical settlement of foundations and structures, and horizontal flow in the downhill direction or toward the drainages. Liquefaction hazard is enhanced by soil moisture and would be higher during the wet winter months and near ponds, drainages, and streams.

Hazards from earthquake-induced landslides are calculated by examining the steepness of slopes in an area. Slopes of less than five degrees have a low risk of earthquake-induced landslides. Slopes with an angle between five and 25 degrees have a moderate risk. Slope angles exceeding 25 degrees have a high risk of landslides caused by earthquakes.

**Table 17** lists the soil types and associated hazards found in the Detroit area. **Figure 5** shows the location of the various soils.

**TABLE 17. SELECTED CHARACTERISTICS OF SOILS IN DETROIT**

Map Symbol	Map Unit Name	Erosion Hazard	Runoff Rate	Shear Strength/Load Bearing Capacity	Permeability	Shrink-Swell Potential	Development Limitations
AsC	Aschoff cobbly loam 8-15%	Moderate	Medium	Low	Moderate	Low	Severe: slopes
AsE	Aschoff cobbly loam 15-30%	High	Rapid	Low	Moderate	Low	Severe: slopes
AsF	Aschoff cobbly loam 30-60%	High	Rapid	Low	Moderate	Low	Severe: slopes
AsG	Aschoff cobbly loam 60-90%	High	Rapid	Low	Moderate	Low	Severe: slopes
BRG	Brightwood very gravelly loam, 50-90%	Severe	Rapid		Moderately rapid		Severe: steep slopes, erosion and high content of rock fragments
BuB	Bull Run-Aschoff complex 3-8%	Slight	Slow	Low	Moderate	Low	Low strength
BuC	Bull Run-Aschoff complex 8-15%	Slight to medium depending on slope	Medium	Low	Moderate	Low	Slight to moderate depending on slope
HEF	Henline very stony sandy loam, 30-55%	Severe	Rapid	Moderate	Moderately rapid	Low	Severe: slopes



**Figure 5**  
**CITY OF DETROIT**  
**SOILS MAP**

## FLOOD HAZARDS

### **Riverine Floods**

There are two types of flood hazards that could impact the City of Detroit: riverine floods and urban flooding. Riverine floods – overbank flooding of rivers and streams – are the most common of all natural disasters. Most communities in the United States have the potential to experience this type of flooding after spring rains, heavy thunderstorms or snowmelt. These floods can be slow or fast rising, but generally develop over a period of days.

Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over wide geographic areas, causing flooding in hundreds of small streams, which then drain into the major rivers. The most severe flooding conditions generally 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. The danger of riverine flooding occurs mainly during the winter months, with the onset of persistent, heavy rainfall and during the spring with the melting of snow in the Cascade and Coast Ranges.

The City of Detroit has adopted floodplain overlay zoning regulations to participate in the National Flood Insurance Program (NFIP). Participation in the National Flood Insurance Program makes flood insurance available to the city. The floodplain overlay zone regulates the area designated as the 100-year floodplain by the Flood Insurance Rate Map (FIRM).

In 1979, the Federal Emergency Management Agency (FEMA) adopted a revised Flood Insurance Study (FIS) and flood insurance rate map (FIRM) for Detroit. Countywide maps and flood insurance studies for Marion County, dated January 19, 2000, have superseded the FIS and FIRM. The FIRM shows the 100-year floodplain along the banks of Detroit Lake, French Creek and the Breitenbush River. The 100-year floodplain is defined as those areas having at least a one percent chance of flooding within any given year. The 100-year floodplain is mostly within the banks of the lake and therefore not

likely to impact most development in the city. There have been no flood insurance claims during the period from 1978-2000. The Detroit Dam controls the water levels of the lake. During winter and early spring, when flooding is most common in western Oregon, the lake levels are lowered far below the banks of the lake.

### **Urban Flooding**

Urban flooding results when land is converted from fields or woodlands to roads and parking lots, causing the land to lose its ability to absorb rainfall. This transition from pervious to impervious surfaces results in more water running off instead of filtering into the ground. Thus, water moves more quickly to watercourses, with resulting water levels rising above historic, pre-development levels. During periods of urban flooding, streets can become swift moving rivers and basements can fill with water. Storm drains often back up with yard waste causing additional, localized flooding.

Another cause of urban flooding is grading associated with development. Grading may cause changes in drainage direction from one property to another. Although this is a small, isolated impact of development, it may be significant to the adjacent property owner. The Detroit Development Code prohibits grading of a site that would lead to runoff or erosion onto adjacent sites.

Detroit lacks a comprehensive public storm drainage system. The city is drained by a series of open ditches. While there are no documented problems with the existing storm drainage system, the city will need to develop a storm-drainage system plan to handle the impacts of new development and protect surface water quality in the area.

### **WEAK FOUNDATION SOILS**

The shear strength and load-bearing capacity of many soils in Detroit (**Table 17**) have low to moderate shear strength and load bearing capacity. Shrink-swell potential for most soils in the city is low.

## EROSION

The erosion hazard for many soil types in Detroit is moderate to severe due to steep slopes. Vegetation removal, earthwork, inadequate storm drainage, or increasing the steepness of slopes are all factors that could cause increased erosion problems in the city.

Many areas of the city exceed 20 percent slope. Aschoff cobbly loam and Bull Run – Aschoff Complex are the predominant soil types throughout the Detroit area. The Aschoff cobbly loam soil type ranges from 8-90 percent slope, with mostly 15-60 percent slopes in the city. Other major soil types in the city with erosion hazards include: Henline very stony sandy loam and Brightwood very gravelly loam.

## LANDSLIDE HAZARDS

Landslides occur when earth materials fall, slide or flow down a slope. Landslides are triggered by both natural and human-induced changes. Landslide hazards in a particular area are studied beginning with an inventory of existing landslides in order to identify the key local causal factors. Natural landslide hazards are related to several factors that include slope, soil and rock strength, and ground and surface water. In general, areas with steep slopes, high groundwater tables, and highly weathered rock are prone to sliding. Human activity can increase natural slide hazards.

There are three major types of landslides: falls, slides and flows. Falls move through the air and land at the base of a slope. Material is detached from a steep slope or cliff and descends through the air by free fall or by bouncing or rolling downslope. Slides move in contact with the underlying surface. Slides include rockslides—the downslope movement of a rock mass along a plane surface; and slumps—the sliding of material along a curved (rotational slide) or flat (translational slide) surface. Flows are plastic or liquid movements in which mass breaks up and flows during movement. Debris flows normally occur when a landslide moves downslope as a semifluid mass scouring or partially scouring soils from the slope along its path.



According to FEMA, areas that are generally prone to landslide hazards include existing old landslides; the bases of steep slopes; the bases of drainage channels; and developed hillsides where leach-field septic systems are used. Detroit has not been specifically evaluated for landslide risks, but the steepness of the slopes in the area do indicate the potential for landslide hazards. As described in the previous section, many areas in the city exceed 20 percent slope.

### **Rapidly Moving Landslides**

In 1999, the state legislature approved Senate Bill 12, directing state and local governments to protect people from rapidly moving landslides. Rapidly moving landslides are channelized (moving through canyons or streambeds) or open-slope debris flows.

Senate Bill 12 provided funding to the Oregon Department of Forestry and the Department of Geology and Mineral Industries (DOGAMI) to map areas in the state at risk from rapidly moving landslides. County maps produced by ODF are available now. The Marion County map shows a high risk for landslides in the vicinity of Detroit, but more detailed information is needed to evaluate hazards within the city. The DOGAMI maps, scheduled for release in Spring 2002, will provide more localized information. The maps produced by DOGAMI will identify "Further Review Areas": areas that require site specific review prior to land management or building activities. Senate Bill 12 also funded development of a model ordinance for local governments to use to regulate any identified Further Review Areas.

### **WILDFIRES**

The land around Detroit is mostly forested with a mix of public and private forestland owners. The federal government, represented by the Willamette National Forest, is the predominant landowner in the area, with smaller areas owned and managed by the state of Oregon and various private landowners. The Willamette National Forest and Oregon Department of Forestry share the responsibility for wildfire prevention and protection with support from the Idanha-Detroit Rural Fire Protection District.

In Spring 2001, an Integrated Natural Fuels Management Strategy (INFMS) for the area was released. The INFMS covers the Willamette National Forest, the Eugene Bureau of Land Management (BLM) district and portions of the Salem BLM district. This document evaluated past fire management practices in the area and proposed new goals and policies to work with fire in the future.

The INMFS included an evaluation of the risk of wildland fires in the area. The area around Detroit was rated as having low to moderate risk of fire. The history of fires in the area shows a trend of fires with variable severity and low (100-200 year) to moderate (50-100 year) frequency.

The Willamette National Forest is currently working on a Fire Management Plan that is expected to be complete by December 2001. This plan will focus on resource management, protection of endangered species and protection of human life and property.

While the Willamette National Forest is primarily responsible for protection of the federal forestland in the area, the ODF is responsible for protection of communities from wildfire. One of the biggest expenses of fire protection is fighting and suppressing wildland fires near urban and suburban areas. In Oregon, these costs are rising because of increased development in these urban/forest interface areas.

To help manage these rising costs, state legislators passed Senate Bill 360, the Oregon Urban-Interface Fire Protection Act, in 1997. Codified as ORS 477.015-016, the Urban-Interface Fire Protection Act will be fully implemented on or after January 1, 2002. The following will be accomplished as directed by the statute:

1. Directs the State Forester to establish a system of classification for forestland-urban interface areas;
2. Defines forestland-urban interface areas;
3. Provides education to property owners about fire hazards in forestland-urban interface areas. Allows a forestland-urban interface county committee to establish classification standards;

4. Requires maps identifying classified areas to be available to the public;
5. Requires public hearings and mailings to affected property owners on proposed classifications;
6. Allows property owners appeal rights;
7. Directs the Board of Forestry to promulgate rules that set minimum acceptable standards to minimize and mitigate fire hazards within forestland-urban interface areas; and
8. Creates a certification system for property owners meeting acceptable standards. Establishes a \$100,000 liability limit for cost of suppressing fires, if certification requirements are not met.

## **Natural Hazards Goals and Policies**

### **GOAL: TO PROTECT LIFE AND PROPERTY IN DETROIT FROM NATURAL DISASTERS AND HAZARDS**

#### **Objective:**

##### **To reduce the risk of earthquake damages in Detroit.**

- Policy: Detroit will promote earthquake hazard awareness and hazard mitigation activities in the community by periodically providing information to residents in their utility bill and displaying pamphlets or other literature related to this topic at city hall.
- Policy: Detroit will coordinate an assessment of the level of earthquake preparedness in the community and vulnerability of key public facilities. Prioritized lists of hazard reduction activities will be developed.

#### **Objective:**

##### **Reduce and prevent flood damage in Detroit**

- Policy: Detroit will continue to participate in the National Flood Insurance Program. Detroit will apply the floodplain overlay zone standards to new development that occurs within designated 100-year floodplains.
- Policy: Detroit will protect transportation facilities and plan for emergencies. Transportation facilities and services located in floodways and floodplains must be designed and constructed to withstand flooding or excessive damage will occur. Emergency management plans and routes must take into account which routes are likely to be closed during flood events and devise alternative routes.

**Objective:**

**Manage storm water runoff.**

- Policy: Detroit will develop a storm-water management plan that manages storm water runoff and addresses water quality concerns and flood mitigation from local and watershed perspectives.

**Objective:**

**Protect people and property from landslide damage.**

- Policy: If the Oregon Department of Geology and Mineral Industries (DOGAMI) maps (scheduled for release Spring 2002) reveal any “Further Review Areas” for rapidly moving landslides within the city, Detroit will adopt an ordinance to regulate such areas.

**Objective:**

**Protect people and property from wildfires.**

- Policy: Detroit will promote wildfire hazard awareness and hazard mitigation activities in the community by periodically providing information to residents in their utility bill and displaying pamphlets or other literature related to this topic at city hall.
- Policy: Detroit will work with the USDA Forest Service, Oregon Department of Forestry, Marion County and the Idanha-Detroit Rural Fire Protection District to prevent and minimize damage from wildfires in the urban interface.