

SECTION 2 HAZARD ANALYSIS

2-A Introduction

This Emergency Management Plan (EMP) is based on an analysis of the natural and technological hazards that can affect Hillsboro residents and businesses. With a clear understanding of the hazards, we can prepare appropriate mitigation, response, and recovery policies, plans, and procedures.

This hazard analysis is the foundation upon which the City's Emergency Management Plan (EMP) and departmental implementing procedures are developed. The method used to analyze the hazards facing the city does not predict the occurrence of a particular event; but, rather, it serves to provide a sense of hazard priorities or relative risk. By quantifying and comparing the risks of various hazardous events, the city can focus its planning efforts in those areas of greatest concern.

The hazard analysis is formatted to provide background information on the city's geography, demography, and hazards; a description of the analysis methodology; and a summary of the hazards, listed in order of risk rating. A Hazard Analysis Worksheet is attached at the end of the document.

2-B Geographic and Demographic Description

The City of Hillsboro is located in central Washington County, Oregon, 17 miles west of the city of Portland. Hillsboro is bordered on the north by the city of North Plains and unincorporated areas, on the east by the city of Beaverton and incorporated areas, on the south by unincorporated areas, and on the west by the city of Cornelius and unincorporated areas.

Incorporated in 1876, Hillsboro occupies an area of 22 square miles and, with a 2002 population of 73,236, is the second largest city in Washington County and the sixth largest in Oregon. Hillsboro is also the County Seat. Washington County has a 2000 population of 445,342, about 58% of which live in the 16 incorporated cities within the county.

Hillsboro and eastern Washington County are heavily developed, with light manufacturing and retail industries dominating. Hillsboro is the heart of the "Silicon Forest," with high technology companies as its largest employers. Washington County is very rural to the west of Hillsboro, with agriculture as the dominant industry.

Washington County is bordered by Tillamook County on the west, Yamhill and Clackamas Counties on the south, Clackamas and Multnomah Counties on the east, and Columbia County on the north. Washington County, together with Clackamas, Multnomah, and Columbia Counties in Oregon, and Clark County, Washington, form the Portland metro area, which has a population of about 1.5 million people.

The city's location is Latitude: N 45° 31' 23", Longitude: W 122° 59' 18". The Hillsboro airport sits at an elevation of 204' above sea level, and the downtown area sits at 196' above sea level. The monthly average low temperature is 33°F, and the monthly average high is 81°F. The average humidity is 62% on a July afternoon and 82% on a January afternoon. Annual Precipitation is 37.39". The coldest month is January; the warmest month is August; and the wettest month is December.

Hillsboro is located in the Tualatin River Valley, and its dominant natural landscape features are the Tualatin River and its various feeder creeks, including Dairy, McKay, and Rock; and the Jackson Bottom Wetlands. The city is relatively flat, but the Coastal Range is visible off to the west, Bull and Cooper Mountains are visible to the south, and Portland's West Hills and the Cascade Range's Mount Hood are visible to the east.

Major highways in Hillsboro include State Highway 26, called the Sunset Highway, which runs across the north edge of the city and links Portland to the coast; and State Highway 8, called the Tualatin Valley Highway, which runs east-west through the city, connecting Beaverton and Forest Grove.

The Hillsboro Airport, which is operated by the Port of Portland, is the second busiest airport in the state (second only to Portland International Airport), and the busiest "general aviation" airport in Oregon. An 870-acre executive airport with two runways (6,600' and 4,000') and three full-service fixed-base operators, it provides all the facilities necessary to support jet and propeller-driven aircraft and helicopters. Hillsboro Airport is also the site of the annual Rose Festival Air Show.

The Southern Pacific Railroad provides limited freight service through Hillsboro. The Tri-County Metropolitan Transit District (Tri-Met) provides light rail commuter service from Hillsboro to Portland and east Multnomah County, and bus service throughout the tri-county region.

Hillsboro is home to a research facility associated with Oregon Health and Sciences University, which includes the Regional Primate Center.

2-C Hazard Identification and Classification

The hazards that exist can be identified by:

- A. Reviewing the State, County, and adjacent jurisdictions' hazard analyses;
- B. Interviewing city leadership, first responders, and long-time residents;
- C. Driving around the area and conducting a "windshield assessment;"
- D. Searching local newspaper archives;
- E. Researching internet websites of local, state and federal agencies; and
- F. Recognizing that certain hazards can drift with wind or water from adjacent jurisdictions.

Hazard identification is an on-going process and is never fully complete. The hazard identification and vulnerability assessment may need to be amended to accommodate new industry, development-related changes, improved knowledge of earthquake fault lines, etc.

The mere existence of a hazard does not, by itself, put the community at risk. We must identify the people, environment, property, and economic sectors that may be susceptible to each hazard. Therefore, it is important to understand the demographics of the community, the physical effects of the hazards, and the proximity of the hazards. It is also important to note both the primary and secondary effects of a hazard, as well as any active or passive mitigation actions that have been taken to lessen the effects. For example, a fire in a commercial building is bad enough; but, when it burns through a petroleum storage area, it is much worse.

All areas of the city may be subject to the effects of natural and technological (human-caused) hazards. This hazard analysis seeks to identify, evaluate, and categorize the hazards that are most likely to have a disastrous impact on the citizens and property of Hillsboro. These hazards include:

A. Natural Hazards

1. Weather – Weather hazards include flood, windstorm, drought, severe winter storm, and tornado.
2. Geologic – Geologic hazards include earthquake and volcanic eruption.
3. Fire – Natural fire hazards include wildfire and urban interface fire.

B. Technological Hazards

1. Utility Failures – Utility hazards include failure or disruption of electrical, telephone, water, gas, fuel oil, sewer or sanitation systems.
2. Hazardous Materials – HAZMAT hazards include the uncontrolled release of gases, explosives, corrosives, flammable liquids and solids, oxidizers, poisons, or radioactive materials at fixed sites or during transportation.
3. Transportation – Transportation hazards include incidents involving aircraft, rail systems, watercraft, motor vehicles, or pipelines.
4. Civil Disturbance – Civil disturbance hazards include unlawful demonstrations, riots, acts of terrorism, or sabotage.
5. Dam Failure – Dam failure hazards include the uncontrolled release of water from natural or human-made impoundments.

The following groupings were identified as potentially being vulnerable to harm from one or more of the hazards identified above:

A. People

- i. Elderly
- ii. Children
- iii. Disabled
- iv. Non-English Speaking

B. Pets

- i. At Home
- ii. Veterinarians
- iii. Animal Shelters/Pet Stores

C. Facilities and Property

- i. Agricultural Fields
- ii. Businesses
- iii. Childcare
- iv. Confinement Facilities
- v. Factories
- vi. Healthcare Facilities (Group, Foster, Hospice, Retirement, Assisted Living, Nursing, etc.)
- vii. Offices
- viii. Residents
- ix. Retail Outlets
- x. Schools
- xi. Sporting Facilities
- xii. Wholesale Suppliers

D. Infrastructure

- i. Transportation (Roads, Bridges, Rail Lines, Airport, Overpasses, Culverts)
- ii. Utilities (Gas, Electric, Telephone, Water, Sewage, Garbage, Cable TV, Internet Service Providers)

E. Critical Facilities

- i. City Hall
- ii. Fire Stations
- iii. Hospitals
- iv. Police Stations

F. Environment

- i. Air, Water, Soil
- ii. Wildlife
- iii. Parks
- iv. Wetlands
- v. Lakes, rivers, creeks

2-D Hazard Analysis Methodology

Although we recognize that many hazards occur together or may have a cause-effect relationship (e.g., dam failures cause flooding and windstorms may cause power outages), the methodology used in this hazard analysis addresses each hazard as a singular event.

Each of the hazards examined by this analysis is “scored” using a formula that incorporates three levels of severity, four rating criteria, the three and weight factors. For every hazard, scores for the four rating criteria (i.e., Event History, Vulnerability, Maximum Threat, and Probability) are determined by multiplying each criterion's severity rating by its weight factor. The rating criteria scores for the hazard are then summed to provide a total score for that hazard. Definitions and values for the severity criteria, rating criteria, and weight factors are noted below.

For the rating criteria of History, Vulnerability, and Probability, only major emergencies and disasters are considered. A major emergency or disaster is an incident that necessitates the activation of a jurisdictional EOC or the issuance of a local Declaration of Emergency.

A. Severity Criteria

High	=	10 points
Moderate	=	5 points
Low	=	1 point

B. Rating Criteria and Weight Factors

1. Event History addresses the record of previous major emergencies or disasters. Weight Factor is 2.

High	=	4 or more events in last 100 years
Moderate	=	3 events in last 100 years
Low	=	1 or no events in last 100 years

2. Vulnerability addresses the percentage of population or property likely to be affected by a major emergency or disaster. Weight Factor is 5.

High	=	More than 10% affected
Moderate	=	1-10% affected
Low	=	Less than 1% affected

3. Maximum Threat addresses the percentage of population or property that could be affected in a worst case incident. Weight Factor is 10.

High	=	More than 25% could be affected
Moderate	=	5-25% could be affected
Low	=	Less than 5% could be affected

4. Probability addresses the likelihood of a future major emergency or disaster within a specified period of time. Weight Factor is 7.

High	=	One incident within a 10 year period
Moderate	=	One incident within a 50 year period
Low	=	One incident within a 100 year period

2-E Hazard Analysis

Based on the analysis methodology outlined above, the following hazards present the greatest risk to the City of Hillsboro. For a breakdown of the total point values, please see the “Hazard Analysis Worksheet” on the last page of this section.

The natural hazards listed below also include a description of potential mitigation activities which would eliminate or lessen the impact of the disaster upon life, property, and the environment.

A. Severe Winter Storm 240 points

A severe winter storm is generally a prolonged event involving snow and/or ice that causes power outages, transportation and economic disruptions, and high risk for injuries and loss of life. The event is also typified by a need to shelter and care for adversely impacted individuals. The characteristics of the hazard are determined by a number of meteorological factors including the amount and extent of snow or ice, air temperature, wind speed, and event duration.

The City of Hillsboro experienced severe winter storms with substantial snowfall in 2004, 1950, 1937, 1919, 1909, and 1892. Hillsboro has also experienced numerous, but less severe, ice storms that have significantly impacted power and transportation. Given the growth in population and development that has occurred since 1950, any severe winter storm of the magnitude that struck in 1950 would have major impacts today.

B. Windstorm 240 points

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph that cause power outages, transportation and economic disruptions, significant property damage, and high risk for injuries and loss of life. The event can also be typified by a need to shelter and care for adversely impacted individuals. Unlike a tornado, a windstorm generally has broader, but less destructive impact.

Hillsboro has suffered several destructive windstorms in the past, most notably the Columbus Day storm in 1962 and the windstorm of December 12, 1995. Both caused extensive damage to public and private property and the 1995 event led to a Presidential Disaster Declaration for Washington County.

Straight-line and cyclonic winds both occur in Washington County. Straight-line winds, which originate as a downdraft of rain-cooled air, and reach the ground and spread out rapidly, are the most common and can produce gusts of up to 100 mph. Hillsboro is susceptible to direct impacts on the infrastructure and property, and indirect costs stemming from business closures and lost work time. Infrastructure damages might include collapsed or damaged buildings; damaged or blocked roads and bridges; or damaged traffic signals, streetlights, and parks. Roads blocked by fallen trees may block

access for emergency service vehicles. Historically, fallen trees have been the major cause of power outages; and damage can also be caused by flying debris or downed utility lines.

Although an uncommon event in the region, a number of tornadoes are sighted each year in the Willamette Valley. Most do not touch down. When they have, they have not produced the widespread destruction seen in the Midwest and South. A tornado did touch down near the city of Sherwood in 1993, but its impacts were minimal.

An increase in the frequency of tornadoes is not expected unless significant changes occur in weather behavior/patterns in the Northwest. Although the likelihood that a tornado event would cause damage or injury will increase with population growth, the worst case scenario in Hillsboro is still not expected to impact a very broad segment of the population.

C. Flood

165 points

Hillsboro's flood hazard includes:

- Rapid-rise flooding of creeks tributary to the Tualatin River;
- Slow-rise flooding of the main stem Tualatin River;
- Flooding of streets and buildings caused by plugged culverts and storm drains or overloaded storm water systems; and/or
- Flooding of individual properties due to improper or inadequate drainage practices.

The hazard generally evolves from a short duration, heavy rain event that may be compounded by heavily saturated or frozen soils and rapid melting of snow and/or ice. Flood impacts are generally concentrated along creeks and streams but may also be scattered in low-lying areas of the city. A flood event typically causes property damage and significant transportation and economic disruptions. It may also require short-term shelter and care support for citizens displaced from their homes.

Hillsboro has suffered several flood events in the past. The most notable were the Christmas flood of 1964 and the flood of February 1996. The 1996 event caused substantial damage to private property, agriculture, and government infrastructure in Washington County, and it led to a Presidential Disaster Declaration. Within Hillsboro, the property damage due to flooding was concentrated in just a couple of neighborhoods. The major problem for the majority of the population is road closures due to flooding, which makes travel difficult.

The City of Hillsboro has about 75 residents who have purchased National Flood Insurance Program (NFIP) policies as economic protection in the event of flood damage. During the February 1996 floods, there were ten claims against NFIP policies within the 97123 and 97124 ZIP Codes. During the January 1997 flooding event, there was one claim in the 97123 ZIP Code.

A number of land development and building codes that have been put in place over the last 30 years will help to mitigate the impacts of future flood events. Those codes affect building/construction near floodplains, stream setbacks, cut and fill, and surface water management. A number of non-profit groups have also done extensive work to enhance stream flow and water quality that will help to mitigate future flood events.

D. Utility Failure

162 points

To rise to the level of major emergency or disaster, a utility failure would typically be an extended duration event impacting a broad segment of the city's population. Such might be the case in an extended power outage involving Portland General Electric (PGE), a disruption in natural gas delivery from Northwest Natural, or a loss of water supply from the Joint Water Commission or Portland's Bull Run System. A short duration event involving a widespread loss of telephone service may also rise to the level of a major emergency if it hampers the public's ability to access the 911 system. Depending on the type and extent of disruption and other conditions, such as weather, a utility failure can have a broad range of impacts. Although vulnerable- and special populations are at highest risk from utility disruptions, all citizens in the city would be significantly impacted by a widespread interruption of government, business, and non-profit services. Utility failures of significant proportion typically arise from other hazard events such as floods or earthquakes, but may occur as standalone events.

Hillsboro does not have a history of standalone utility failure incidents; however, the 1993 West Coast brownout did have impacts within the city.

Telephone System Failure: There are two general modes of communication system failure to consider. In a hurricane the first to occur is usually "call volume overload", followed by infrastructure damage and failure. A tornado will likely produce the same two results, but in the opposite order. This is significant for two reasons. In the hurricane example, you will have time to "ramp up" your support as the communication systems deteriorate. In the tornado example, the maximum effect will be almost immediate. For planning purposes, these two situations could be characterized as having "gradual" and "immediate" needs.

Telephone network overload occurs when the number of attempted calls exceeds the system's simultaneous call capacity. Most telephone networks are designed so that at normal peak loads, your probability of being able to make a call is 90% to 95%. When a disaster occurs, the call volume can increase more than a hundred-fold beyond the normal peak load, and the probability of being able to complete a telephone call drops tremendously.

Cellular telephone networks fail for the same reasons wireline networks do, with the additional liability of a more fragile infrastructure. Antennas and towers can fail, and microwave links between cells and switching centers can be damaged quite easily. Add in call volume overload, and you can quickly understand why cellular networks should never be relied upon as a replacement for landline (wired) networks in a disaster situation.

Public safety communication networks suffer from the same general modes of failure as telephone systems. In addition, public safety agencies are labor-intensive operations, and quickly run short of personnel to do the communicating. Available personnel work around the clock with adrenaline pumping, they become physically exhausted, tempers grow short, and the ability to cope with the disaster diminishes.

Organizations like the American Red Cross and Salvation Army have minimal communication systems of their own, and are not equipped to deal with the large volume of message traffic a disaster brings. American Red Cross has limited national communication assets that can be moved into a large disaster area as needed, but this takes considerable time and is seldom enough. Since they are generally dependant on telephone service and very limited radio systems in a disaster situation, these organizations are almost automatically in "overload" mode without outside radio communication support.

E. Earthquake

162 points

The Earth's crust is broken into massive pieces called tectonic plates, that ride on semi-fluid rock below. Powerful forces generated within the Earth drive these plates. When these plates collide with, slip along, or plunge underneath each other, they produce earthquakes. Most earthquakes are minor in scale and many are too small to even feel. However, a number of quakes ranging in scale from moderate to great occur annually throughout the world and take a heavy toll on lives and property. The Pacific Northwest lies along what is known as the Ring of Fire - an area that experiences frequent earthquake and volcanic activity. Although Oregon's recorded history is relatively free of large magnitude earthquakes, it's geologic history shows ample evidence of past periodic, large-scale events.

Like most of Oregon, Hillsboro has little recorded data of significant earthquake activity. The "Spring Break Quake," a 5.7 Richter magnitude crustal earthquake centered near Molalla, shook Hillsboro in March of 1993 and caused limited damage. The Nisqually earthquake, a 6.8 magnitude deep, intra-plate earthquake centered near Olympia, Washington, shook Hillsboro on February 28, 2001; however, it, too, caused only minor damage locally. A number of smaller magnitude events have also occurred near Hillsboro, but few, if any, have produced noticeable impacts.

Despite the record, several earthquake faults are known to run in or near Washington County; and the Cascadia Subduction Zone is known to run just off the coast, stretching from British Columbia to northern California. The Cascadia Subduction Zone, where the Juan de Fuca Plate is diving beneath the North American Plate, is capable of producing great quakes of up to 9.5 Richter Scale magnitude. Adding to the earthquake hazard within Washington County are other geological conditions that would serve to magnify the degree of shaking and the consequent damages the shaking would create. These conditions include clay/silt/loam soils and high water tables. Although recent upgrades in the Oregon Building Codes will reduce the extent of property damage from future earthquakes, any quake of over 7.0 magnitude within Washington County can be

expected to cause widespread damage to public and private facilities, mass casualties, and significant disruption of lifeline services.

F. Volcanic Eruption (Ash Fallout) 159 points

Hillsboro faces no direct threat from a volcanic eruption. However, its proximity to a number of Cascade Range volcanoes places it at risk from ash fallout after such an event. Hillsboro also faces an indirect threat to its water supply based on a volcanic scenario impacting the Bull Run Water System.

The impacts of a significant ash fall are substantial. Persons with respiratory problems are endangered; transportation, communications, and other lifeline services are interrupted; drainage systems become overloaded/clogged; buildings can become structurally threatened from the weight (especially when wet); and the economy takes a major hit.

Such an event was experienced by the city of Yakima, Washington, following the 1980 eruption of Mount St. Helens. Fortunately for Hillsboro, prevailing westerly winds carried most of the ash clouds to the east; however, we did experience some ash fallout from that event, despite the prevailing winds. Any future eruption of a nearby volcano (e.g., Hood, St. Helens, Jefferson, or Adams) occurring during a period of easterly winds would likely have adverse consequences for Hillsboro.

Volcanic eruptions are often accompanied by seismic activity and electrical storms. Responding to and recovering from such an incident would require a concerted effort on the part of the city and its emergency response agencies.

G. Drought/Water Shortage 134 points

A water shortage may arise from a number of causes, but it would most likely derive from drought or a significant diversion/interruption of water supplies supporting Hillsboro. Drought involves a period of prolonged dryness resulting from a lack of precipitation. A severe drought could require that strict conservation measures be implemented to assure an adequate supply of potable water for Hillsboro citizens. Long term drought conditions typically have devastating consequences for agricultural and other businesses dependent on a good supply of water, and place large areas surrounding Hillsboro are at risk for wildland or urban interface fires.

Although Hillsboro has suffered periods of drought in the past, the impacts have not been severe enough to reach major emergency or disaster proportions. The drought of 2000-01 is the worst on record in the County. Hagg Lake, the reservoir behind Scoggins Dam, fell to a record low of 9%. A combination of effective water management, significant conservation on the part of local irrigators, and adequate potable water supplies from the Bull Run system helped the County avert a major water crisis that year.

Diversions/interruptions of water supplies supporting Hillsboro could stem from failed reservoirs or wells, ruptured pipelines, or contaminated water sources. Significant redundancy exists in most of the County water systems; however, an incident impacting multiple sources or suppliers could pose serious risks for Hillsboro residents. Damage to two of the Bull Run water system's primary pipelines during the flood of 1996 did impact the amount of water the system was able to deliver to Washington County's water purveyors during that event.

H. Hazardous Materials Release

112 points

This hazard involves the release or spillage of hazardous chemicals or chemical wastes that pose a serious threat to life, property, and/or the environment. The release or spillage may also generate long-term contamination or toxicity problems. A hazardous materials incident is most commonly associated with a transportation accident (highway, rail, waterway, or pipeline), but it may also arise from accidents at fixed facilities.

Hazardous materials are used extensively within Hillsboro, particularly in high technology and manufacturing applications. Hillsboro has over 300 companies/facilities that annually report their hazardous materials inventory to the Office of the State Fire Marshal. About 20 of these facilities handle various amounts of twenty-two types of chemicals classed by the Environmental Protection Agency as Extremely Hazardous Substances (EHS). A risk identification study found that 15 facilities possess quantities of five different EHS or materials regulated under the Clean Air Act (112r) that meet or exceed the designated planning quantities under the Federal regulations. The Hillsboro Fire Department includes details of those facilities in their site-specific hazardous materials response plans.

Hillsboro has pipelines that deliver natural gas to commercial and residential customers. Most other hazardous materials transported within the city are moved by truck, and, to a lesser extent, by rail.

The most serious hazardous materials incidents that might impact the city are those that would involve the release of significant quantities of extremely hazardous substances into heavily populated commercial or residential areas. Any such incident could pose acute toxicity, corrosivity, and/or flammability problems and require immediate actions to evacuate and shelter large numbers of people.

Hillsboro has a history of minor hazardous materials incidents, but none that have risen to the level of major emergency or disaster. However, the increased use of hazardous materials in all aspects of daily life, their increased presence within Hillsboro, and the proximity of commercial and residential developments to hazardous material facilities raise the probability of a significant future event. This probability is offset somewhat by stricter regulations, more frequent deliveries of smaller amounts of hazardous materials, and tougher regulatory enforcement for facilities and companies that manufacture, transport, or store hazardous materials.

I. Wildland/Urban Interface Fire

112 points

Approximately 13% of the land within Washington County is public forestland, managed by the U.S. Bureau of Land Management and Oregon Department of Forestry. A larger percentage of land is woodland used for recreation or private commercial purposes. Most of these lands lie on the County's extreme north, west, and south boundaries. In addition to these lands, there are many pockets of forested land scattered throughout Washington County. Whether lying in rural, undeveloped areas or alongside heavily developed commercial or residential properties, these lands pose a significant wildland/urban interface fire threat.

Although Washington County has no history of fires rising to the level of major emergency or disaster, the potential will remain well into the future.

J. Civil Disturbance

112 points

This hazard includes riots, protests, strikes, demonstrations, and acts of terrorism that can result in the taking of hostages, injuries and/or deaths, damage to property, sabotage, and extortion. In the case of terrorist incidents, the use of chemical, biological, or nuclear weapons as well as conventional explosives is possible. As an example, the city of Tualatin received numerous bomb threats and three threats involving the use of biological materials (i.e., Anthrax) in the 1998-99 time period.

While there has been no history of terrorism or other instances of civil disorder rising to the level of major emergency or disaster in Washington County, the potential for such an incident exists. Terrorism has been prevalent on the international level for many years and has been on the rise domestically for the past few years. The attacks against the World Trade Center and The Pentagon; the mailed Anthrax attacks in Florida, New York, and Washington D.C.; the Oklahoma City and New York City bombings; the Rodney King riots in Los Angeles; and the WTO riot in Seattle are but a few examples of the potential that exists within the country. A number of large national and international companies are based in Washington County and at least one of those companies (Nike) has been the target of protests over foreign labor practices. Additionally, a number of animal rights demonstrations/protests have been staged at the Regional Primate Center.

While the history and probability of a conventional or unconventional (nuclear, biological, chemical) attack on the United States is low, the threat posed by such an event is extremely high. Government infrastructure and public and private services and supplies could all be severely disrupted and hundreds, if not thousands, of injuries or deaths could occur.

K. Dam Failure

84 points

Scoggins Dam is the only dam within Washington County capable of producing a major emergency or disaster event. It is an earthfill dam with a height of 151 feet, a crest length of 2,700 feet, and a reservoir of capacity of 60,000 acre-feet. It lies on Scoggins Creek in

the west county area about 7 miles southwest of Forest Grove. Scoggins Creek drains into the Tualatin River just downstream from the city of Gaston.

A catastrophic failure of Scoggins Dam with a full or near full reservoir would impact low-lying areas and roadways along the Tualatin River, Dairy Creek, McKay Creek, and Rock Creek in Hillsboro. Inundation levels would be dependent upon the river and creek levels at the time of the dam failure. During times of low water levels, impact would be minimal. The Bureau of Reclamation estimates that it would take approximately 3.5 hours for the leading flood wave to reach State Highway 219 at Jackson Bottoms Wetlands.

Scoggins Dam has never experienced a catastrophic failure or any other event where its integrity was placed in question. Although the dam is aging, it has a good system to detect both seepage and earth movement. That system should provide sufficient warning of a problem to allow the reservoir to be drawn down to mitigate the threat.

L. Transportation Accident 52 points

This hazard includes major incidents involving motor vehicles, trains, aircraft, and pipelines. Although the highest risk from this hazard would arise from the release of hazardous materials, such incidents are addressed elsewhere in this analysis. Excluding accidents involving hazardous materials, the primary risk from this hazard is an aircraft or light rail crash creating a mass casualty or mass fatality incident.

Hillsboro has no history of a transportation accident rising to the level of a major emergency or disaster; however, a number of factors have combined to increase the potential for such an incident in the future. Hillsboro's location relative to the flight path for Portland International Airport, a large increase in the number and frequency of flights into and out of the Hillsboro Airport, and the operation of light rail trains with capacity for 600 passengers, all combine to place it at greater risk than in the past.

1) 2-F Hazard Analysis Worksheet

Hazard	Rating Criteria and Weight Factors				Total Score
	History WF=2	Vulnerability WF=5	Max Threat WF=10	Probability WF=7	
Winter Storm	High (20)	High (50)	High (100)	High (70)	240
Windstorm	High (20)	High (50)	High (100)	High (70)	240
Flood	High (20)	Moderate (25)	Moderate (50)	High (70)	165
Utility Failure	Low (2)	Moderate (25)	High (100)	Moderate (35)	162
Earthquake	Low (2)	Moderate (25)	High (100)	Moderate (35)	162
Ash Fallout	Low (2)	High (50)	High (100)	Low (7)	159
Drought/Water Shortage	Low (2)	Moderate (25)	High (100)	Low (7)	134
HazMat Release	Low (2)	Moderate (25)	Moderate (50)	Moderate (35)	112
Wildland/Urban Interface Fire	Low (2)	Moderate (25)	Moderate (50)	Moderate (35)	112
Civil Disturbance/ Terrorism	Low (2)	Moderate (25)	Moderate (50)	Moderate (35)	112
Dam Failure	Low (2)	Moderate (25)	Moderate (50)	Low (7)	84
Transportation Accident	Low (2)	Low (5)	Low (10)	Moderate (35)	52
Score for each rating criteria = Rating Factor (High = 10 points; Moderate = 5 points; Low = 1 point) X Weight Factor (WF)					

2-G: Potential Mitigation Opportunities

The hazard identification and vulnerability analysis highlights many opportunities to increase our city's resilience with respect to disasters. In addition, the rising cost of disaster response has renewed interest in identifying ways to reduce vulnerability to disasters. Listed below are mitigation activities which are designed to reduce risk, prevent loss, and protect life, property, and the environment from future natural hazard events. They are divided into hazard-specific and multi-hazard mitigation activities.

Mitigation activities can be conducted before, during, or after disaster strikes. The most effective is, of course, pre-disaster, which hopefully cuts down on the damage suffered. Some of these activities come at the cost of staff time, while others would incur significant cost in engineering and construction. Some can be done by city staff, some must be done by residents or businesses, and some require a collaboration of public and private partners to be most effective.

More specific recommendations, and the process used to prioritize and implement the mitigation activities, are discussed in the City of Hillsboro Natural Hazard Mitigation Plan (still under development).

Hazard-specific mitigation activities might include:

Winter Storm

- Increase public awareness of severe winter storm mitigation activities
- Develop and implement programs to keep trees from threatening lives, property, and public infrastructure from severe winter storm events
- Map and publicize locations around the county that have the highest incidence of extreme weather
- Support/encourage electrical utilities to use underground construction methods where possible to reduce outages from severe winter storms
- Develop and implement, or enhance, strategies for debris management for severe winter storm events

Wind Storm

- Increase public awareness of windstorm mitigation activities
- Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events
- Map and publicize locations around the county that have highest incidence of extreme weather
- Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms
- Develop and implement or enhance strategies for debris management for windstorm events

Flood

- Identify critical public infrastructure and facilities located in flood hazard areas and highlight those facilities as a focus for mitigation and preparedness measures
- Identify floodway obstructions

- Develop strategies to enhance the use of open space within the floodplain for flood mitigation, fish habitat, and water quality issues
- Develop outreach programs to business organizations that must manage for flood protection
- Integrate a flood hazard component into local watershed education programs
- Enhance data and mapping for floodplain information within the city, and identify and map flood-prone areas outside of designated floodplains

Earthquake

- Identify funding sources or establish tax incentives to retrofit structures that are identified as seismically vulnerable
- Encourage purchase of earthquake hazard insurance
- Pursue regulatory mandates for structural mitigation of critical facilities for the earthquake threat
- Develop public/private partnerships with building contractors and architects to pursue specific retrofitting projects
- Reduce nonstructural hazards in homes, schools, businesses, and government offices
- Ensure schools and universities, government infrastructures, and critical facilities meet current seismic standards
- Improve local capabilities to perform earthquake building safety evaluations and to record and manage building inventory data

Volcano

- Identify critical facilities and industries that may be affected by ash falls and collaborate with them on ash fall emergency response
- Collaborate with the USGS's Cascade Volcano Observatory and related agencies to create ash fall warning messages that are more appropriate for Hillsboro
- Increase understanding of volcanic eruptions and their potential impact to Hillsboro through a visual guide
- Strengthen response and recovery programs and develop and implement public education programs for volcanic eruption hazards

Wildfire/Urban Interface

- Educate staff on federal cost-share and grant programs, Fire Protection Agreements, and other related federal programs, so the full array of assistance available to local agencies is understood
- Inventory alternative firefighting water sources and encourage the development of additional sources
- Encourage creation and adoption of wildland interface maps to direct development requirements that assist wildfire mitigation
- Develop and implement, or enhance existing, outreach and education programs aimed at mitigating wildfire hazards and reducing or preventing the exposure of citizens, public agencies, private property owners, and businesses to natural hazards
- Increase communication, coordination, and collaboration between wildland/urban interface property owners, city and county planners, and fire prevention crews and officials to address inherent risks in wildland/urban interface areas, available prevention/protection measures, and federal mitigation assistance programs

- Implement fire mitigation activities in a manner consistent with the goals of promoting sustainable ecological management and community stability

Multi-hazard mitigation activities might include:

- Identify and pursue funding opportunities to develop and implement mitigation activities
- Establish and City of Hillsboro Natural Hazards Mitigation Committee to facilitate implementation, monitoring, and evaluation of mitigation activities
- Present the mitigation plan to appropriate stakeholders to discuss and plan for implementation of specific action items.
- Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals
- Develop public and private partnerships to foster natural hazard program coordination and collaboration
- Develop benchmarks for a disaster-resistant community
- Develop inventories of at-risk buildings and infrastructure, and prioritize mitigation projects based on those providing the most benefit (at the least cost) to the population of the City of Hillsboro
- Strengthen emergency services by maintaining the City of Hillsboro Emergency Management Plan, linking emergency services with hazard mitigation programs, and enhancing public education
- Develop, enhance, and implement education programs aimed at mitigating natural hazards and reducing their risk to citizens, public agencies, private property owners, businesses, and schools
- Increase technical knowledge of natural hazards and mitigation strategies, and implement policies and programs on the basis of that knowledge
- Use technical knowledge of natural ecosystems and events to link natural resource management and land use organizations to mitigation activities and technical assistance