



# Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan

A Guidebook for Local Governments



**FEMA**  
Region X

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# Introduction

**FEMA developed this guidebook to explain and demonstrate how to integrate natural hazard mitigation concepts into local comprehensive plans (also referred to as general plans in some jurisdictions). The guidebook describes the benefits of integration, provides examples of how it can be accomplished, reviews existing state authorities and regulations, and highlights successful best practices in Region X communities. FEMA’s “Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials” is another resource that provides additional guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns (including the comprehensive plan) and presents nation-wide case study examples to demonstrate successful integration in practice<sup>1</sup>.**

Comprehensive plans establish policies that are intended to guide a community’s day-to-day land use decisions and capital facilities expenditures. These policies have a major impact on whether people and property are exposed to natural hazards as well as the extent to which they are vulnerable to injury and damage. Therefore, it is imperative that these policies are based on best available hazard data (acknowledging known data errors or gaps), including the nature of local hazards, the vulnerability of people and property, and the potential destruction that can be caused by these hazards. This hazard data is the foundation on which natural hazard mitigation plans are developed.

Natural hazard mitigation plans identify policies and actions that can be implemented to reduce risk and future losses. These plans form the groundwork for a community’s long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. Strategies to reduce loss will range from specific mitigation projects to changes in day-to-day operations.

It is important to consider the legal status of the local natural hazard mitigation plan compared to the comprehensive plan. While the natural hazard mitigation plan is non-regulatory in nature, the comprehensive plan is typically viewed as a major policy document, and most state laws specify some degree of consistency between it and zoning and development decisions. This gives the comprehensive plan considerable authority in emphasizing a community’s intent to implement the policies it includes, particularly with regard to development regulations. Stronger state laws regarding such consistency make it all the more crucial that mitigation be addressed in the comprehensive plan in order to enhance the probability of successful implementation through local land use codes.

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<sup>1</sup> <http://www.fema.gov/library/viewRecord.do?id=7130>

### HAZARD MITIGATION PLANNING RESOURCES

Local Mitigation Plan Review Guide:

<http://www.fema.gov/library/viewRecord.do?id=4859>

Local Mitigation Planning Handbook:

<http://www.fema.gov/library/viewRecord.do?id=7209>

Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards:

<http://www.fema.gov/library/viewRecord.do?id=6938>

Generally, the responsibility of comprehensive land use planning falls to professional planners, while natural hazard mitigation plans are typically developed by emergency managers with the assistance of stakeholder committees. Planners are specifically trained to analyze spatial relationships, plan for future growth and development, and implement the resulting decisions. Most planners also have at least some training or experience in facilitating public involvement, which can be used to initiate public dialogue on mitigation. Further, planners have experience drafting and communicating a plan with clear goals and objectives as well as thinking comprehensively about the challenges facing a community, how to address them with the resources available, and how to steer the public and decision makers toward goals and objectives to achieve the desired ends. Emergency managers are trained to observe and anticipate what might go wrong in the community when disaster strikes and to respond quickly and efficiently with the resources available. Emergency managers are also trained to view risk from an all-hazards perspective and have an understanding of how particular solutions can help address multiple hazards. Together, planners and emergency managers can develop a more robust and comprehensive approach to hazard mitigation planning.

Emergency managers and planners can work collaboratively to select mitigation strategies and determine how they can best be integrated into the comprehensive plan and development regulations or linked with other public or private efforts, such as open space preservation. Integrating the natural hazard mitigation plan into the comprehensive planning process can help ensure communication and collaboration occurs between planners and emergency managers to make certain that the appropriate hazard assessment information is considered during future land use and development planning.

# ▲ Benefits of Integrating Natural Hazard Mitigation into Comprehensive Planning

There are numerous benefits from integrating natural hazard mitigation into comprehensive planning.

Integration will:

- Enhance both the comprehensive planning process and the natural hazard mitigation strategy;
- Reduce a community's vulnerability to disasters;
- Support effective pre- and post-disaster decision making;
- Create an effective planning tool;
- Help speed the return of an impacted community to normalcy following a hazard event; and
- Provide a forum for analysis of potentially sensitive issues.



## Enhances Natural Hazard Mitigation Awareness, Coordination, and Efforts

By integrating the emergency management function into the planning process, a local government will enhance its opportunity to develop and implement strategies for reducing risks from multiple natural hazards. Additionally, planning can combine mitigation measures with development and growth management programs to create coordinated strategies that effectively address natural hazard mitigation and avoid conflicting outcomes, such as high-density development planned in a hazard-prone area. Planning can also focus efforts to target and mitigate those vulnerabilities that are identified as posing the highest risk for a particular area or a community at large.

While it can be difficult for political leaders to take steps that may be perceived as unfriendly to economic development, proactively minimizing risk by addressing natural hazards during initial land use decision making and development is much easier and more cost effective than attempting to retrofit, modify, or improve existing development to withstand hazards.

## Improves Hazard Mitigation Plan Implementation

Stand-alone natural hazard mitigation plans often face issues with implementation because they have no legal status for guiding local decision making regarding land use or capital expenditures. However, many natural hazards have geographical boundaries, such as the flood, landslide, erosion, and earthquake hazards, that can be mapped (to some degree of accuracy) with various levels of probability for events of specific magnitude or frequency. As a result, land use controls and incentives are often implicated as part of the solution to mitigate the hazards.

Although the exact legal status of comprehensive plans varies from state to state (refer to the State-by-State Examination section on page 14), state courts typically view such plans as a major policy document when issues arise regarding consistency between zoning and development and the comprehensive plan. This gives the comprehensive plan considerable influence on development regulations by emphasizing a community's intent to implement identified solutions.

Including aspects of the natural hazard mitigation strategy into the comprehensive plan is a formal mechanism for improving implementation of the mitigation strategy. The comprehensive planning process should be the central planning tool driving natural hazard mitigation.



# ▲ The “How To” of Natural Hazard Mitigation Plan Integration

## General Principles and Ideas for Integration

**There are three primary opportunities to more effectively integrate natural hazard mitigation into the comprehensive plan.**

The first is to integrate natural hazard information and mitigation policies into the comprehensive plan.

- Include background information on natural hazards, including history of past events and potential impacts.
- Clearly identify any hazard-prone areas located throughout the community.
- Add relevant natural hazard mitigation goals, objectives, policies, and projects to the appropriate plan elements.

The second opportunity for integration is through collaborative planning and implementation.

- Involve key community officials who understand the comprehensive and hazard mitigation policies, as well as their context in local government decision making, and who have the authority to execute the policies and programs in the development and implementation of both plans. This will ensure that all relevant parties are informed and assure plan implementation is feasible.
- Designate overlapping membership of key agency staff for both planning bodies to facilitate the sharing of knowledge and help build relationships that are important to successful implementation of mitigation activities.

The third opportunity for integration is through coordinated plan reviews and updates.

- Reevaluate mitigation policies whenever new information regarding a community’s hazard exposure, vulnerability, or risk becomes available.
- Develop a method to coordinate revisions and updates of the natural hazard mitigation and comprehensive plans.



## Integration by Plan Element

Natural hazard mitigation can be integrated into the comprehensive plan through the incorporation of information and or mitigation strategies into each plan element or as a separate stand-alone element. Possible methods of integration are described below for each of the elements found in a typical comprehensive plan.



### Community History, Existing Conditions, and Physical Features

- Include a description of past natural disasters and their effects on the community as well as the geographical extent, severity, and probability of potential natural hazards.
- Include hazard maps to identify the location of hazardous areas within the community.



### Future Land Use

- Analyze hazard exposure and vulnerability as part of the development of the future land use map and policies.
- Identify hazard areas and include policies to establish standards to control development and reduce vulnerability.
- Identify potential problems that may arise from various densities of development in hazard-prone areas, determine what densities are appropriate, and establish standards to direct development away from high-hazard areas.
- Use easements and acquisition, when possible, to prevent inappropriate or unsafe uses of land.



### Conservation/ Natural Resources

- Protect and restore natural protective features, such as floodplains, wetlands, marshes, and dunes.
- Protect wildlife migration corridors along rivers and streams to serve as habitat and environmental protection.
- Limit development in floodprone areas.
- Preserve natural vegetation and woodlands on steep slopes to reduce the likelihood of landslides.
- Conserve natural woodlands without development to reduce building exposure to wildfires.



### **Public Facilities/ Services**

- Include policies that limit public expenditure for infrastructure and public facilities in high-hazard areas.
- Use capital improvement policies to steer development away from hazardous areas.
- Link water treatment facilities, stormwater management, and sewerage and solid waste policies to natural hazard mitigation.
- Interconnect service networks, such as roads, pipelines, and cables, and allow more than one route to any point so that they are less vulnerable to local failures because individual sections can be isolated as necessary.
- Locate critical public facilities, such as police and fire stations or emergency operation centers, in safe locations that are not likely to be affected by hazards.
- Locate other major public facilities in safe areas to double as emergency shelters.



### **Transportation**

- Determine if transportation facilities are adequate in the event of an evacuation.
- Plan for contingencies if there is structural failure of bridges or other infrastructure.
- Correct any known deficiencies of potential weakness in infrastructure.
- Use transportation projects to determine the location and density patterns of future growth (projects most likely to be involved directly with capital improvements planning).
- Use transportation policies to guide growth to safe locations and limit access to natural hazard areas.



### **Housing**

- Acquire older housing stock in floodplains or other hazardous areas.
- Address issues of how housing demand is influenced by the desire for siting near natural amenities, which can produce attractions to hazardous locations.
- Retrofit or replace public and publicly-subsidized affordable housing to reduce damage to inhabitants during a natural disaster.
- Be aware that manufactured homes pose particular problems of vulnerability especially to high winds.



### **Historic Preservation**

- Protect historic resources from hazards, specifically floods or earthquakes, with appropriate retrofitting techniques.



### **Economic Development**

- Develop policies to aid economic recovery post disaster, such as undergrounding utilities within a business district.
- Provide technical assistance to support natural hazard mitigation for vulnerable small businesses.
- Use the community’s safety to attract potential new businesses to the area.



### **Recreation and Open Space**

- Convert vulnerable floodplain land, steep slopes, and areas vulnerable to wildfire or other hazards into open space or recreational areas to help avert or minimize disaster by sacrificing park land in the short term instead of allowing floods, landslides, wildfires, and other natural hazards to ruin homes or businesses.
- Use natural hazard mitigation objectives to protect and provide public access to areas that are also deemed potentially hazardous for development (i.e., riverfronts and beaches) to guide land acquisition choices for open space.



### **Environment**

- Couple mitigation goals like floodplain management with clean air and clean water goals.
- Designate critical and sensitive areas to focus planning for specific areas that have an especially high priority for protection of natural features.
- Establish good floodplain management practices that protect endangered species habitat as well as help reduce and prevent flood damage.
- Link the goals and objectives of watershed management (i.e., pollution runoff control, Total Maximum Daily Loads implementation) with hazard mitigation efforts.
- Prevent the conflict of natural forces and hazardous materials by mitigating the potential destructive combination of natural hazards and industrial development that could otherwise exacerbate losses, such as the contamination of floodwaters.
- Link wildfire safety with environmental protection strategies (i.e., improving forest ecology, wildlife habitat, etc.).
- Protect and restore natural vegetation and other natural resources that provide floodplain protection, minimize erosion, stabilize slopes, or provide other ecosystem services.



### **Public Safety**

- Reduce the risk of public exposure to natural hazards.
- Protect the community from the risk of natural hazard events.
- Develop emergency response plans for natural hazard events.



### **Hazards**

- Incorporate all or most of the content and findings of the natural hazard mitigation plan by reference in a stand-alone natural hazards element, and preferably the two documents will differ little, if at all, in overall content.

## Integration into Plan Implementation Tools

**There are several common planning tools used to implement the comprehensive plan. The primary goals of implementation, as it relates to natural hazard mitigation, should be to keep future development out of known hazard areas, prevent hazards from affecting existing developed areas, and strengthen existing development to resist hazards.**

### Land Use Designation

Land use designations identify the type and intensity of land uses that are allowed within a specific area. Specific standards can be established to address the impacts related to specific land use classifications. Land use designations can include hazard areas or conservation areas that require special development considerations. For example, a hazard land use designation can consist of any type of hazardous area, including floodplains, steep slopes, and urban-wildfire interfaces, within in which development should be limited using tools such as the zoning ordinance.

### Zoning Ordinance

The zoning ordinance is among the most effective planning tools that can be used to limit damage from natural hazards. A zoning ordinance specifies the location, type, amount, density, and characteristics of development in mapped zoning districts. Zoning can be used to restrict development in hazardous areas to only allow land uses that will not suffer from extensive natural disaster losses, and conversely, it can encourage growth in safe locations. The zoning ordinance can also establish performance standards that reduce vulnerability and create incentives for development that incorporates natural hazard mitigation techniques. For example, tax incentives can be offered for reductions in the intensity of development in hazard areas, locating development outside of hazard areas, or maintaining or enhancing natural protection features.

Zoning for flood hazards is typically implemented through the placement of floodplain boundaries on the local zoning map and using various regulations to enforce restrictions on development in and adjacent to those floodplains. The most common regulations prohibit development within the most hazardous parts of the floodplain, also known as the floodway channel where water flows and where any obstructions would limit the channel and increase downstream flooding, and limit density (or the amount of obstruction) that can occur in the flood fringe area, which is still within the floodplain but outside of the floodway.

**Specific examples of flood zoning elements include:**



- Regulations that permit only open space uses within floodplains;
- Setbacks to minimize flood exposure of buildings and provide waterfront buffers, maintain natural vegetation, and limit runoff;
- Non-conforming use regulations that prescribe standards for permissible reconstruction of flood-damaged structures;
- Special-use permits that require development to meet set criteria or conditions to minimize future flooding; and
- Overlay districts that add a separate level of regulation to sensitive areas such as floodplains.

Earthquake and geologic hazard zoning is implemented through the mapping of seismic areas and restricting development in and adjacent to them. These hazards may be regulated through a natural hazards overlay zone to allow the underlying uses from the zoning map but also requiring that uses and facilities which are vulnerable to geologic hazards be protected against collapse or severe damage at the time of construction or placement in the zone.

**Specific examples of earthquake zoning elements include:**



- Regulations that prohibit development on soils susceptible to liquefaction;
- Regulations that restrict development near earthquake faults and on steep slopes;
- Non-conforming use regulations that prescribe standards for permissible reconstruction of earthquake-damaged structures; and
- Regulations that require development located in high-hazard seismic zones to meet set criteria or building standards to minimize future earthquake damage.

Wildfire zoning is intended to manage conditions in the urban-wildland interface as well as in other forest or recreation areas with high wildfire potential. Regulations can reduce residential densities or encourage cluster development patterns in the most vulnerable interfaces. Requirements to use nonflammable building materials, plant fire-resistant vegetation, and construct firebreaks and safety zones around residential areas and public facilities in the urban-wildland interface can also be established.

### Specific examples of wildfire zoning elements include:



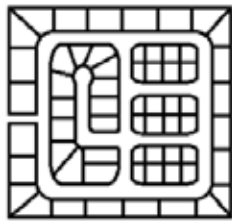
- Regulations that limit development in the wildland-urban interface;
- Setbacks to maintain a defensible buffer between buildings and grasses, trees, shrubs, or any wildland area;
- Special-use permits that require development to meet set criteria or conditions to minimize future wildfire risk; and
- Overlay districts that add a separate level of regulation to sensitive areas such as the wildland-urban interface.

Additional hazard-specific zoning ordinances can be used to address landslide, avalanche, erosion, high wind, and tsunami where those hazards exist.

Transfer of development rights is a zoning-based technique that can also be used to mitigate the risk of natural hazards. This technique allows property owners in defined sending areas to sell their development rights to property owners in receiving areas. Sending areas can include natural hazard areas, as well as agricultural land or protective natural features, and they are downzoned to a low density. Receiving zones are areas planned to accommodate urban growth and are upzoned to a higher density that is permitted only when purchased development rights are applied.

### Subdivision Regulations

Subdivision regulations govern the basic process of dividing land into salable parcels and servicing those parcels with roads, water, and sewer systems. It is important that subdivision regulations are designed and implemented with awareness of and sensitivity to natural hazards because once property rights are established by the sale of lots to individual buyers, it is almost impossible to change the resulting urban form. Further, subdivision regulations should be based on clear and objective standards that are easily understood and do not involve substantial discretion or individual judgment in their application. This will ensure consistency and accountability among all parties.



Subdivision regulations can impact the following:

- Location on or adjacent to hazard-prone lands, such as landslide or floodplain areas, which can heighten the risk of natural disasters;
- Placement of roads, residential lots, and public facilities within subdivision projects, which can increase natural hazard risks by reducing evacuation or public safety access; and
- Amount of impervious surfaces and destruction of natural vegetation and environmental features, such as wetlands and dunes, which can generate increased stormwater runoff, reduce the capacity of the environment to contain or absorb water, and heighten flooding risks.

Subdivision regulations can be used to prohibit development in high-hazard areas or require that structures be protected from damage by floodproofing, elevation, or other mitigation measures. Regulations can also require land be dedicated for parks, open space, or other purposes to prevent environmental degradation and to mitigate natural hazards. Dedication of land or fees in lieu of dedication can also be used to acquire high-hazard lands for open space or recreation purposes. Additionally, subdivision regulations can be used to require that natural hazard information appear in deeds in order to disclose to prospective buyers that natural hazard risks are present.

There are various techniques that can be used to promote design flexibility within subdivision regulations for natural hazard mitigation purposes. Cluster development and planned unit development can be enacted as part of subdivision regulations to offer the option of grouping buildings together away from hazardous areas while not decreasing the overall density of development. For example, in a subdivision proposed for a property containing floodplains, development can be clustered in a compact area on the upland portion of the property by minimizing lot sizes, setbacks, and frontage distances, thus maximizing open space and leaving the low-lying features of the floodplains undisturbed. Conservation subdivisions can also be used to help preserve open space and natural areas within developments by concentrating building construction to allow sensitive environments and open space to be protected.

### Capital Improvements Plan

A capital improvements plan lays out a jurisdiction’s medium-term (five to six year) spending plan for capital projects that support existing and future development (i.e., roadways and sewer and water systems). Capital improvements planning can help determine the location and density of future growth. The plan should include and consider any identified natural hazard mitigation projects.



A capital improvements plan can incorporate natural hazard mitigation through hazard-specific expenditures and non-expenditures. Hazard-specific expenditures include spending for open space acquisition (e.g., at-risk waterfront properties that can be converted to parks and greenways) and spending for natural hazard mitigation projects (e.g., strengthening at-risk public facilities, such as schools, hospitals, fire and police stations, and utility systems, to resist floods and geological hazards). Hazard-specific non-expenditures include prohibitions against support of infrastructure projects that would increase vulnerability of future development (e.g., extending trunk sewer lines into natural hazard areas).

### Building Codes

Building codes establish the minimum acceptable level of safety for construction. They can be used to protect new construction in natural hazard areas by specifying design standards for resistance to the stresses of hazards. They can also set standards for retrofitting existing buildings to make them less vulnerable to natural hazards.



# Region X State-by-State Examination

## Alaska

### Authorities and Regulations for Comprehensive Planning



Alaska State Law requires that planning, platting, and land use regulation are carried out by the State's incorporated municipalities, including home rule, unified home rule, first-class, and second-class boroughs; unified municipalities; and first-class and home rule cities outside of boroughs. Second-class cities located outside of boroughs may, but are not required to, exercise planning powers. The unorganized borough is not a municipal corporation, thus the State of Alaska has no legal authority to mandate planning, platting, and land use regulations in second class cities or in unincorporated communities in the unorganized borough.

All boroughs must exercise planning powers on an area-wide basis, both inside and outside their cities. Therefore, cities inside a borough have no planning, platting, or land use regulation authority. However, a borough is authorized to delegate any of its powers and duties that govern the exercise of planning, platting, and land use regulation to a city. A number of cities within boroughs have been delegated some or all of their borough's planning and land use regulation powers.

Land use regulation is required for only a minority of the communities in Alaska and is elective for second class cities, which are largely located in rural Alaska. For communities outside of boroughs that do not exercise planning powers, the Alaska Department of Natural Resources (DNR), Division of Mining, Land, and Water acts as the platting authority. Depending on the form and classification of local government and a city's location within a borough or unorganized borough, the state statutes governing planning will have different applications.

According to Alaska Statute 29.40, a municipality may implement land use regulations, such as a zoning or subdivision ordinance, only after it has legally adopted a comprehensive plan by ordinance. The comprehensive plan is defined as a compilation of policy statements, goals, standards, and maps for guiding the physical, social, and economic development, both private and public, of the first or second class borough. It may include, but is not limited to, the following:

- Statements of policies, goals, and standards;
- A land use plan;
- A community facility plan;
- A transportation plan; and
- Recommendations for implementation of the comprehensive plan.



## Methods for Integration

Any elements of the local hazard mitigation plan that address the community's vision, goals, and objectives for hazard mitigation planning, as well as proposed strategies to implement the goals and objectives, can be integrated into the comprehensive plan. The comprehensive plan offers communities the opportunity to mitigate natural hazards through land use regulation.

It is important to note that although second class cities in the unorganized borough are not required to provide for planning, platting, and land use regulation, they do have the same legal authority as first classes cities should they choose to plan and regulate land use. Further, although unincorporated communities do not have the legal authority to regulate land use, they do have the ability to adopt best practices for planning and development within the community. Unincorporated communities can develop a comprehensive community plan which lays out a community vision, goals, and objectives for future growth and development and identifies action strategies to implement those goals and objectives. Additionally, a tribal government's decisions and recommendations for best practices can have a strong influence on land use and development in the community.

## Current Barriers to Integration

The local governing bodies for boroughs and cities (the borough assembly or city council) have the legal authority to adopt a comprehensive plan by ordinance. However, if the local governing body is not supportive of including natural hazard mitigation in the comprehensive plan, this presents a significant barrier to integration.

Local capacity limitations can also present a significant barrier to integrating natural hazard mitigation into a comprehensive plan update. Some of the smaller municipalities in Alaska have a difficult time maintaining an active planning commission because service is voluntary and requires a personal time commitment. A comprehensive plan is very difficult to update without an active, engaged, and informed planning commission. Some local governments seek outside grants to fund comprehensive plan updates, such as the Community Development Block Grant Program.

## Idaho

### Authorities and Regulations for Comprehensive Planning

Idaho adopted its Local Land Use Planning Act (LLUPA) in 1975. See Idaho Code Title 67, Chapter 65 Local Land Use Planning. This act requires every city and county to adopt a comprehensive plan, zoning ordinance, subdivision ordinance, and area of city impact ordinances. The LLUPA also grants cities and counties the authority to adopt certain laws and policies at the discretion of the governing board, including:

- Establishing a planning and zoning commission (or separate planning and zoning commissions) to assist the governing board in dealing with planning and land use matters;
- Establishing a future acquisitions map;
- Providing for development agreements;
- Allowing transfer of development rights;
- Establishing hearing examiners;
- Regulating planned unit developments;
- Providing for enforcement of land use regulations;
- Establishing development standards; and
- Providing for conditional use permits.

Under the law, the planning or planning and zoning commission must conduct a comprehensive planning process designed to prepare, implement, and review and update the comprehensive plan. Unless the comprehensive plan specifies reasons why a particular component is unneeded, the plan must include the following components:

- Property rights;
- Population;
- School facilities and transportation;
- Economic development;
- Land use;



- Natural resources;
- Hazardous areas;
- Public services, facilities, and utilities;
- Transportation;
- Recreation;
- Special areas or sites;
- Housing;
- Community design;
- Agriculture;
- Implementation; and
- National interest electric transmission corridors.

Although the hazardous areas component provides communities with the opportunity to integrate natural hazard mitigation into their comprehensive plans, the Idaho Land Use Analysis study (2010) found this component to be one of the two weakest plan elements statewide (along with community design). “The inadequacy of the comprehensive plan process to assist in future planning for a community and the lack of statutory requirements for capital infrastructure development plans were cited as weaknesses to the comprehensive planning process.”

## Methods for Integration

Information from the local hazard mitigation plan should be incorporated in the hazardous areas element of the comprehensive plan. This includes information on hazardous areas, past hazard events, local vulnerability and risk, and potential impacts. Mitigation actions can also be incorporated into the hazardous areas policies and implementation actions.

## Current Barriers to Integration

While the LLUPA requires Idaho cities and counties to develop comprehensive plans and zoning ordinances, the act offers limited direction as to how the duties listed above should be met. Unlike many states, Idaho does not have a state agency to ensure local implementation of comprehensive planning requirements or to provide technical assistance with local government planning. Additionally, Idaho does not have any state-based funding for cities and counties to carry out their land use planning work and many cities and counties have limited or nonexistent budgets for planning staffs. In some rural and sparsely populated areas, city clerks, city treasurers, and city engineers serve the planner role. Due to these limitations, many communities are using comprehensive plans that were adopted shortly after the LLUPA was enacted in 1975.

## Oregon

### Authorities and Regulations for Comprehensive Planning

Oregon has a strong statewide planning program in place, the foundation of which is set on 19 statutory statewide planning goals. These goals include the following:

- Goal 1: Citizen Involvement;
- Goal 2: Land Use Planning;
- Goal 3: Agricultural Lands;
- Goal 4: Forest Lands;
- Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces;
- Goal 6: Air, Water, and Land Resources Quality;
- Goal 7: Areas Subject to Natural Hazards;
- Goal 8: Recreational Needs;
- Goal 9: Economic Development;
- Goal 10: Housing;
- Goal 11: Public Facilities and Services;
- Goal 12: Transportation;
- Goal 13: Energy Conservation;
- Goal 14: Urbanization;
- Goal 15: Willamette River Greenway;
- Goal 16: Estuarine Resources;
- Goal 17: Coastal Shorelands;
- Goal 18: Beach and Dunes; and
- Goal 19: Ocean Resources.

Many of the goals are accompanied by administrative rules. The goals and administrative rules each contain mandatory and non-mandatory elements. Together, they form a framework for comprehensive planning and implementation.



State law requires each city and county to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. Local comprehensive plans must be consistent with the statewide planning goals. Goal 7 specifically addresses “areas subject to natural hazards” and requires that communities consider natural hazards as a part of their comprehensive plan. The local plans are reviewed for consistency by the Land Conservation and Development Commission. Once approved, a plan is said to be acknowledged and it becomes the controlling document for land use in the area covered by the plan.

Oregon planning laws apply not only to local governments, but also to special districts and state agencies. The laws emphasize coordination, keeping plans and programs consistent with each other, the goals, and acknowledged local plans. The State land use program allows for regional differences, such as area of the state and size of jurisdiction.

Oregon’s Department of Land Conservation and Development has a technical resource guide that is designed to help local governments strengthen the natural hazard element of their comprehensive land use plans. The guide provides information on how to identify, plan, and implement programs to address floods, landslides, wildfires, seismic, and coastal hazards.

## Methods for Integration

All communities must consider natural hazards as part of the comprehensive plan. Hazard data sets and risk assessment information should be integrated into the section of the plan that addresses areas subject to natural hazards so that the hazard mitigation plan and comprehensive plan are coordinated and use the same language. Hazard mitigation can also be incorporated into the policies of other plan sections that address land use planning, natural resources, open spaces, economic development, housing, public facilities and services, transportation, urbanization, the Willamette River Greenway, estuarine resources, coastal shorelands, and beach and dunes.

## Current Barriers to Integration

The key barrier to the integration of natural hazard mitigation into comprehensive planning is staff resources, particularly time, as well as funding. Political leadership can also play a critical role in the success of integration. The political leaders of local jurisdictions may be hesitant to take any steps that may be seen as unfriendly to development and/or the tourism industry.

An additional barrier is the fact that there is often no relationship or direct coordination between the processes through which the two plans are developed, even though there may be significant overlap in the content. Additionally, the plans are often updated on different schedules when ideally the hazard mitigation plan will be kept current in parallel or in partnership with the comprehensive plan, rather than updating the hazard mitigation plan once every five years.

## Washington

### Authorities and Regulations for Comprehensive Planning

In Washington, there are three statutory enabling acts for planning at the local level. The Planning Commission Act permits a city or county to engage in planning by creating a city or county planning commission. Once a planning commission has been appointed, it must recommend adoption of land use regulations and implement a comprehensive plan.

The Municipal Code provides the same general authority to engage in planning as the Planning Commission Act; however, it does require greater detail in the elements and format of the comprehensive plan. To engage in planning and zoning under this code, a city may create a planning agency to prepare a comprehensive plan.

The Planning Enabling Act is directed specifically at counties, and it is the most detailed of the three statutes. This statute provides a specific statutory framework that integrates planning with zoning, platting, and other specific land use regulations, and it requires a more detailed comprehensive plan.

Communities also have the option to operate under a charter model which provides a different planning structure.

In 1990, the State Growth Management Act (GMA) was adopted because uncoordinated, unplanned growth was posing a threat to the environment, sustainable economic development, and quality of life in Washington. The GMA, and its implementing amendment, do not change the method or manner of planning in a local community; they specify the elements that must be planned and additional criteria to be followed, regardless of the local community's statutory model.

The GMA provides the tools to counties and cities to manage and direct growth to urban areas where public facilities and services can be provided most efficiently, to protect rural character, to protect critical areas, and to conserve natural resources. It also provides a more detailed policy framework that includes 14 goals and a number of requirements for local comprehensive plans and development regulations. The goals address the following:



- Urban growth;
- Reduce sprawl;
- Transportation;
- Housing;
- Economic development;
- Property rights;
- Permits;
- Natural resource industries;
- Open space and recreation;
- Environment;
- Citizen participation;
- Public facilities and services;
- Historic preservation; and
- Shoreline management.

Under the statute, all counties and cities are required to designate and protect critical areas, including wetlands, frequently flooded areas, and geologically hazardous areas, and to designate natural resource lands. However, only those counties and cities considered faster growing are required to fully plan under the GMA by meeting all of the goals and requirements of the act, including adopting a comprehensive plan. Any city or county not mandated has the option to fully plan under the GMA. Additionally, the statute requires all county and city comprehensive plans to include specific elements, or chapters, to address land use, housing, capital facilities, utilities, transportation, rural lands (for counties), and shorelines.

The Washington Department of Commerce has developed a guidebook that provides a process for developing an optional natural hazard reduction element to address hazard avoidance and mitigation in a comprehensive plan. The guidebook will assist in planning for flood, wildfire, and landslide hazards, and although other natural hazards such as high winds, earthquakes, and volcanic events are not specifically addressed, many of the principles and techniques described are also applicable to these as well.

## Methods for Integration

All counties and cities are required to address critical areas, including frequently flooded and geologically hazardous areas, regardless of whether they are required to adopt a comprehensive plan. Accordingly, the land inventories, data, and other findings from this critical areas planning should be incorporated into local comprehensive plans. Any additional information regarding hazardous areas, past occurrences, vulnerability, potential impacts, and future risk found in the local hazard mitigation plan or hazard identification and vulnerability analysis (required for development of a comprehensive emergency management plan) should also be integrated into the comprehensive plan. Policies that address critical areas should also include mitigation actions to reduce risk.

## Current Barriers to Integration

Currently, there is little or no money to do either comprehensive planning or hazard mitigation planning from state or federal funding sources. The Growth Management Services Division of the Department of Commerce administers multiple planning grants, including growth management compliance, update, and emerging issues grants. However, due to state budget deficit, funding is not available at this time for jurisdictions that are required to review and, if necessary, revise their comprehensive plans. Additionally, most medium- and small-sized jurisdictions do not have the technical expertise to complete plan updates in-house. As a result, it is more difficult for communities to integrate natural hazard mitigation into their comprehensive planning efforts, especially because this can be seen as a duplication of planning efforts.



# Best Practices Case Studies

## Case Study Evaluation Methodology

Local comprehensive plans for jurisdictions in each of the four FEMA Region X states were reviewed for best practice examples of integrating natural hazard mitigation. Jurisdictions were initially selected for review based on recommendations from the states as well as their Community Rating System (CRS) Class score, number of National Flood Insurance Program (NFIP) policies and claims, and number of repetitive loss properties. These criteria were selected based on the assumption that communities with high flood risk and flood losses would be more likely to implement hazard mitigation and because flood is the most frequent and costly natural hazard in the U.S.

Fifteen plans for Alaska communities, nineteen plans for Idaho communities, twenty-one plans for Oregon communities, and twenty-three plans for Washington communities were reviewed for a total of seventy-eight comprehensive plans. The plans were reviewed using an evaluation tool created based on the Safe Growth Audit technique developed by Dr. David Godschalk<sup>2</sup>. A safe growth audit is used to evaluate the extent to which a jurisdiction is growing safely relative to the natural hazards it faces, and basing the evaluation of comprehensive plans on basic safe growth audit questions will help determine if and how natural hazard mitigation is integrated into the comprehensive plan.

The evaluation tool used for plan review can be found in the appendix. It is important to note that this tool was created with the focus of identifying best practice examples of hazard mitigation and comprehensive planning integration. Scores assigned by this evaluation tool are not indicative of plan quality or planning efforts, but rather they were used to determine plans in which hazard mitigation was incorporated.

<sup>2</sup> <http://www.planning.org/zoningpractice/open/pdf/octog.pdf>

## Municipality of Anchorage, Alaska



### Background

Anchorage is located in south central Alaska at the head of Cook Inlet. The area consists of mostly rugged mountainous terrain, with 84% being comprised of national forest or state parklands and tidelands, and only about 10% of the entire municipality is inhabited. Anchorage was long known to have a transient population due to the seasonal boom-bust economy and military personnel rotations. However, in the 1990s, economic stability and military cutbacks reduced annual population turnover by half, resulting in a more permanent population. According to the 2010 Census, Anchorage has a population of 291,826 people, making it the most populous jurisdiction in the state and constituting 40% of the state's total population.

Anchorage is vulnerable to a wide range of natural hazards, including earthquake, wildfire, extreme weather, flood, avalanche, landslide, volcanic ashfall, tsunami, and erosion. These hazards can affect the safety of residents, damage or destroy public and private property, disrupt the local economy, and negatively impact the quality of life.



## Examples of Integration

The Anchorage Comprehensive Plan (2001) incorporates natural hazard mitigation into the plan goals and policies. The plan goals include being an urban place that is mindful of its natural hazards as well as having coordinated and proactive public policies, emergency plans and procedures, and educational programs that minimize the risk to the community from natural hazards and disasters.

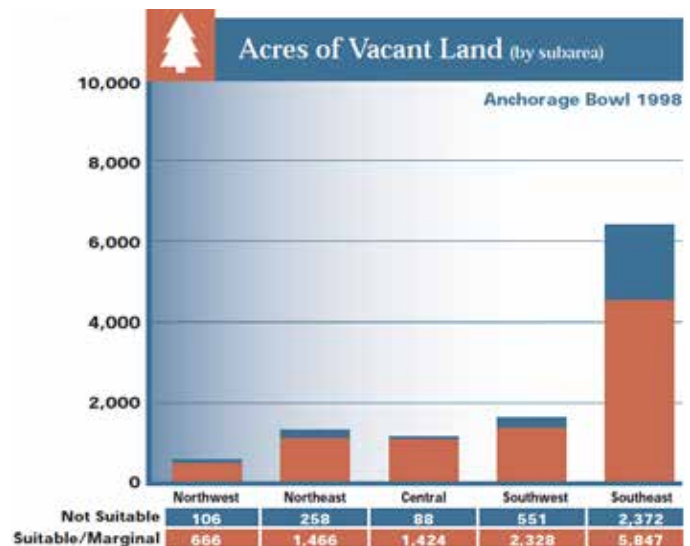
In addition to incorporating goals that address natural hazard mitigation, the plan includes multiple policies related to mitigation. These include:

- New rural residential subdivisions shall be designed to protect, maintain, or avoid sensitive environmental areas (wetlands, steep slopes, drainageways, unsuitable soils, geohazard areas).
- The Municipality shall preserve the functions and values of wetlands, and manage the proper use of low-value wetlands with General Permits, as delineated in the Anchorage Wetlands Management Plan.
- The Municipality shall minimize the incidence of new developments for human occupancy in high natural hazard areas.
- Utilities shall be located and designed with balanced regard for the environment and natural hazard survivability.

The Plan Implementation chapter goes on to include a “Geohazards Management” implementation strategy. Because some of the residual parcels and redevelopment target areas lie within identified geohazard zones, the Municipality and development community should address these geohazards in order to minimize risk and damage potentials. The plan states that data and mapping updates are fundamental in addressing geohazards and the need for new and/or revised policies for regulatory development guidelines in the geohazard areas should be evaluated.

The plan also provides a suitability analysis of vacant land for development that considers site conditions such as steep slopes, poor soils, and seismic or other hazards that limit development potential.

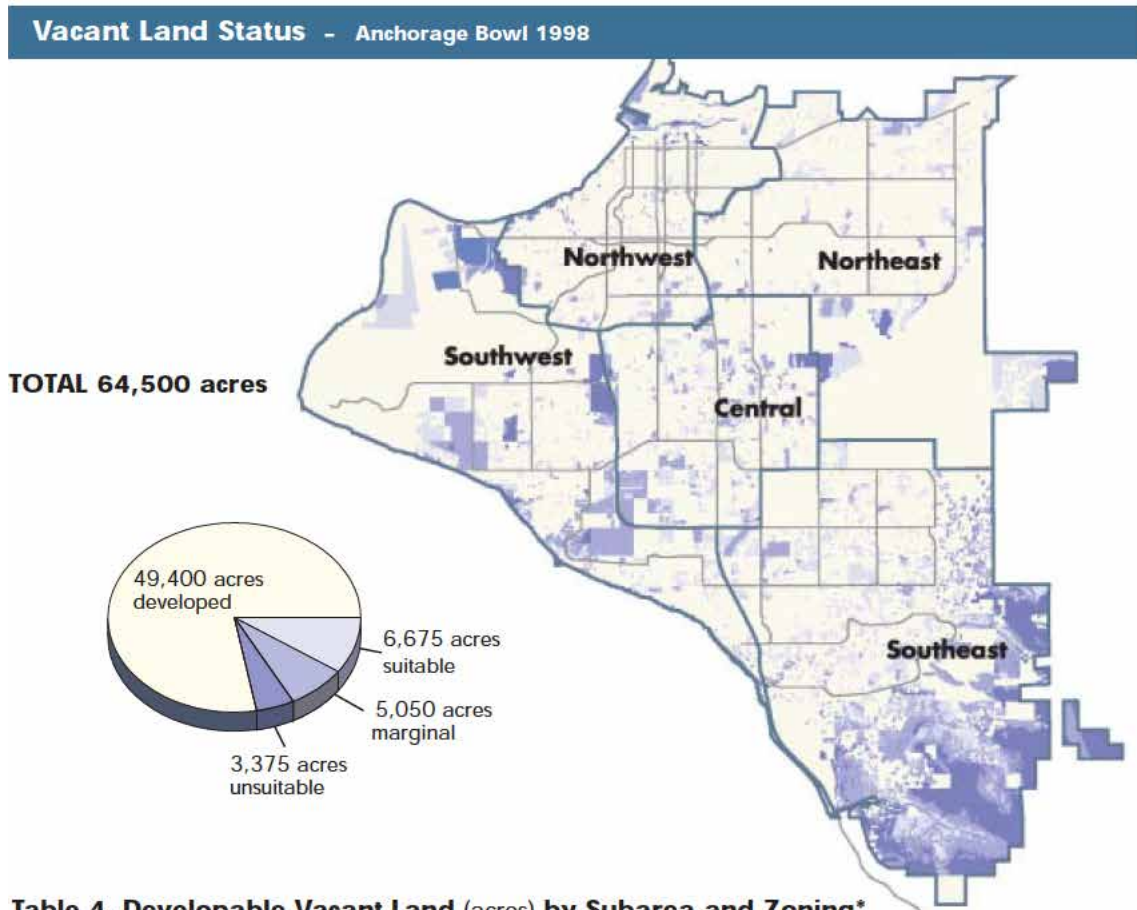
Anchorage Bowl Areas of Vacant Land Suitability Analysis



## Benefits of Integration

The incorporation of goals, policies, and implementation strategies that address natural hazard mitigation in the Comprehensive Plan will encourage local land use decisions to consider the risks posed by natural hazards. Additionally, by considering hazardous conditions in the land suitability analysis, the Comprehensive Plan is able to direct development and infrastructure expansion in those areas that are at lower risk.

Anchorage Bowl Vacant Land Status Map



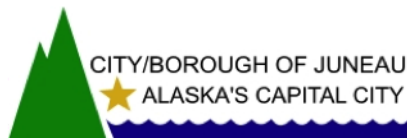
**Table 4. Developable Vacant Land (acres) by Subarea and Zoning\***

Anchorage Bowl, 1998

Zoning	Northwest	Northeast	Central	Southwest	Southeast	Total	Percent
Residential	231	804	649	1,406	5,447	8,537	73%
Commercial	145	98	113	61	4	421	4%
Industrial	204	53	589	88	0	934	8%
PLI	4	381	33	155	273	846	7%
Other	82	130	40	618	123	993	8%
<b>TOTAL</b>	<b>666</b>	<b>1,466</b>	<b>1,424</b>	<b>2,328</b>	<b>5,847</b>	<b>11,731</b>	<b>100%</b>
Percent	6%	12%	12%	20%	50%	100%	

\*Includes suitable and marginally suitable vacant land

## City and Borough of Juneau, Alaska



### Background

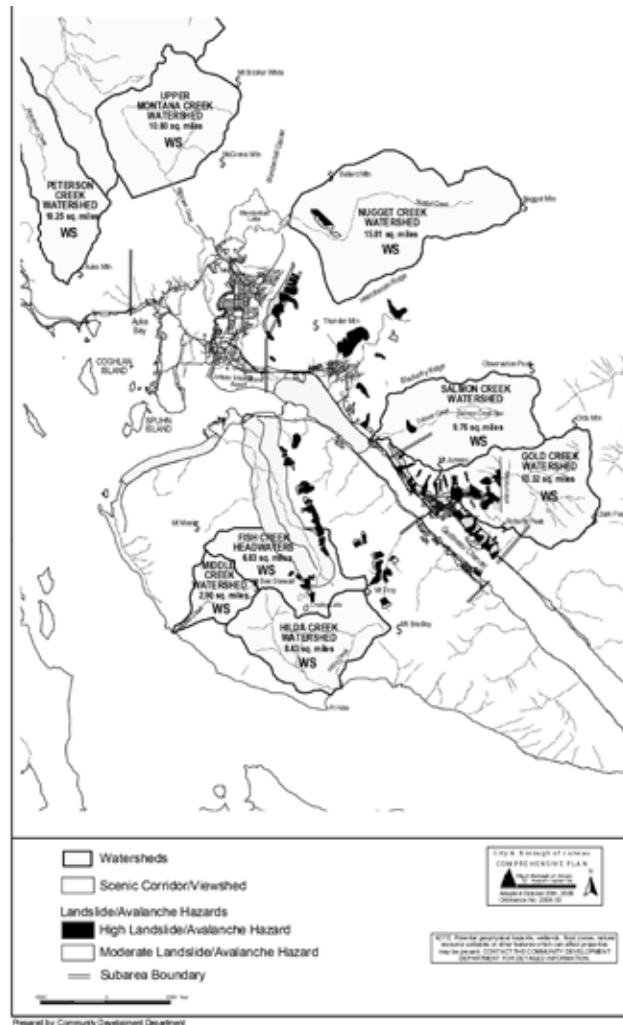
The City and Borough of Juneau, Alaska’s capital city, is situated between the sea and steep glacial peaks on the panhandle of southeast Alaska and is only accessible by air and sea. Although Juneau encompasses a very large geographical area, only a small percentage is suitable for development as the area is composed of remote areas with steep slopes and glaciers. The most rapidly developing area in recent years, and also the most densely populated residential area in the Borough, is the Mendenhall Valley. The Borough’s current population, according to the 2010 Census, is 31,275 and the local economy is based on government, tourism, mining, and fishing.

Juneau is vulnerable to multiple natural hazards, including avalanche, landslide, earthquakes, severe weather, floods, wildland fire, tsunamis and seiches, and volcanoes. These hazards pose a risk to community assets, infrastructure, development, and human safety. Further, in the event of a disaster, Juneau has the potential to become isolated from shipping and air flight for days.

### Examples of Integration

The City and Borough of Juneau Comprehensive Plan (2008) incorporates hazard mitigation information into the chapter on natural resources and hazards. The plan describes the landslide, avalanche, earthquake, and flood hazards to which Juneau is faced, provides a map of high landslide and avalanche hazard areas and moderate landslide and avalanche areas, and specifies hazard locations in the designated subareas, such as rivers and creeks prone to flooding and mountains and valleys susceptible to avalanches and landslides.

City and Borough of Juneau Hazard Map



The plan further integrates hazard mitigation by including a policy to minimize the threat to human safety and development posed by landslides and avalanches. The following development guidelines are also included to implement this policy:

**POLICY**

**It is the policy of the CBJ to minimize the threat to human safety and development posed by landslides (mass wasting) and avalanches.**

**Development Guidelines**

- If a developer disagrees with the boundaries shown on the CBJ hazard maps, the developer may seek departmental relocation of the boundaries by submitting site-specific studies prepared by a licensed engineer, geologist, or recognized specialist in snow avalanche or masswasting behavior, energy, velocity, and destructive potential. Such studies shall include detailed analyses of topography, vegetation, soil and snow conditions, storm and climate analysis, and other factors relevant to the description of the snow avalanche or mass-wasting process. The study must describe how each of the factors was used in re-evaluating the snow avalanche or mass-wasting hazard. The results must indicate hazard boundaries and the physical characteristics of the process (extent, velocity, energy, flow height, impact and depositional loading, etc.).
- Review any proposed land disposals of CBJ lands in light of their hazard classification; retain ownership of CBJ lands with moderate- to high-potential for avalanche or mass-wasting (landslide).
- Eliminate from long- and short-range development plans any public facilities that would have the effect of concentrating people in hazard areas, but do not preclude roads through hazard areas.
- Tax-foreclosed property in the high hazard areas should be dedicated to the CBJ public natural areas inventory.

**Implementing Actions**

- Designate areas of moderate and high landslide/avalanche hazards as being subject to such threats on the CBJ GIS database and maps as well as the Land Use Code Maps.
- Designate all public lands located in hazard areas as Hazard Areas (HA) on the Comprehensive Plan Maps. Include all CBJ land in hazard area in the Parks and Open Space/Natural Areas Plan.
- Complete the reassessment of hazard areas and include all areas of the original 1972 study that were not included in the 1992 study, including the Downtown Juneau waterfront area. Complete detailed mapping of the White Subdivision, Thunder Mountain and Thane Road hazard areas.
- Provide mitigating standards in the Land Use and/or Building Code for development in landslide and avalanche hazard areas based on the 1972 and the 1992 studies. These standards may include dissipating structures or dams, appropriate structural and special engineering, or other techniques that respond to the specific hazards of the site. All development in the hazard areas must include mitigating measures that respond to the specific hazards of that site.
- The CBJ should, to the greatest extent practical, acquire properties lying within areas designated as having high mass wasting or avalanche hazard potentials; these CBJ lands should remain undeveloped.
- Amend the Land Use Code to prohibit industrial and resource extraction activities in high landslide or avalanche hazard areas unless it is determined that these activities will not increase the threat of landslides and avalanches on nearby lands.
- Amend the Land Use Code to require a hazard threat study for proposed development in areas outside of mapped hazard areas if the property shows potential for containing or being affected by such threats.

The plan also includes a policy to prohibit residential, commercial, and industrial development in floodways, to regulate development in floodplains, and to maintain a program of education, assistance, and information in order to maintain eligibility for the National Flood Insurance Program. A standard operating procedure, development guideline, and implementing action are provided to implement this policy.

**POLICY**

**It is the policy of the CBJ to prohibit residential, commercial, and industrial development in floodways, to regulate development in floodplains, and to maintain a program of education, assistance, and information in order to maintain eligibility for the National Flood Insurance Program for the benefit of local property owners and the lending industry.**

**Standard Operating Procedure**

- Use the floodway and floodplain boundary lines outlined on maps prepared by FEMA as the basis for defining flood boundaries.

**Development Guideline**

- Apply the Flood Hazard Provisions of the Land Use Code to development proposals in the 100-year floodplain that increase flood danger, and prohibit commercial or industrial storage of toxic chemicals or materials in the 100-year floodplain.

**Implementing Action**

- Designate, on the CBJ GIS maps and Land Use Code Maps, areas within the 100-year floodplain but outside floodways as public open space/natural areas or stream corridor protection areas if the subject land is in public ownership.

**Benefits of Integration**

The inclusion of natural hazard information in the Comprehensive Plan will educate the public and emphasize that development decisions impact the ability to create a safe community. Although knowledge of existing hazards and hazardous areas is not enough to adequately prepare, proper planning can help minimize the extent of damage from future hazard events. By including policies to incentivize riparian and wetland conservation, provide flexibility in development to allow minimal impacts on wetlands and streams, eliminate public facilities that would concentrate people in hazard areas, and dedicate tax-foreclosed property in high-hazard areas to public natural areas, the plan is increasing the likelihood that mitigation practices will be implemented, thereby reducing risk.

**City of Kenai, Alaska**

**Background**



The City of Kenai is located centrally in the Kenai Peninsula Borough at the mouth of the Kenai River on the west coast of the Kenai Peninsula. According to the 2010 census, the City has a population of 7,100. Kenai boasts a rich history founded on natural resources. Today, key industries continue to rely on natural resources and include oil, natural gas, commercial fishing, and tourism. The City shares planning functions with the Borough but has been delegated the authority to adopt land use plans and enact and enforce zoning and land use regulations.

Natural hazards may affect the City of Kenai to various degrees. The City’s high-risk hazards include floods, wildfire, earthquakes, weather, and erosion. Hazards with medium risk include volcanoes, and hazards with low risks include tsunamis.

**Examples of Integration**

At the time of this review, the Kenai Comprehensive Plan (2012) was undergoing public review and had not been formally adopted by the Kenai City Council. Therefore, the public review draft version of the plan was reviewed. The Kenai Comprehensive Plan articulates a clear vision, goal, and objective regarding natural hazards and disasters. The plan also provides a series of strategies for implementing the goal and objective.

**GOAL**

**Natural Hazards and Disasters: Prepare and protect the citizens of Kenai from natural hazards and disasters**

Vision: Kenai has coordinated and proactive public policies, emergency plans and procedures, and educational programs that minimize the risk to the community from natural hazards and disasters.

Kenai’s natural hazards identified in the Hazard Mitigation Plan include erosion, wildland fires, floods, volcanoes, earthquakes, and a low risk of a tsunami.

**Issues:**

- Bluff Erosion.
- Conservation easements along the Kenai River.
- Continued public educational programs.
- Development in designated hazard areas.



**Bluff erosion along Kenai River**

<b>Objectives</b>	<b>Strategies</b>	<b>Priority</b>	<b>Department</b>	<b>Funding</b>
Implement the Hazard Mitigation Plan strategies	Develop and demonstrate defensible space and landscaping techniques to encourage community and home construction contractor participation.	High	Public Safety	City
	Reduce fuels in hazard areas and emergency egress routes in cooperation with the Kenai Peninsula Spruce Bark Beetle Mitigation Office, State Division of Forestry and landowners.	High	Public Safety	City KPB State
	Raise public awareness of the possible magnitude of flood damage and debris based on historical events using on site visits and meetings during the permit process.	Medium	Public Works Planning	City KPB State
	Educate the public of the importance of securing of docks, vehicles, trash and utilities (LPG tanks, fuel tanks, etc.) to reduce loss and reduce influx of debris into waterways during floods.	Medium	Public Works and Planning	City KPB State
	Alert the public to the harmful effects of volcanic ash fallout to life and property.	Medium	Public Safety	City KPB
	Continue cooperative advisements to the public via Borough Office of Emergency Management (OEM), local media, and City of Kenai websites during periods of increased volcanic and seismic activity.	Medium	Public Safety	City KPB
	Provide information regarding measures to prevent illness and damage to air intake of homes, vehicles, and businesses.	Medium	Public Safety	City
	Prepare citizens and the built environment to better survive the hazards associated with earthquakes through the promotion of public education.	Medium	Public Safety	City KPB
	Promote the practice of sheltering in place, and encourage the preparation of citizens for self-sufficiency in post earthquake scenario.	Medium	Public Safety	City KPB
	Continue cooperative advisements to public via Borough OEM, local media, and local emergency responders to collectively evacuate the public.	Medium	Public Safety	City KPB

Additionally, the plan provides information on flooding, erosion, coastal storms, fire, volcanoes, and earthquakes. This information includes descriptions of hazardous areas and past disaster events and damage.

## Benefits of Integration

The incorporation of a goal, objective, and implementation strategies that are specific to natural hazard mitigation in the Comprehensive Plan will increase the likelihood that local hazard mitigation actions are successfully implemented. It will also encourage local land use decisions to consider the risks posed by natural hazards.

## Kenai Peninsula Borough, Alaska



### Background

The Kenai Peninsula Borough encompasses over 24,000 square miles and is located in south-central Alaska. The Borough is divided into two land masses by the Cook Inlet, and the Kenai Peninsula, or eastside land mass, is more populated and developed while the westside is largely undeveloped and sparsely populated. The Kenai Peninsula was the site of the first major Alaska oil strike; however development has centered around natural gas because oil was less abundant. The Borough has a population of 55,400 as of the 2010 Census.

The large size and substantial regional variations in climate and geographic features make the Borough vulnerable to natural hazards such as flooding, earthquakes, tsunamis, winter storms, wildfire, erosion, volcanoes, and avalanches. These disasters have the potential to affect all segments of the communities they strike, and they can have long-lasting social and economic impacts.

### Examples of Integration

The Kenai Peninsula Borough Comprehensive Plan (2005) references the local Hazard Mitigation Plan and considers natural hazards as a development constraint. Plan goals and objectives targeted at implementing the Borough Hazard Mitigation Plan are incorporated into the comprehensive plan.

#### GOAL

**To prepare public officials and citizens for natural and human induced disasters likely to occur within the Borough**

#### OBJECTIVES

To adopt and implement emergency response plans and to implement the adopted All-Hazard Mitigation Plans for the Borough.

### Implementation Actions

- Continue to implement and update emergency response plans for the established “North”, “South”, “East”, and “Central” emergency planning zones of the Borough.

- Continue to implement and update the All-Hazard Mitigation Plan for the Borough.
- Continue to work with the Borough Office of Emergency Management, the LEPC, and the State to inventory toxic and hazardous substances that are stored, used or transported through the Borough and develop procedures to handle accidental leaks or spills.
- Ensure that projects reviewed under the KPB Coastal Management Program comply with established guidelines for storing and transporting toxic and hazardous substances.

Brief summaries of the natural hazards that constrain development and use of land in the Borough are also included in the comprehensive plan. These summaries include information on the hazard characteristics, history of past events, and potential impacts and damages. The hazards addressed include flood, erosion, landslide or avalanche, earthquakes, volcanic activity, tsunamis, and wildfires.

Objectives and implementation actions that address wetlands, floodplains, erosion prone areas, and landslide or avalanche zones are included in the plan.



**To assess and help identify wetlands, floodplains, erosion prone areas, and landslide or avalanche zones.**



To continue to consider the natural features and development suitability of the land during the subdivision review process.

### Implementation Actions

- Implement the All-Hazard Mitigation Plan to define and map natural hazard areas and future borough efforts to address them.
- Review the All-Hazard Mitigation Plan to identify changes that would be necessary to the borough subdivision code to bring the preliminary plat review process into compliance with the All-Hazard Mitigation Plan.
- Continue to use an integrated approach to address impacts on water quality/quantity of subdivision development, gravel extraction, road construction, shoreline armoring, and other land development and use activities.

- Work with property owners to minimize development impacts on wetlands, coastal shores and bluffs, riparian areas, and wildlife and their corridors and essential habitats by encouraging siting of structures to avoid impacts on these resources.
- Continue to discourage location of subdivision roads through wetlands, floodways and floodplains, steep slopes, waterways, or other open water areas.
- Identify sources that offer incentives for developers to set aside sensitive areas and open areas to serve as open space, conservation or natural areas
- Support efforts to minimize adverse impacts of flooding or erosion to protect neighboring properties or resources.

Additional mitigation-related actions include:

- Complete and maintain an inventory of the natural hazards of borough-owned, approved, and selected land.
- Design upgrades to streets, culverts, and bridges (new and old) to accommodate the 1% flood event to protect or minimize adverse impacts of flooding or erosion to neighboring properties or resources.
- Develop a plan to repair flood damaged streets, culverts, and bridges to a level that they can accommodate 1% flood events.
- Improve regulation of specific land uses and types of land, including gravel pits, floodplains, correctional facilities, mobile home parks, steep slopes, and coastal beach and shoreline bluffs per Borough Ordinance (Chapter 21) to protect or minimize adverse impacts of flooding or erosion to neighboring properties or conflicts with surrounding lands.

### Benefits of Integration

The inclusion of actions to implement the Hazard Mitigation Plan in the Comprehensive Plan will increase the likelihood that the mitigation strategy will be implemented by the Borough. Additionally, by including actions to design infrastructure to withstand flood events and improve regulation of land uses to protect against or minimize the impact of flooding and erosion, the level of hazard risk to which the community is exposed will be reduced.



## City of Nome, Alaska



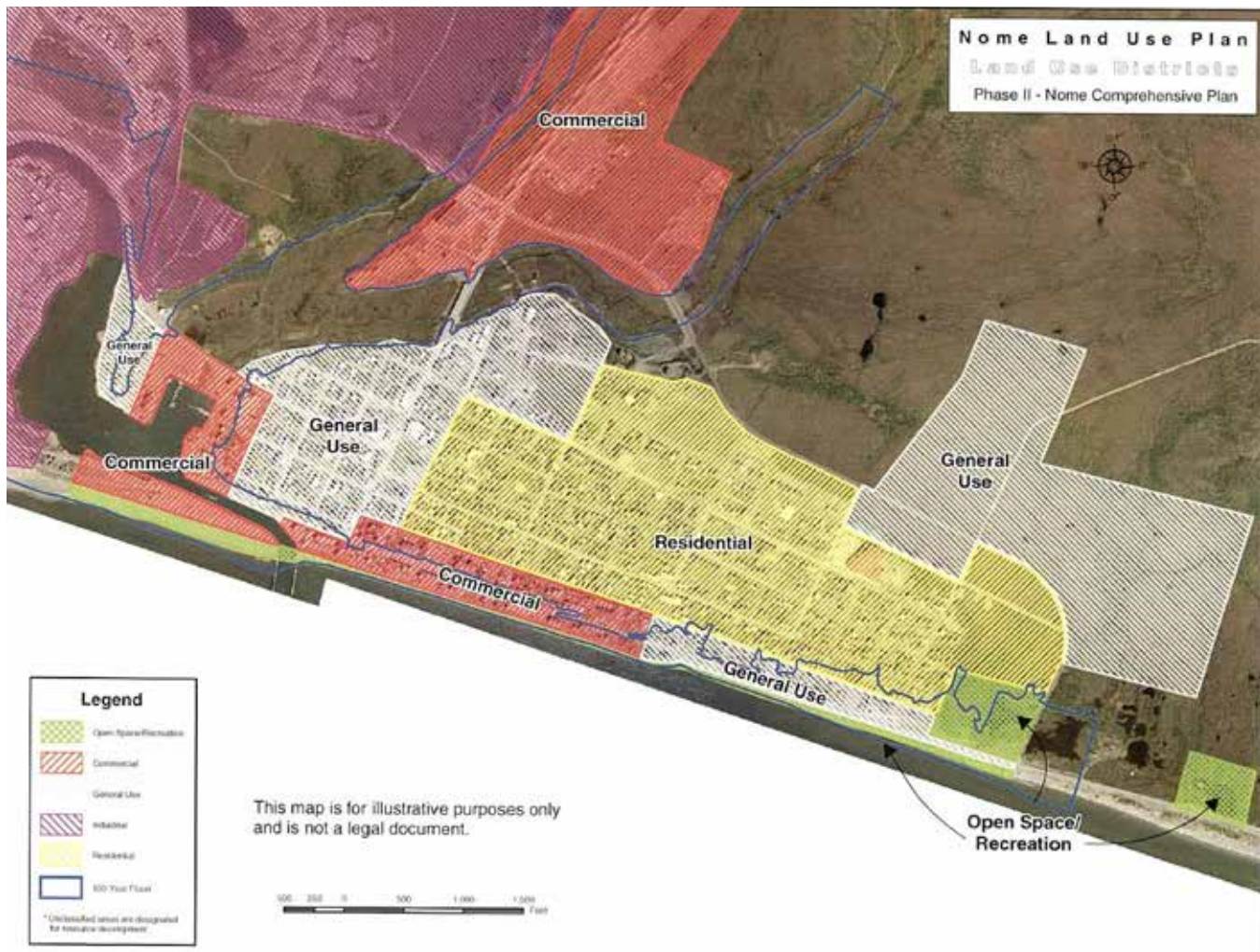
### Background

The City of Nome is located in northwest Alaska on the southern coast of the Seward Peninsula. Its location makes it a vital hub for the region. The population of Nome is a mixture of Eskimos and non-Natives. According to the 2010 Census, the city population is

3,598. Although some employment opportunities are available, subsistence activities are prevalent in the community.

The principal hazards impacting Nome are coastline flooding, coastal storm surge, and erosion. Bering Sea storms have wreaked havoc on the City many times during the 20th century, destroying property, resulting in injuries and fatalities, and contaminating public water supplies. Severe weather and earthquake hazards are additional community-wide hazards. All of these natural hazard events can result in road closures, reduced access and response capabilities for public safety, limited availability of perishable commodities, isolation, as well as structure and critical infrastructure damage.

### City of Nome Land Use District Map



## Examples of Integration

The City of Nome has incorporated its local Hazard Mitigation Plan (2005) into the City's Comprehensive Plan by dedicating a chapter to the Hazard Mitigation Plan. This chapter includes a summary of the Hazard Mitigation Plan that includes a description of its purpose as well as the short- and long-term mitigation projects.

The Comprehensive Plan also clearly articulates objectives and implementation strategies related to mitigation. These include the following:

- Review the floodplain regulations.
- Relocate the museum and library out of the 100-year floodplain.

Additionally, the Comprehensive Plan delineates the 100-year floodplain on the land use district map. The map uses different colored crosshatching to designate various land uses and a solid blue line is overlaid to designate the boundary of the 100-year flood.

## Benefits of Integration

The inclusion of a Comprehensive Plan chapter dedicated to the Hazard Mitigation Plan will help to ensure that the two documents are consistent and will increase the likelihood that the hazard mitigation projects are implemented. Further, the identification of the 100-year floodplain on the land use map will also encourage the location of flood hazard areas to be considered during land use and development decision making.

## Ada County, Idaho



### Background

Ada County is located in southwestern Idaho at the western end of the Snake River Plain known as Treasure Valley, an area originally inhabited by Native Americans. Since the late 1980s, the area's economic opportunities, climate, and access to the outdoors have attracted people and businesses to the County. These attractions fueled record population growth and development that made the area the seventh-fastest growing region in the U.S. through the 1990s. Today, according to the 2010 Census, the population is 392,365.

Severe weather, wildfire, earthquake, and flood are the hazards of highest concern in Ada County. People, property, critical facilities, infrastructure, and the environment are all vulnerable to impacts caused by these hazard events. Since 1956, 22 hazard events have been so severe that they resulted in presidential disaster declarations. However, many hazard events have also occurred that did not result in disaster declarations but still had significant impacts on the County.

### Examples of Integration

The Ada County Comprehensive Plan (2007) includes a chapter on natural resources and hazardous areas. This chapter includes a map of sensitive lands, including steep slopes and the 100-year floodplain, and information on the defined floodway.

**POLICIES** This chapter also includes a goal, 18 policies, and several implementation actions related to protecting human life and property from floods and reducing expenditures related to flood damage.

Policies of note include the following:

- Work to retain the floodway in a natural state as a greenbelt, wildlife habitat, and open space-recreation area.
- Prohibit all structural development within floodways, with the exception of bridges or other selected public facilities identified in the County development code.
- Design and construct all river and stream crossings to withstand at minimum the flows and velocities of the 100-year flood.

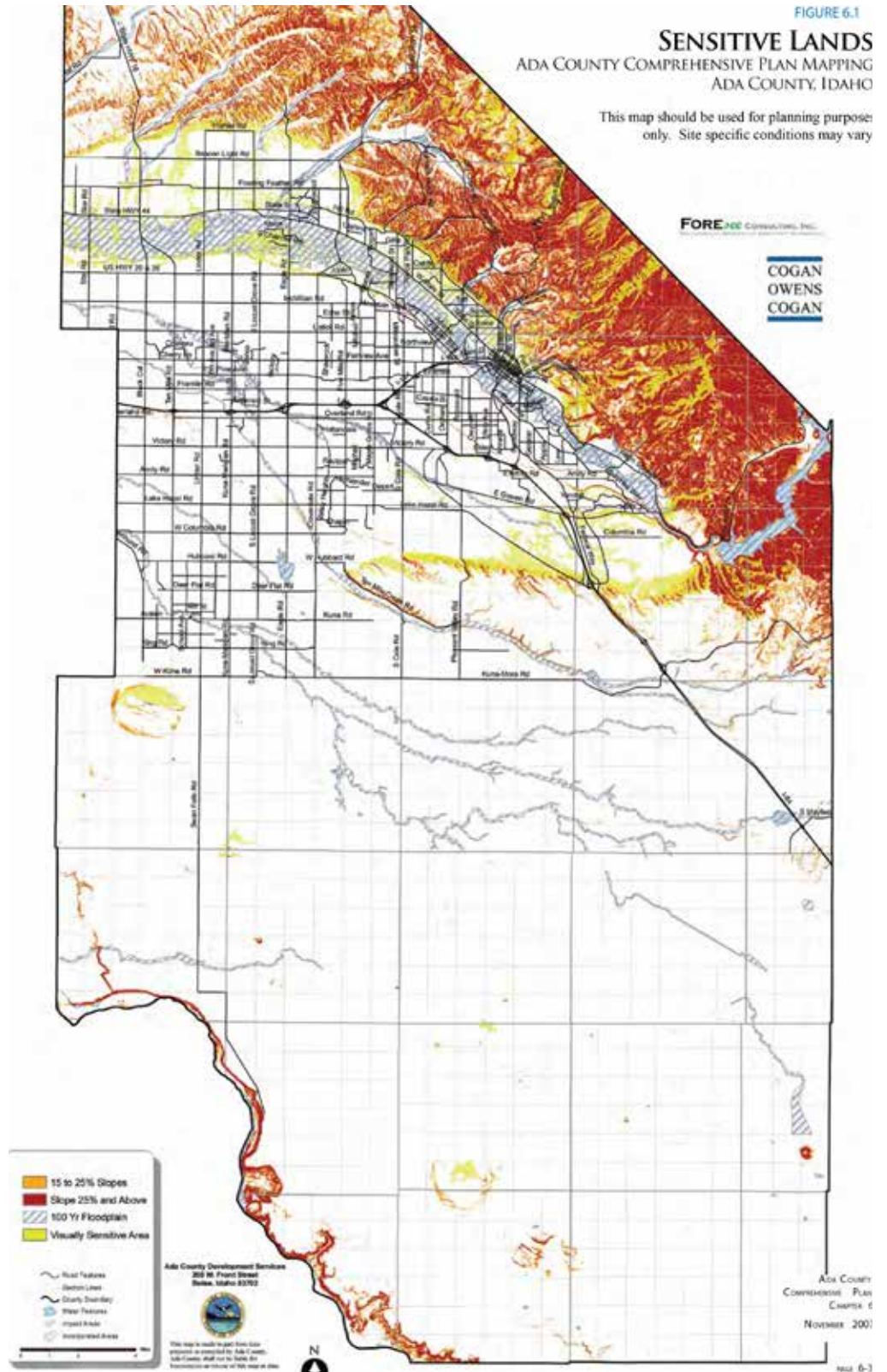
Ada County Sensitive Lands Map

FIGURE 6.1  
**SENSITIVE LANDS**  
 ADA COUNTY COMPREHENSIVE PLAN MAPPING  
 ADA COUNTY, IDAHO

This map should be used for planning purposes only. Site specific conditions may vary.

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- Minimum setback and/or safety requirements should be established along the periphery of foothill tributaries to protect structures from damage by lateral erosion.
- Provide for reasonable density transfer so that the flood-free portion of parcels partially within the 100-year floodplain can take development that would otherwise have been permitted in the floodplain.
- Prohibit the location of critical facilities within the floodplains.
- Planning of major transportation routes should take into consideration the hazards of locating in floodplain areas.
- Transportation routes should take into consideration the extreme hazards of foothill tributary floodways, and twice the normal minimum clearance of bridges should be established to protect infrastructure from floods/debris flows.

These policies shall be implemented by updating the County Zoning Ordinance and other requirements to ensure consistency with the policies related to floodplain protection and by establishing a minimum setback from the floodway in the County Code for unincorporated portions of the County.

## Benefits of Integration

The inclusion of a map that delineates steep slopes and the 100-year floodplain in the Comprehensive Plan can encourage development and infrastructure to be located in those areas at lower risk of hazards. Additionally, the incorporation of mitigation actions that specifically address floodplains into the Comprehensive Plan goals and policies will also help to ensure that proper planning is taken to reduce flood risk in the community. For example, designing infrastructure to withstand 100-year floods, prohibiting critical facilities within floodplains, and prohibiting all structural development in floodways will reduce potential flood damage in the County.

## City of Boise, Idaho

### Background

The City of Boise is located in Ada County in southwestern Idaho in a region called Treasure Valley. It is situated within the Boise River Valley at the base of the foothills of the Rocky Mountains, and the Boise River traverses the City. Boise’s economic base was originally built on farming and mining activities. However, the expansion of manufacturing and government fueled much of the population growth from the 1970s through the 1990s. Between 1990 and 2000, the growth rate in the City was 47.8%; however, between 2000 and 2010, that rate declined to 10.7%. Growth in Boise all but stopped in 2008 but is slowly beginning to recover. According to the 2010 Census, the current population is 205,671.



Earthquake, flood, severe storm, and wildland fire are rated as having the highest natural hazard risk in the City. People, property, critical facilities, infrastructure, and the environment are all vulnerable to impacts caused by these hazard events. There are 10 hazard events on record, including severe wind, wildfire, flooding, and earthquake, that have impacted Boise. These events have resulted in damage that ranged from minimal local damage to \$3.3 million in losses.

### Examples of Integration

The City of Boise has incorporated hazard mitigation into its Comprehensive Plan (2011), Blueprint Boise, by including goals and policies that relate to wildfire, geologic and seismic risk, and flood hazards. The plan includes a Safe, Health, and Caring Community theme to “protect life and property from natural hazards” as well as three goals that specifically target individual natural hazards.

- GOAL** Minimize the degree of risk to life and property from wildfire.
- GOAL** Account for known geologic and seismic risks in land use planning.

**Minimize risk from flood hazards to life, property, and public investment.**

Policies to support the wildfire goal include:

- Development Standards—Implement development standards for mitigation measures in areas prone to wildfire.
- Public Education and Awareness—Promote public education of and awareness of wildfire prevention and protection.
- Wildland Urban Interface—Monitor the effectiveness of provisions to protect structures and prevent loss in the wildland urban interface.

Policies to support the geologic and seismic risk goal include:

- Location and Distribution of Hazards—Develop and maintain thorough knowledge of the location and distribution of geologic, seismic, and hydrologic hazards related to slope and soil stability, erosion, water table levels and ground movement.
- Development in Hazard Areas—Support land use patterns and locational criteria that prohibit development in known geologic hazard areas or significantly reduce risk by requiring geologic assessment and engineering prior to construction in these areas.
- Public Facilities—Design and operate public safety facilities to maximize their ability to remain safe and functional during and after disasters.
- Public Facilities—Mitigate problems with existing, substandard city-owned structures according to priority based on level of risk, hazard to life, type of occupancy, method of construction, physical condition, and location.
- Hillside Revegetation—Require revegetation plans in hillside areas to promote erosion control.



Policies to support the flood hazard goal include:

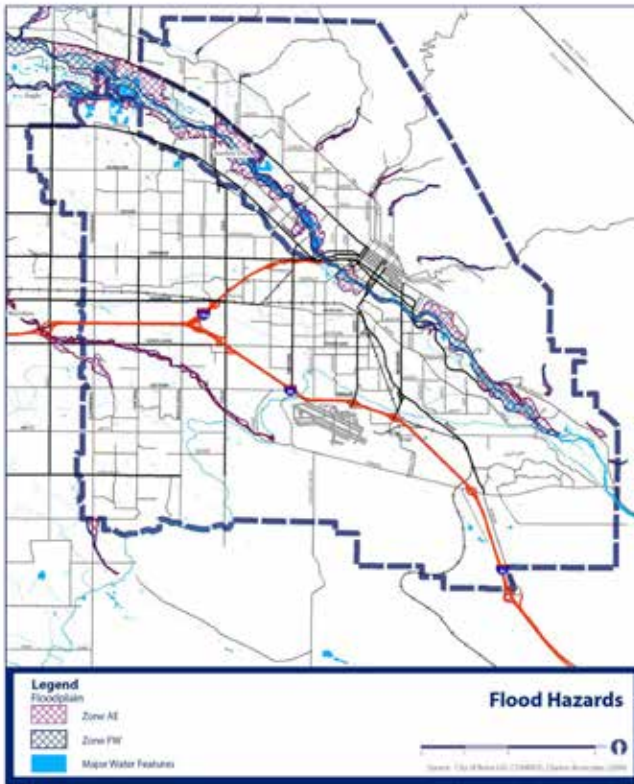
- Public Information/Coordination—Maintain and update public information regarding the nature and location of flood hazards in Boise.
- Development Standards—Maintain and enforce location criteria and development standards that minimize financial loss and maximize protection of property in the event of flooding.
- Erosion Prevention—Protect the Boise River banks and Foothills gulches from further erosion by enacting programs to install and maintain streamside native vegetation.
- Flood Channel Capacity—Explore strategies to maintain flood channel capacity in the Boise River, including annual spring flushing from the reservoirs or periodic dredging.
- River Access—Preserve and obtain adequate access to the river for flood-control maintenance at the time of new development along the river.
- Stream Flow and Precipitation Data—Continue to obtain stream-flow and precipitation data on the seven major tributaries in the Foothills for planning purposes.
- Public Acquisition—Support the public acquisition of properties located in the floodplain.

Additional policies give consideration to hazardous areas during development in the planning area policies section:

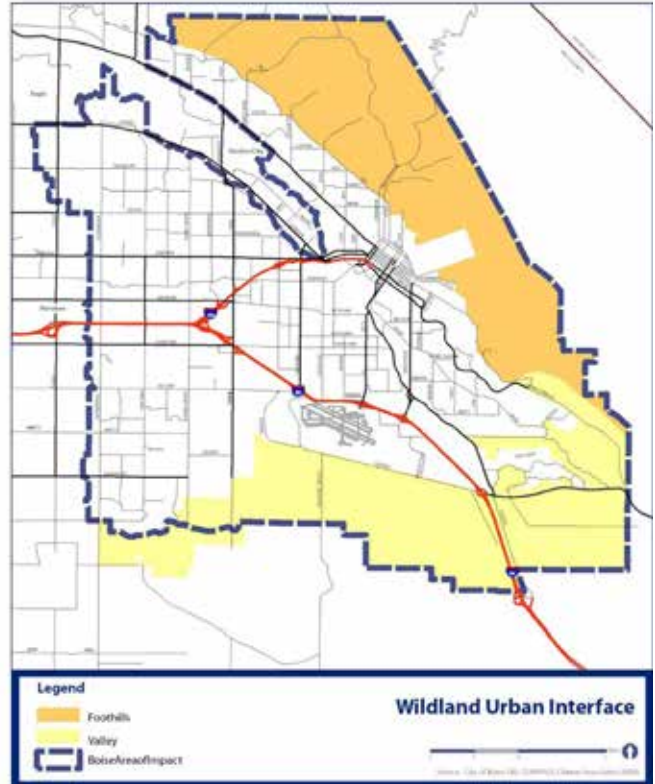
- Foothills development shall be designed and engineered to avoid hazardous areas, thereby minimizing risk to life and property.
- The location of foothills development will be regulated to avoid environmentally sensitive areas such as water bodies, floodways, landslides and fault zones, steep slopes, and unstable soils.
- Development shall be prohibited on slopes of 25% grade or greater and within designated floodways.

The plan also includes maps of the designated floodplains and wildland urban interface in the City.

City of Boise Flood Hazards Map



City of Boise Wildland Urban Interface Map



## Benefits of Integration

When the goals and policies that address wildfire, geologic and seismic risk, and flood hazards in the Comprehensive Plan are implemented, they will improve public education and awareness, enhance hazard data available for planning purposes, promote development that considers the location of hazardous areas and is more resistant to hazard impacts, and reduce future hazard impacts by improving natural mitigating features. The inclusion of the flood hazards and wildland urban interface maps also increases the likelihood that the location of hazard areas will be considered during land use and development decision making in the City.

## Bonner County, Idaho



### Background

Bonner County is located in the panhandle of northern Idaho in an area characterized by lakes, mountains, and forests. For more than a century, Bonner County’s economy depended almost entirely on logging and lumber mills. However, over the past 20 years, the local economic base has shifted to a mixture of tourism, manufacturing, retail, and services. The population has been growing steadily as many people relocate to seek easier access to recreational opportunities, available commercial land, and relatively low taxes. The 2010 Census population was 40,877.

The six major hazards identified for the County include wildfire, winter storms, flooding, severe wind, landslides, and earthquake. Critical facilities, infrastructure, buildings, and vulnerable populations are located in hazard impact areas and have the potential to be affected by each of these hazards. Additionally, much of the County’s future growth is projected to take place in the wildland urban interface and/or adjacent to lakes and rivers, potentially exposing greater numbers of buildings, infrastructure, and people to the hazards.

### Examples of Integration

The Bonner County Comprehensive Plan (2001) includes a Hazards Areas Component. This plan component includes chapters on faulting/earthquakes, ground failure, avalanches, wildfire, floodplains, and slopes. Each of these chapters provides risk assessment information on the hazards, including a description of the characteristics, history of past events, location, and significance.

The Plan Implementation component includes a goal, objectives, and policies to address these hazards and reduce the risk, loss of lives and property, and public and private financial losses.

#### HAZARDOUS AREAS:



Bonner County desires to protect its community from the loss of lives and property and to reduce public and private financial losses due to flood, fire, mass wasting, avalanches and excessive slopes by

setting standards for development within hazard areas and discouraging development in high hazard areas.



Bonner County intends to regulate the location and density of new development in floodplain to reduce the potential for the loss of lives and property within flood hazard areas.

Future development shall be designed to reduce exposure to wildland fire and to provide for emergency and escape routes for residents.

Development within areas of excessive slopes, unstable areas and avalanche zones shall be discouraged.



Flood mitigation standards shall be adopted that meet or exceed the National Flood Insurance Program minimum requirements.

Residential, commercial or industrial development within the floodway should be prohibited.

Fill within the floodplain should be discouraged.

The county’s wildland fire, urban/wildland interface policies and plans should be integrated into development patterns and standards.

Excessive slopes should be identified and development discouraged by providing lower densities within these areas.

Avalanche zones should be identified and avoided.

### Benefits of Integration

The inclusion of natural hazard risk assessment information in the Comprehensive Plan will help to educate the public and local County offices as well as emphasize that hazards should be considered during development decisions. Although knowledge of existing hazards in the County is not enough to adequately prepare, proper planning can help minimize the extent of damage from future hazard events. The plan achieves this by identifying several policies that will restrict, limit, and prohibit development in hazardous areas.

## City of Driggs, Idaho



### Background

The City of Driggs is located in the Teton Valley between the Tetons and Big Hole Mountains in eastern Idaho. At the 2010 Census, the City had a population of 1,660, but the City expects the growth rate to increase in the future. Growth in the City is being driven by the development of second homes, relocating Jackson, Wyoming workers, and urban to rural migration. Employment in Driggs over the next 10 years is expected to be led by construction, accommodation and food services, health and education, as well as visitor-oriented retail trade as the City experiences continued growth in new home construction and tourism.

Drought, winter storm, flooding, earthquake, and wildfire pose a threat to Driggs. These hazard events can result in direct and indirect economic impacts; human death and injury; destruction and damage of structures, furnishings, and business assets, including records, crops, livestock, roads, and highways; and loss of electrical service, potable water supplies, wastewater treatment, communications, and many other community services such as medical care, possibly for long periods of time.

### Examples of Integration

The City of Driggs Comprehensive Plan (2007) includes a chapter dedicated to hazardous areas. This chapter provides basic information on earthquake, flood, and wildfire hazards. The chapter goes on to describe future conditions and development as well as the resulting concerns related to hazard dangers and impacts. A goal, objective, and policies are also included to address minimizing risk and damage from known hazards.

#### GOAL

**Minimize risk of damage or injury from known hazards**

#### OBJECTIVES

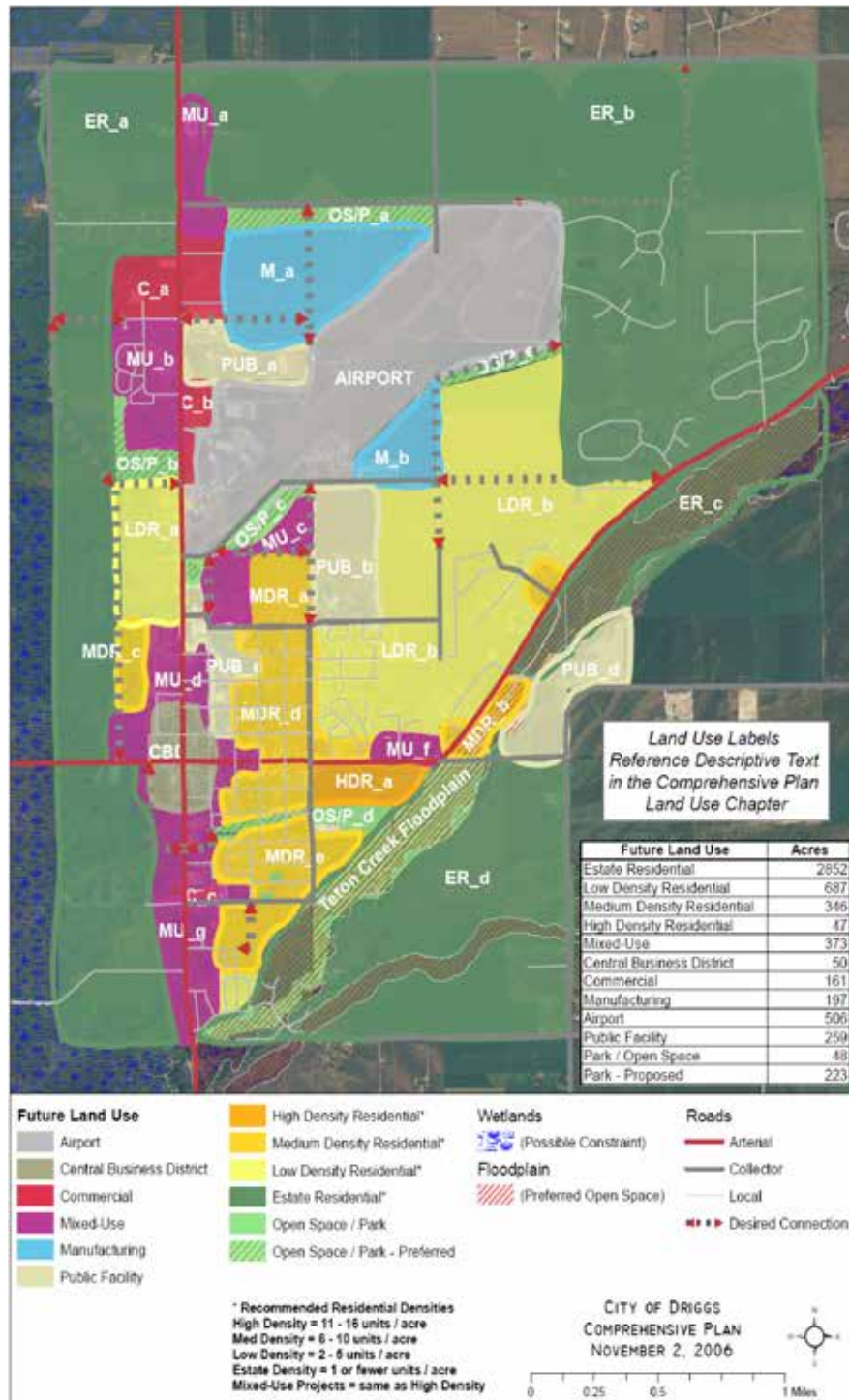
Adopt the necessary ordinances and codes to assure that unwarranted establishment of hazardous uses and development in hazardous areas will not occur without appropriate and effective mitigation.

#### ACTIONS:

- Develop a floodplain ordinance.
- Require Planned Unit Developments to place all building envelopes outside of the 100 year floodplain and provide adequate incentives for developers to choose the PUD option.
- Revise the Subdivision Ordinance to establish a clear and comprehensive set of standards for any development in the floodplain that will protect ecological function as well as property and safety.
- Continue working with county, state and federal agencies and organizations on a long term management and restoration plan for Teton Creek.
- Continue to adopt the most recent International Building Code regulations to ensure that new and remodeled structures will survive potential ground shaking events.
- Enforce the business license requirements for inspections of potential hazards prior to allowing occupancy for new uses.
- Work with the Teton County Fire District and other emergency management officials to assess zoning and development regulations for potential hazardous uses.



City of Driggs Recommend Future Land Use Map



- Use agency pamphlets and web-page links to make information available to the public on the risks of radon, testing services and mitigation systems.

The Recommended Future Land Use Map also identifies the floodplain, which is marked as preferred open space, and wetlands, which are marked as a possible constraint.

### Benefits of Integration

The incorporation of mitigation actions that specifically address known hazard areas into the Comprehensive Plan policies will help to ensure that proper planning is taken to reduce hazard risk in the community by ensuring development in hazardous areas does not occur without appropriate and effective mitigation. For example, requiring Planned Unit Developments (PUD) to place all building envelopes outside of the 100-year floodplain and providing adequate incentives for developers to choose the PUD option, establishing clear and comprehensive standards for development in the floodplain, and adopting regulations to ensure new and remodeled structures will survive potential ground shaking events will reduce potential flood and seismic damage in the City. Additionally, the inclusion of the floodplain on the recommended future land use map can encourage the location of flood hazard areas to be considered during land use and development decision making.

## City of Eagle, Idaho



### Background

The City of Eagle is located in southwestern Idaho and northeastern Ada County between the Boise foothills and the Boise River. The City's early history was founded on mining and agriculture in a small country village setting. Today, Eagle is home to a wide range of businesses, including retail trade, services, construction, government, and agriculture. According to the 2010 Census, Eagle's population is 19,908 people. Demand for a greater labor force in the region is expected to further population growth and increase the demand for housing in the City.

Flood, wildfire, severe weather, and earthquake are rated as having the highest natural hazard risk in the City. People, property, critical facilities, infrastructure, and the environment are all vulnerable to impacts caused by these hazard events. There are 11 hazard events on record, including wildfire, severe storm, and flooding, that have impacted Eagle. These events have resulted in damage that ranged from no damage to \$7 million in losses.

### Examples of Integration

The Eagle Comprehensive Plan (2007) includes a chapter dedicated to natural resources and hazard areas that provides basic information on floodplains and floodways. The plan further integrates mitigation by including implementation strategies to preserve natural features and resources, support flood and storm regulations, explore private/public or intergovernmental agreements to protect open space, and preserve the floodway in its natural state.

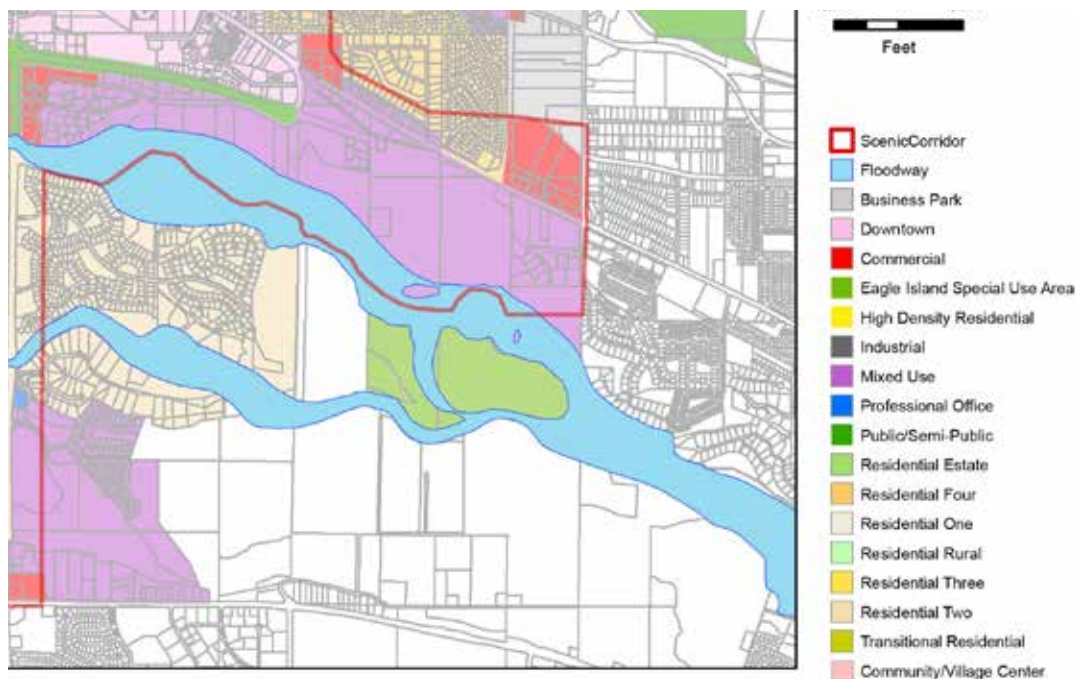
The plan also identifies the floodway on the future land use map and provides parcel-level detail, allowing residents and business owners to easily determine if their property is located in or near the floodway.

Additionally, the City does not allow residential density calculations to include the floodway area. However, the floodway area may be used to calculate open space. The City requires 20% open space for all residential development.

### Benefits of Integration

The inclusion of information on floodplains and floodways in the Comprehensive Plan will help to ensure flood hazard areas are considered during land use and development decision making. Further, the identification

City of Eagle Future Land Use Map



of the floodway on the future land use map not only delineates flood hazard areas, but also informs property owners if their parcel is located in or near the floodway.

## City of Albany, Oregon

### Background



The City of Albany is located in Linn and Benton Counties at the confluence of the Calapooia and Willamette rivers. Its location between the Cascade and Coast mountain ranges and Oregon's major metropolitan areas has brought many changes to the community over time. Today, Albany is the center of one of the most diversified non-metropolitan economies in the state. Traditional wood products and agricultural industries continue to remain an important part of the local economy, but other activities, such as the production of specialty metals, finished building products, transportation-related services, and agricultural products including foodstuffs and their processing, are also major economic activities. As of the 2010 Census, the population of Albany was 50,158.

Albany is subject to flooding, windstorms, severe weather, earthquakes, wildfires, and volcanic eruption. The historic impacts of these hazards have resulted in economic loss and damaged infrastructure in and around the City. Landslides have not significantly impacted Albany in the past, but this hazard may become more prominent as the North Albany area of the City develops. Awareness of the natural hazards that pose a risk to Albany residents increased following a major flood in 1996.

### Examples of Integration

The Albany Comprehensive Plan (2012) includes a chapter that addresses flood hazards and hillsides. This chapter includes information on the flood hazards, such as major past flood events, land located in the 100-year floodplain, the City's participation in the National Flood Insurance Program (NFIP), and a goal to protect life and property from natural disasters and hazards. Maps of hazard areas, including the floodway, flood fringe, slopes 12-25% steep, and slopes over 25% steep, are also provided. The chapter also includes policies and implementation methods to achieve the goal concerning development in flood hazard and hillside areas.

The Comprehensive Plan further incorporates hazard information into its housing needs projections. The City calculated projected housing needs under various growth rate scenarios and compared those needs to the buildable

land available. Buildable land was considered to be land not constrained by floodplains, wetlands, or slopes. The plan found that there is enough land to accommodate the City's projected housing needs to 2025.

### Benefits of Integration

The inclusion of natural hazard information in the Comprehensive Plan will educate the public and emphasize that development decisions impact the ability to create a safe, more sustainable community. Knowledge of existing natural hazards in the area is not enough to adequately prepare; however, proper planning, such as determining if enough buildable land is available for future growth, can help minimize the extent of damage from future hazard events. If the location and construction of new development considers the vulnerability to natural hazards, future natural disasters can be prevented.

## Benton County, Oregon



### Background

Benton County is in the Willamette Valley Region in central western Oregon. Along with Oregon State University, agriculture, lumber, wood products, and some printing technology research and development form the economic base of the County. Tourism and recreation also play a role in the economy as the County's natural beauty and opportunities for fishing, hunting, cycling, snow sports, river sports, tennis, golf, theater, and cultural events attract visitors. According to the 2010 Census, the County population is 85,579.

Earthquake, flood, snow/ice storm, wind storm, and wildland fire are the top natural hazards posing a risk to Benton County, and of these, flood, wildfire, and landslides are the most likely to occur. All areas of the County may be subject to the effects of natural hazards, and as a result, the population, infrastructure, critical and essential facilities, economy, and environment are all vulnerable to the effects of these natural hazards.

### Examples of Integration

The Benton County Comprehensive Plan (2007) references the local Hazard Mitigation Plan and other related County documents. The plan also includes a Natural Hazards chapter that provides risk assessment information in its Findings and References section. This section describes areas of greatest concern, past occurrences, and vulnerability associated with flood, landslide and slope erosion, earthquakes, and wildfires. The Natural Hazards chapter also includes a goal and several policies that address hazard mitigation, including the following:

- Benton County shall protect property and lives by encouraging or requiring homes, business, infrastructure, and critical facilities to be resistant to losses from natural hazards.
- Benton County shall use the most current hazard assessment inventories to discourage development in hazardous areas and promote preventative measures for existing development to minimize risk to life, property, and the environment.

- Benton County shall increase public awareness of the risks associated with natural hazards.
- Benton County shall integrate watershed management, natural resource management, and natural hazard mitigation into its land use planning process. Public education shall be a high priority.
- Benton County shall develop programs to preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.
- Benton County shall strengthen emergency preparedness and operations for addressing natural hazards by maintaining a Pre-Disaster Mitigation Plan.
- Benton County shall develop mechanisms to address liability for development in high-risk areas (fire, flood, earthquake, landslide) so that property owners and the insurance industry bear the costs of the risks incurred, thereby avoiding public liability to the maximum degree possible.

Further, the Natural Hazards chapter includes 24 policies that are specific to floodplain, earth movement/slope erosion, earthquake, stream erosion/deposition, and wildfire and are intended to prohibit and restrict development in hazard areas as well as minimize the damaging effects of the hazards through other measures. These policies also guide the development of the County's Pre-Disaster and Natural Hazards Mitigation Plan.

Additional mitigation actions are also incorporated into several Agricultural Lands, Natural Areas, and Willamette River Greenway policies.

### Benefits of Integration

The incorporation of risk assessment information into the Comprehensive Plan will educate the public and emphasize that development decisions impact the ability to create a safe community. Although knowledge of existing hazards and hazardous areas is not enough to adequately prepare, proper planning can help minimize the extent of damage from future hazard events. By including policies to encourage or require homes, businesses, infrastructure, and critical facilities to be resistant to losses from natural hazards; discourage development in hazardous areas; and promote preventative measures for existing development, the plan is increasing the likelihood that mitigation practices will be implemented, thereby reducing risk.

## Clackamas County, Oregon



### Background

Clackamas County is located in the Willamette Valley region in northwestern Oregon. Since its creation, agriculture, timber, manufacturing, and commerce have been the principal economic activities in the County. The County's year-round ski resort and other outdoor activities, including rafting, fishing, and camping, are also major attractions for recreation and tourism. As of the 2010 Census, the population was 375,992.

Flood, landslide, wildfire, severe winter storm, windstorm, earthquake, and volcano hazards all pose risk to Clackamas County. Critical facilities, infrastructure, and economic centers are vulnerable to these hazards, and it could significantly impact the public safety, economic conditions, and environmental integrity of the County if they are damaged. Further, these hazards can also result in injury, death, and property destruction.

### Examples of Integration

The Clackamas County Comprehensive Plan (2001) Natural Resources and Energy section includes a goal to minimize erosion and hazards to life or private and public property. This section also includes policies on natural hazards. These policies include:

- Apply erosion and sediment reduction practices in all river basins.
- Require a minimum setback of not less than 100 feet or more than 150 from mean high water level for all structures, except water-dependent uses.
- Limit development and intense recreation activities on those sites designated Protection Resource Areas; islands shall not be developed.
- Encourage posting of hazardous water signs in reaches of the river where safety hazards exist.

The Land Use section also includes a policy that the following factors guide the determination of the most appropriate zone:

- Physical site conditions such as soils, slope, drainage:
  - Land with soils subject to slippage, compaction or high shrink-swell characteristics shall not be zoned for larger lots.
  - Land with slopes of:
    - 0 percent to 20 percent shall be considered for zones in the 2,500 to 8,500 square foot range.
    - 20 percent and over shall be considered for zones in the 10,000 to 30,000 square foot range.
  - Land with hydrological conditions such as flooding, high water table or poor drainage shall be zoned for larger lots.

Additional policies that address hazard mitigation are incorporated in the Land Use section. These policies include:

- Permit transfer of density within a development; encourage the transfer of units from hazardous or environmentally sensitive areas to be transferred to areas which are less hazardous or less expensive to develop.
- Establish special development criteria and density standards in the following areas:
  - On slopes over 20%:
    - Avoid major hazard areas.
    - Maintain the stability of the slope.
    - Maintain vegetation and natural terrain features to sustain slope stability.
  - In flood hazard areas or wetlands:
    - Avoid major flood hazard areas.
    - Maintain natural function of the area to reduce or absorb flood runoff.
    - Land in the flood fringe and slopes over 20% shall be allowed to develop at no more than 50% of the density of the zone. If not developed, up to 100% of the density may be transferred to more suitable land within the site, density should be reduced as slope increases above 20% with development discouraged on slopes over 35%.
    - Land in the floodway and on landslides shall not be allowed to develop and 100% of units allowed in the zone may be transferred to more suitable land within the site.

The Open Space and Floodplains section also includes a goal to protect the lives and property of County residents from natural hazards as well as the following natural hazard policies:

- Designate areas with some constraint or degree of hazard for development, such as landslides, steep slope, or flooding, as open space.
- Establish a Resource Protection Open Space category to protect natural resources that includes the flood fringe of 100-year floodplains, areas with 100 feet of mean low water on all major rivers and 50 feet of other permanent streams, wetland areas, and hill-sides of more than 20% slope.
- Establish a Major Hazards Open Space category to protect the public from natural hazards in the floodway of the 100-year floodplains, areas of known landslide hazard, and areas of severe erosion, unstable soil, or earth movement.
- Encourage floodplains to be retained as open space.
- Restrict development and/or fill in the flood fringe to insure that danger to life and property will not result; development which would significantly increase flood elevations will not be permitted.
- Prohibit development and/or fill in the floodway due to risk to life and property.
- Require structures in the floodplain to be secured to prevent flotation.
- Require the lowest floor of buildings designed for human occupancy to be at least one foot above the 100-year flood elevation.

## Benefits of Integration

The incorporation of goals and policies that address flood, erosion, and landslide hazards in the Comprehensive Plan will reduce or restrict development in hazard-prone areas, thereby reducing the risk to human life and property. By including these policies in the Comprehensive Plan, and not just the Hazard Mitigation Plan, the likelihood that these mitigation actions will be successfully implemented is increased.

## City of Corvallis, Oregon



### Background

Corvallis is located in Benton County in central western Oregon along the Willamette River. Corvallis is a compact city that serves as a regional center for higher education, industrial technology, engineering, research, commerce, and health care. The City has been able to maintain a strong employment base despite high unemployment rates in Oregon over the past few years. The 2010 Census population was 54,462.

Corvallis has floodprone areas along the Willamette River and its tributaries as well as smaller areas that are subject to wildland urban interface fire and landslide risks. Earthquake and winter storms (severe weather) also pose high and moderate risks to the City, respectively. All of these hazards have the potential to cause damage, economic losses, and casualties in the City.

### Examples of Integration

The Corvallis Comprehensive Plan (2000) includes a Natural Features, Land, and Water Resources section which includes hillsides, natural hazards, floodplains, and flood hazards. This section provides basic information on hazard risks, the location of hazardous areas, and any existing policies related to these hazards. Policies in this section that mitigate natural hazards include:

- Preserving significant natural features and areas.
- Regulating hillside development.
- Preventing development in known areas of natural hazards with appropriate safeguards.
- Requiring special design considerations and construction measures be taken to offset the soil and geologic constraints present.
- Reducing the risks of natural hazards with reduced density provisions.
- Prohibiting structures from being located over the Corvallis fault line and requiring a minimum setback be maintained.
- Prohibiting development of new buildings in the 100-year floodplain.

- Prohibiting development within the floodway (except bridges, public utilities, and seasonal and other temporary water-related uses).
- Controlling development in the floodway fringe to minimize potential damage to life and property.
- Acquiring land and easements in the 100-year floodplain.
- Developing and implementing incentives for floodplain protection, enhancement, and restoration as part of the development process.

However, it is important to note that although there is a comprehensive plan policy that speaks to locating structures over and near the Corvallis fault line, the City has not precisely mapped the fault line. Due to subsequent conversations with the local authority on earthquake hazards, the City opted not to include specific provisions related to development and the fault line since it is likely there are additional undiscovered fault lines in the area. Placing a disproportionate amount of emphasis on development along the Corvallis fault line may give citizens the false impression that seismic activity is less likely in locations away from that fault line; therefore, it is better to simply make sure all buildings in the City are up to code and that the community is aware of the earthquake hazard in the region.

Additionally, the development of new buildings is not entirely prohibited in the City’s 100-year floodplain. The City does not allow new buildings in highly protected floodplain areas; however, new development is allowed in partial protection floodplain areas, subject to certain standards to minimize its impacts. Partial protection areas are typically developed areas of the City where prohibiting development in the floodplain would have a very significant impact on property owners.

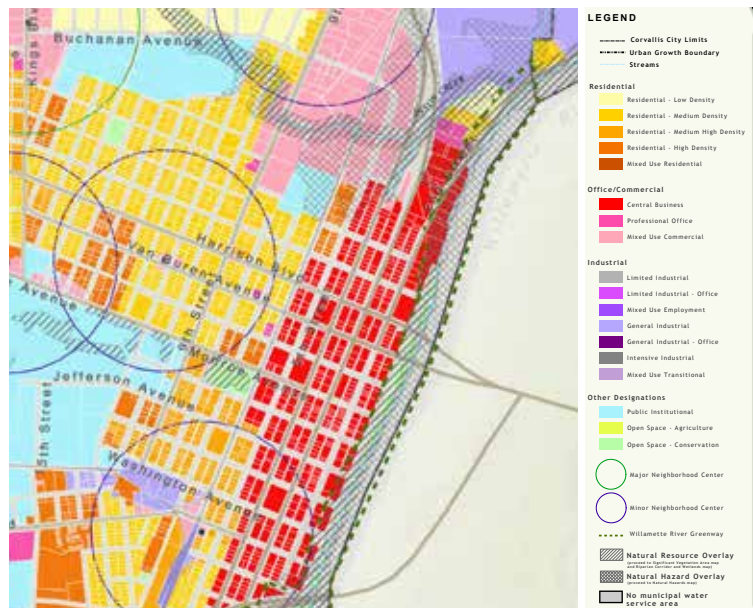
There are also multiple polices dedicated to density transfer and transfer of development rights which shall be encouraged to prevent the development of potentially hazardous areas, to mitigate potential negative effects of hillside development, and to maximize open space.

Further, the Comprehensive Plan Map includes a natural hazard overlay that identifies land in the 100-year

floodplain, landslide hazard areas, and areas with slopes 10% or greater.

The map contains parcel-level detail, allowing owners to easily determine if their property is located in or near hazardous areas.

City of Corvallis Comprehensive Plan Map



Although there is mapped data of landslide risk, the mapping is based on a very rough, broad-brushed statewide study that relied on topography and aerial photographs. It is important to note that the City has since learned the maps are not entirely accurate in locating landslide hazard areas in the community.

## Benefits of Integration

The inclusion of policies that regulate and prohibit development in natural hazard areas will reduce the City’s risk to these hazards. Additionally, by including these policies in the Comprehensive Plan, and not just the Hazard Mitigation Plan, there is a better chance that they will be implemented through actions. Further, the incorporation of a natural hazard overlay on the Comprehensive Plan Map will inform residents and business owners if their parcel is located in or near natural hazard areas and encourage hazard areas to be considered during land use and development decision making.

## City of Tillamook, Oregon

### Background



The City of Tillamook is located in northwest Oregon near the Tillamook Bay on the Pacific Ocean. The City is comprised of land containing floodplains and rich agricultural lowlands. Historically, the area’s economy has been based primarily on dairy farms. There is also a large lumber industry that is experiencing a comeback from the replanting that followed the infamous Tillamook Burn forest fires during the mid-20th century. Tillamook also serves tourists on their way to the ocean beaches. The City population was 4,935 at the 2010 Census.

The most significant natural hazard in the Tillamook area is flooding, but Tillamook also has a risk of natural hazards from climate change, El Niño, debris flow, La Niña, drought, earthquake, tsunami, wildland urban interface fire, windstorms, and winter storms. The City has a risk of catastrophic earthquake and tsunami, but historically, flooding, El Niño, debris flow, La Niña, windstorms, and winter storms have occurred frequently.

### Examples of Integration

The City of Tillamook Comprehensive Plan (2012) includes background information on natural hazards and disasters. This information is focused on flooding since it is the most significant natural hazard in the City and describes flood characteristics, flood history, and the Flood Mitigation Group Project Steering Committee that is developing a plan for the businesses and residents affected by floods. The plan also references the Flood Mitigation Action Plan (also included in the appendix) and the Hazard Mitigation Plan, and it includes goals, an objective, and policies for natural disasters and flood mitigation.

#### GOAL

#### Goals for Natural Disasters and Hazards and Flood Mitigation

- “Protect Life and Property from Natural Disasters and Hazards.”
- “Preserve Natural Areas Related to Flooding.”
- “Coordinate and Enhance Emergency Services.”
- “Improve Structural Projects.”
- “Enhance and Promote Public Education.”
- “Improve and Promote Partnerships, Coordination, and Implementation.”

#### OBJECTIVES

#### Objective for Natural Disasters and Hazards and Flood Mitigation:

To maintain damage or loss of life and property caused by natural hazards in the Tillamook area by carefully managing development and redevelopment in areas subject to natural hazards.

#### POLICIES

#### Policies for Natural Disasters and Hazards and Flood Mitigation

- Development may take place within areas of natural hazards only if appropriate safeguards are provided to protect the property in question as well as adjacent properties, from damage. A developer shall assume the burden of proof that a development project is appropriate in this regard.
- In all areas of flood hazard the requirements of the National Flood Insurance Program will be adhered to.
- Flood plain and Floodway overlay zoning for all hazard areas will be applied by the City in terms of the Flood Hazard Overlay (FHO District) in the City Zoning Ordinance; building permits will be reviewed to insure that necessary requirements of structures are met. The purpose shall be to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas. The legislature of the State of Oregon has in ORS Chapter 227 delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry.



- Natural hazards that could result from new developments, such as runoff from new buildings, paving projects and/or soil slippage due to weak foundation soils, that has the potential to have adverse impacts and a cumulative effect on property owners downstream, will be considered and evaluated. Measures that prevent or minimize the extent of the natural hazard, adverse impacts and cumulative effects on property owners downstream shall be provided for. Such natural hazards, adverse impacts and cumulative effects on property owners downstream shall be considered in evaluating zone changes, conditional uses, site plans, variances, and in issuing building permits.
- All estuaries in Tillamook City shall be maintained so as to not restrict water flows. Tillamook City shall develop and help coordinate a plan to clean and maintain all estuaries in the Tillamook area with Tillamook County, the Port of Tillamook Bay, the Port of Bay City, and any other affected agencies. These activities shall be centered around the task of minimizing flood conditions for areas adjacent to the estuarine areas.
- All water bodies within the City of Tillamook shall be maintained free and clear of all obstructions by the appropriate landowner with coordination between the property owner and DSL, ACE, and ODFW.
- The city will discourage residential, commercial and industrial development in the identified floodway, but will consider the fiscal ramifications of “takings” issues.
- Any new development within the floodplains shall be designed to avoid damage from flooding and to minimize the damage potential to other developments or properties.
- The city will promote increased public awareness of flood hazards and how to deal with them.
- The City shall enforce the Flood Hazard Development Ordinance (Ordinance No. 971), and the Flood Hazard Overlay District as listed in Ordinance #979, and promote flood control measures that help minimize flood hazards and are environmentally sound.
- The city will cooperate with the Tillamook County Office of Emergency Management Office and other agencies working to protect life and property from natural disasters and hazards.

- The city will promote flood control measures that help minimize flood hazards and are environmentally sound and encourage the continued practice of feasibility studies conducted by the County Sanitarians on proposed sites for septic system installation outside the City Limits but inside the Urban Growth Area where city services are not available.

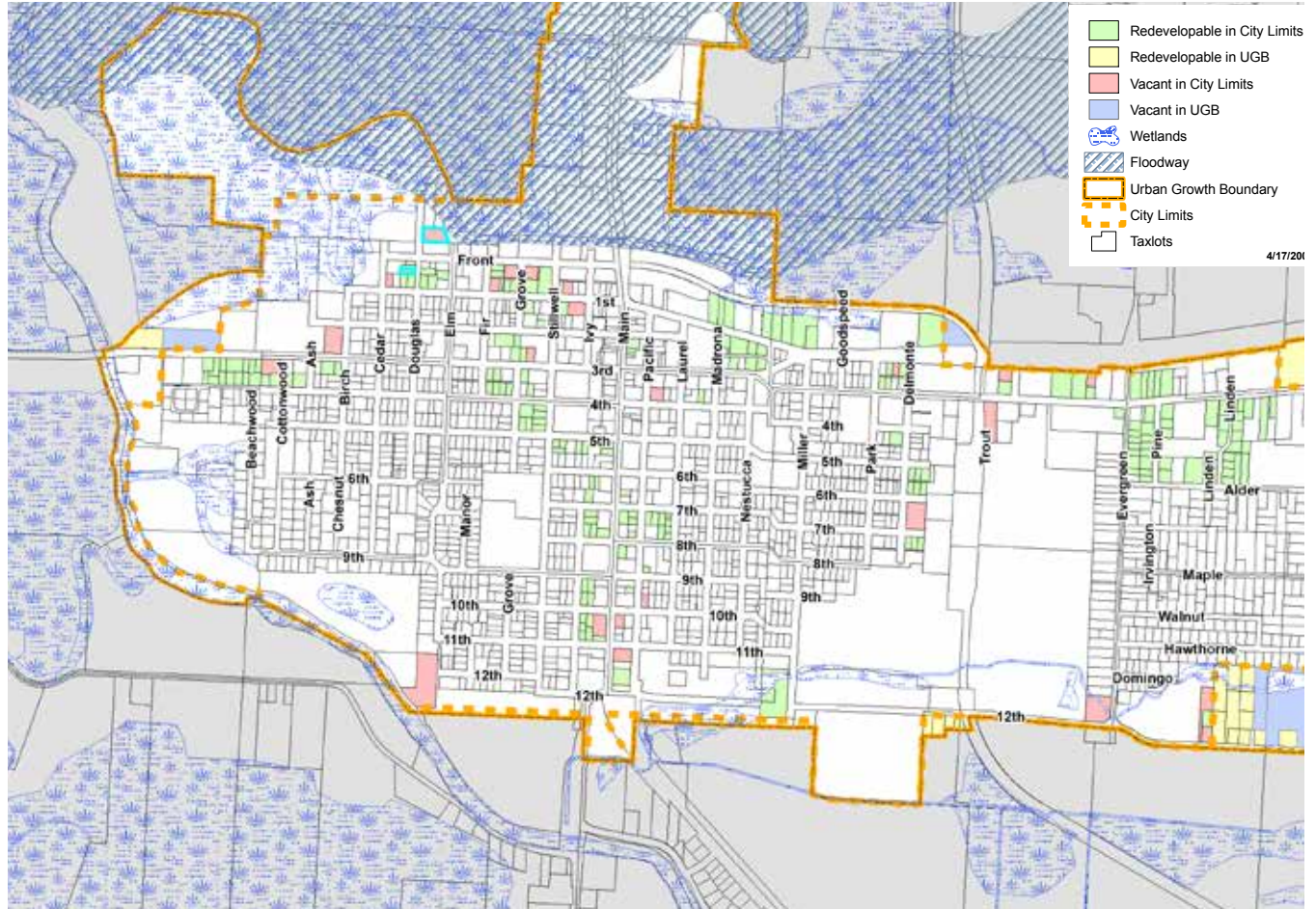
The Comprehensive Plan also considers flood hazard areas and river buffers as a constraint on available buildable land for future growth unless the land is adequately protected. The Plan found that the City has an adequate amount of land planned and zoned for residential, commercial, and industrial development for the next 20 years, and the total also could accommodate the necessary acreage needed to relocate the 21 identified floodprone properties.

The Comprehensive Plan also includes a Flood Hazard Overlay as a zoning district. This overlay is intended to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- To protect human life and health.
- To minimize expenditure of public money and costly flood control projects.
- To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
- To minimize prolonged business interruptions.
- To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard.
- To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas.
- To ensure that potential buyers are notified that property is in an area of special flood hazard.
- To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

The Flood Hazard Overlay is also included on the Vacant and Redevelopable Lands Map with parcel-level detail, allowing owners to determine if their property is located in or near the floodway.

### City of Tillamook Vacant and Redevelopable Lands Map

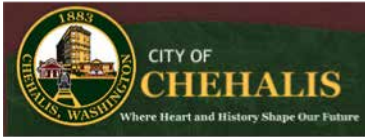


### Benefits of Integration

References to the Flood Mitigation Action Plan and Hazard Mitigation Plan in the Comprehensive Plan will help to ensure that the three documents are consistent and will increase the likelihood that the hazard mitigation projects are implemented. Additionally, including flood mitigation policies and adopting a Flood Hazard Overlay zone will reduce the City’s risk to flooding by ensuring development does not occur in areas of natural hazard without appropriate safeguards; discouraging residential, commercial, and industrial development in the identified floodway; adopting regulations to minimize losses due to flood conditions; and requiring any new development within the floodplains to be designed to avoid damage from flooding.

Further, mapping the flood hazard overlay on the Vacant and Redevelopable Lands Map will encourage flood hazard areas to be considered during land use and development or redevelopment decision making. However, the 2004 Flood Insurance Rate Map (FIRM) is the most accurate source of flood information the City has that will inform residents and business owners if their parcel is located in or near the floodway.

## City of Chehalis, Washington



### Background

The City of Chehalis is located in Lewis County in southwest Washington and is bounded on the west by the Chehalis River. The City's growth, in terms of population and economy, has been relatively steady over time. This can be attributed to the diverse economy of the area. The largest sectors of the Chehalis economy are government, wholesale and retail trade, and manufacturing. The 2010 Census found the City to have a population of 7,259, and the City anticipates slow growth in the future.

Chehalis is most vulnerable to the following hazards: earthquake, flooding, landslide, levee failure, winter storm, and volcano. The City's structural development, infrastructure, critical facilities, and population are vulnerable to each of these hazards and potential losses include property damage, service disruption, economic disruption, population displacement, injury, and death. In December 2007, severe flooding in Chehalis forced interstates and roads to close, left 75,000 customers without power, and resulted in 8 deaths.

### Examples of Integration

The City of Chehalis Comprehensive Plan (2011) incorporates hazard mitigation by including the City's Flood Hazard Management Plan in the document and by integrating mitigation principles and hazard information in other plan chapters, such as the Natural Environment, Land Use, and Housing chapters. The Comprehensive Plan describes flood, landslide, erosion, and seismic hazard areas and provides maps to delineate wetlands, floodways, floodplains, earthquake hazards, seismic hazards, volcanic hazards, and steep slope hazards. The Future Land Use Map also includes a critical areas overlay which includes wetlands, floodways, and steep slopes.

The Comprehensive Plan includes the following objectives and policies related to hazard mitigation:

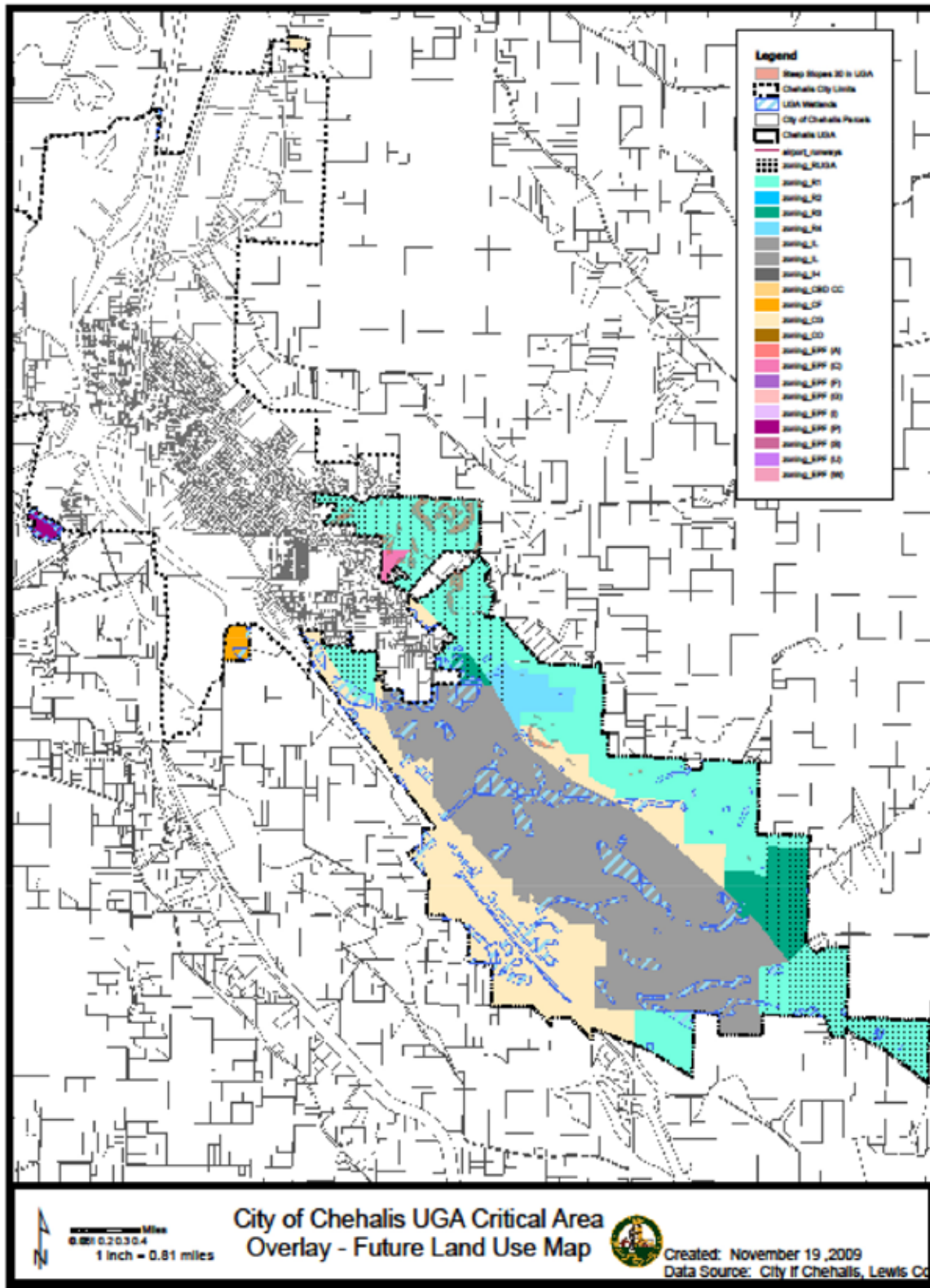
- Encourage development in areas with few environmental hazards in order to minimize both the loss of natural resources due to urbanization and the loss of capital investment and life due to natural disasters.
- New development should be located in areas which have minimal environmental constraints (e.g., soils, steep slopes, bedrock, water table, flood prone areas).
- Residential development should be discouraged and/or mitigated within the 100-year floodplain and prohibited in the floodway.
- Protect and maintain natural functions of wetlands by maintaining an undisturbed or restored native vegetation buffer around wetlands and discouraging filling, draining, and clearing.
- Provide regulatory and tax incentives to preserve wetland areas.
- Provide regulatory incentives that reward the concentration of development on upland and non-flood zone portions of development sites.

The Comprehensive Plan also includes additional goals, objectives, and policies specifically regarding frequently flooded areas and geologic hazard areas as well as a policy to cooperate with Lewis County to implement the Hazard Mitigation Plan.

### Benefits of Integration

The inclusion of the City's Flood Management Plan and a policy to implement the Hazard Mitigation Plan in the Comprehensive Plan will help to ensure that the three documents are consistent and will increase the likelihood that the hazard mitigation projects are implemented. By providing information on hazard areas and delineating the critical areas overlay on the Future Land Use Map, the Comprehensive Plan will also encourage the location of floodways and steep slopes to be considered as constraints during land use and development decision making. Additionally, people and property will be better protected from future damages by limiting and prohibiting development in areas with environmental hazards.

City of Chehalis Critical Areas Overlay Future Land Use Map



## City of Hoquiam, Washington



### Background

The City of Hoquiam lies along the north shore of the Grays Harbor Estuary and straddles the mouth of the Hoquiam River in central western Washington. Hoquiam consists of broad, flat lowlands backdropped by steep hillsides. The City has an economic history in lumbering and exporting. After hitting an unprecedented economic low in the 1990s, the local economy is steadily making progress again due to large regional private investment in transshipping opportunities, sawmills, and bio-diesel production. Since 1950, the City population has seen mostly a downward trend; however, if current economic development opportunities are coupled with an increase in new housing construction, Hoquiam could see future growth. According to the 2010 census, the population is 8,726.

Hoquiam is vulnerable to floods, earthquakes, severe storms, tsunamis, landslides, volcanoes, and wildfires, which can cause considerable damage to property, economic losses, and injuries or fatalities. From a frequency standpoint, severe storms and flooding have the highest number of events, but geographically, flooding is the most widespread. Despite their infrequency, severe tsunamis and earthquake events have the potential to be the most deadly and can result in significant mortality, property damage, and crippling economic disruption.

### Examples of Integration

The Hoquiam Comprehensive Plan (2009) discusses flood, tsunami, erosion, landslide, and seismic hazards in the Background Information section. This includes descriptions of hazard areas, hazard characteristics, and hazard history. Maps of flood zones, tsunami hazard zones, liquefaction zones, and susceptibility to earthquake damage by site class zones are also included.

The Comprehensive Plan also includes land use action steps that address these hazards. Actions that address open space and wetlands preservation include:

- Encourage the protection of open space within neighborhoods, such as forestlands, wildlife corridors, and critical areas, by creating incentives within development regulations.
- Use the Planned Unit Development/Mixed-Use Overlay District to encourage new neighborhoods that provide a broad range of housing types and allow flexibility in design to encourage open space and protect critical areas by using density and dimensional bonuses.
- The city requires development activities to mitigate impacts to wetlands by implementing buffer requirements appropriate to their value. The city relies on the best available science to determine buffer widths. Currently, the Washington State Wetlands Rating System for Western Washington will serve as a guiding document for determining buffer widths.
- The city maintains a goal of no-net loss of wetlands. However, limited development of wetlands is possible if no practical alternative exists for locating a project elsewhere or if protection precludes any reasonable use of the property. Loss or alteration of wetlands requires replacement mitigation of equal or greater value.
- The city supports efforts for restoring degraded wetlands to increase their value for flood control and habitat for fish and wildlife. This includes restoring connectivity to rivers and streams cut-off by past development.
- Public and nonprofit entities are encouraged to acquire wetland areas within the city to ensure their retention as open space, parkland, or community stormwater control.
- Encourage the preservation of wetlands on private property by allowing density and dimensional bonuses.
- Encourage the retention of open space critical areas within the city, particularly in relation to wetlands, geologically hazardous areas, and fish and wildlife conservation areas.
- Use critical area ordinances and development incentives as tools to preserve open space on private property within the city limits.
- Amend the Parks and Recreation Plan to identify key open space areas to acquire through outright purchase or obtaining conservation easements.

- Explore creating a transfer of development rights or mitigation banking program for open space within the city limits.

Actions that address geologically hazardous areas include:

- Require development proposals on soils with moderate or severe slopes to undergo geo-technical analysis to ensure the safety of on-site and area property owners. Prohibit development on slopes 40% or more in grade.
- Limit development on soils with slopes greater than 15% or severe erosion hazard by encouraging the preservation of open space. Use cluster development or density and dimensional bonuses as incentives to developers to avoid geologically hazardous areas.
- Minimize and control soil erosion during and after construction by using best management practices and retaining native vegetation to the greatest extent practical.
- Preserve natural topographic, geologic, and hydrological features to the greatest extent possible to prevent erosion and slope instability.
- Encourage the retention of open space in geologically hazardous areas by allowing density and dimensional bonuses.
- Preserve natural vegetation along the top, toe, and sides of steep slopes in excess of 40% in grade.
- The city will coordinate with the Department of Natural Resources all Forest Practices Application Permits to ensure that harvest and road building activities do not create unstable slopes or severe erosion within geologically hazardous areas.
- Encourage essential public facilities to either locate outside of geologically hazardous areas or upgrade structures to withstand potential loss in the event of earthquake.

Actions that address frequently flooded areas include:

- Maintain the city's participation and rating in the National Flood Insurance Program by requiring development to meet minimum program requirements.
- Continue to work with the National Flood Insurance Program to update the Flood Hazard Map of the city.
- Prohibit any development within the floodway that would reduce the capacity of the floodway.
- The city may require studies as part of the state environmental review process and require mitigation

measures for new development within frequently-flooded areas. Mitigation may include flood storage improvements, flood-proofing of structures, and elevating structures.

- Use the most recent Stormwater Management Manual for Western Washington to set stormwater management requirements for new and expanded developments.
- When practical, require the use of natural systems over the installation of engineered structures, impoundments, or other engineered alterations for protecting development in frequently flooded areas.
- Integrate flood control measures with projects that benefit fish and wildlife conservation areas and wetlands.

## Benefits of Integration

The incorporation of background information on flood, tsunami, erosion, landslide, and seismic hazards into the Comprehensive Plan will educate the public and emphasize that development decisions impact the ability to create a safe community. Although knowledge of existing hazards and hazardous areas is not enough to adequately prepare, proper planning can help minimize the extent of damage from future hazard events. By including policies to protect open space, wetlands, and critical areas; regulate development in geologically hazardous areas; and minimize the threat of flooding and flood-related damage, the plan is increasing the likelihood that mitigation practices will be implemented, thereby reducing the City's risk.

## Kittitas County, Washington

### Background



Kittitas County is located in the geographic center of Washington, beginning in the high Cascades and extending east to the Columbia River. More than half of the County is covered by coniferous forests while approximately one-third is in pasture or unimproved grazing land. The local economy is comprised of resource-based industries, recreation, industrial, and commercial businesses. As of the 2010 Census, the County population was 40,915.

Kittitas County has experienced 11 presidential disaster declarations since 1964, including flooding, severe storms, volcanic eruption, high winds, severe winter storms, landslides, mudslides and earthquake. Overall, severe weather, earthquake, and flood are considered the hazards of highest concern in the County, followed by avalanche, landslide, and wildfire. These hazards have the potential to impact people, property, and the economy.

### Examples of Integration

The Kittitas County Comprehensive Plan (2012) includes basic information on frequently flooded areas and geologically hazardous areas, including erosion/landslide, seismic, and volcano hazards, as well as general goals and policies to address these hazards.

#### Frequently Flooded Areas

Frequently flooded areas provide storage for flood control by slow release of water; provide wildlife and fisheries habitat, recreation areas and agricultural lands; and these areas are subject to periodic inundation which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare. These flood losses are caused by the cumulative effects of obstructions in areas of special flood hazards, which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Structures that are inadequately flood proofed, elevated

or otherwise protected also contribute to flood loss. Floodways are especially hazardous areas due to the velocity of floodwaters, which carry debris, potential projectiles and erosion potential.

- Maintain the current Kittitas County Shoreline Master Program.
- Maintain Kittitas County's eligibility under the National Flood Insurance Program. Eligibility is maintained by compliance with the Kittitas County Flood Damage Prevention Ordinance.
- All submitted preliminary plats must clearly delineate the 100-year Floodplain boundary.
- Increasing the reservoir capacity of the river system may be beneficial to flood control and the public welfare.
- Utilize the concept of zero rise in identified high-risk areas of the 100-year Floodplain.

#### Geologically Hazardous Areas

Geologically hazardous areas are in tenuous geologic balance and disturbance can result in the loss of slope and soil stability, allowing increased erosion, including mass wasting and landslides, increasing stormwater runoff; and maintaining this balance reduces the danger to public health and safety.

In most cases, the risk to development from geological hazards can be reduced or mitigated to acceptable levels by engineering design, or modified construction practices. In areas where these measures are not sufficient to reduce the risk from geological hazards, uses that include development are best avoided.

#### Erosion/Landslide Hazards

- Design provisions should be adequately reflected in the Kittitas County Building Code.
- Natural resource-based access and activities should not be unduly restricted or prohibited in areas of known geologic hazards.
- Risk of erosion should be considered accordingly throughout Kittitas County, based on localized rainfall average.
- Kittitas County recognizes the policies of the proposed Snoqualmie Pass Subarea Comprehensive Plan regarding Snow Avalanche Hazard Areas, including possible hazards outside of the Snoqualmie Pass subarea.

### Seismic Hazard Areas

- Because of existing Kittitas County Building Code, the risk from tertiary effects do not indicate an unusual hazard at this time.

### Volcanic Hazards

- The planning of volcanic hazards should be addressed through Kittitas County emergency management procedures: better planning of warning and emergency communications.
- Manual disposal of ash fallout into bodies of water shall not be allowed; alternatives for the handling and disposal of ash fallout should be considered by Kittitas County in emergency management procedures.

Additional mitigation policies related to shoreline management, shoreline use activity, and transportation include the following:

- **Economic Development:** It is the goal of our County that commercial development locate inland from designated flood plain and shoreline areas unless that development is particularly dependent upon a shoreline location and is consistent with the long range needs of the public.
- **Flood Plains:** It is the policy of this Section to minimize losses in flood plains by restricting or prohibiting uses which are dangerous to health, safety or property in times of flood or cause excessive increases in flood heights or velocities.  
Uses vulnerable to floods, including facilities, which serve such uses, shall be protected against flood damage at the time of initial construction. General regulations for carrying out this policy given under the Shoreline Master Program Ordinance, Section 25, pages ORD-10- 11, apply to the four Environments, which include Natural, Conservancy, Rural and Urban.
- Kittitas County should give positive tax incentives to private property owners who maintain, reclaim, or enhance class I, II, III, and IV wetlands.
- Kittitas County should support or encourage the purchase and dedication of lands by public or private organizations for wetlands and apply sound management principles to said property.
- To provide all-weather, all-season use of the arterial system for the movement of goods and services.

The Comprehensive Plan further integrates hazard mitigation by adopting the local Hazard Mitigation Plan by reference.

### Hazard Mitigation Plan

The Kittitas County Multi-Jurisdictional Hazard Mitigation Plan was developed by twelve participating jurisdictions with the assistance of Tetra Tech and received final approval from FEMA in 2012. The plan outlines hazards which have or may occur within the County, along with mitigation actions that will reduce or prevent damage from occurring during hazard events. The information and actions identified within the plan are designed to serve as guidance for integrating hazard mitigation concepts and strategies into land use decisions.

The 2012 Kittitas County Multi-Jurisdictional Hazard Mitigation Plan is adopted by reference into this comprehensive plan subject to the following limitations:

- The Hazard Mitigation Plan is adopted as a reference document to be used by Kittitas County as an aid in land use, capital facilities, and public policy discussions, and by members of the public wishing to propose projects, pursue grants for projects, or propose agreements with landholders.
- Non-compliance or inconsistency with the Hazard Mitigation Plan shall not be considered noncompliance or an inconsistency with the comprehensive plan or the GMA; nor may any noncompliance or inconsistency with the Hazard Mitigation Plan be a basis for appeal of any land use or public policy decision made by Kittitas County.

### Benefits of Integration

The adoption of the local Hazard Mitigation Plan by reference in the Comprehensive Plan will ensure that the two documents are consistent and will increase the likelihood that the hazard mitigation projects are implemented. Additionally, by including Comprehensive Plan goals and policies related to frequently flooded and geologically hazardous areas, there is a better chance that mitigation actions will be implemented in these areas and that hazard considerations will be made during land use and development decision making.



## Skagit County, Washington

### Background



Skagit County is located in northwestern Washington, and land within the County ranges from broad, flat floodplain to jagged exposed rock peaks. The western one-third of the County includes a broad delta and floodplain that extend through the rich and fertile Skagit flats. The rugged and heavily forested mountains of the Cascade Range dominate the eastern two-thirds of the County. For many years, the local economy revolved around the agricultural, timber, and fishing industries, and for the most part, these industries are still present in the County today. As the population of the County has increased over the past 30 years, a greater percentage of the local economy has shifted toward service-based companies, including retail sales, contracting, fabrication, and services. As of the 2010 Census, the County population was 116,901.

Flood, high winds, earthquake, winter storm, and wildland fire are the top rating hazards with which Skagit County is faced. Volcanic activity, land movement, drought, and tsunami are additional hazards that can impact the County. All of these hazards have the potential to result in injuries or fatalities, property damage or destruction, environmental damage, and economic disruption, and Skagit County has experienced a wide variety of emergency and disaster events as a result of the various natural hazards that affect the area.

### Examples of Integration

The Skagit County Comprehensive Plan (2007) references the Hazard Mitigation Plan and describes its basic purpose.

#### Natural Hazards Mitigation Plan

In 2003, Skagit County, the cities and towns, the Upper Skagit and Swinomish tribes, and Dike District #12 adopted a county wide plan for addressing natural hazards such as avalanches, droughts, earthquakes, fires, floods, tsunamis, severe storms, and volcanic events. More than 50 separate jurisdictions within Skagit County participated in the development of this plan and are included within the plan's vulnerability assessments and

mitigation strategies. The basis for this planning is federal legislation in the Disaster Mitigation Act of 2000 that establishes the means for states and local governments to anticipate and reduce the impacts of disasters caused by natural hazards. This plan includes vulnerability assessments of the jurisdictions' exposure to the hazards and their capacities and proposed strategies for mitigation. The Skagit County Natural Hazards Mitigation Plan provides the jurisdictions with opportunities for future federal funding to implement the strategies and reduce the exposure to hazards. It must be evaluated each year and updated every five years.

The adopted Natural Hazards Mitigation Plan includes goals and policies from the Comprehensive Plan (2000) and building code references. It proposes strategies for earthquake, fire and flooding hazard mitigation including facility improvements that could be incorporated into the Capital Facilities Element, and others that relate to policies. For example the Natural Hazard Mitigation Plan suggests implementing the "Fire Wise" public education program, a policy reflected in the Natural Resource Element and elsewhere in the Comprehensive Plan. The most recent update of the Comprehensive Plan has identified additional fire prevention planning as a priority for the rural portions of the County as well. Another strategy suggests enacting additional regulations to restrict future residential and non-agricultural construction in the 100-year floodplain. The County's recently updated Flood Damage Prevention Ordinance (2006) has taken important steps in this direction, and additional flood prevention planning has been identified by the Planning Commission as a priority "trailing issue." The County's Critical Areas Ordinance update, ongoing in 2007, will implement new regulations based on "best available science" for wetlands, aquifer recharge areas, geologically hazardous areas, and frequently flooded areas. Skagit County's Emergency Management Department has initiated planning efforts to better prepare Skagit County in the event of a tsunami.

The Comprehensive Plan also briefly describes frequently flooded areas and geologically hazardous areas in the Critical Areas section.

Additionally, the Environment plan element includes critical area policies with sub-policies that are specific to frequently flooded areas and geologically hazardous areas, including the following:

- Critical Areas shall be designated and protected to prevent their continued loss and degradation. Furthermore, priority shall be given to the avoidance of impacts to Critical Areas, followed by the minimization of impacts and full mitigation respectively.
  - Frequently Flooded Areas:
    - Undisturbed natural rivers, streams, lakes, wetlands, and floodplains shall be protected to avoid increases in flood elevations, to reduce flood damage, and to allow proper conveyance of flood flows.
- Land uses that are incompatible with critical areas shall be discouraged.
  - Frequently Flooded Areas:
    - Low intensity land use activities such as agricultural, forestry, and recreational land uses should be encouraged in floodplain areas and other land uses in these areas should be discouraged.
    - Land uses, densities, and development activities in the floodplain and coastal high hazard areas should be limited to protect public health, safety, and welfare, to minimize expenditure of public money and costly flood control project, and to maintain hydrologic systems.
  - Geologically Hazardous Areas:
    - Low land use densities and intensities or open space shall be preferred in geologically hazardous areas where this practice can provide site specific mitigation.
    - Land use regulations and practices for geologically hazardous areas shall be established so that development does not cause or exacerbate natural processes that endanger lives, property, infrastructure, and resources on or off site.
- Development allowed in critical areas shall be conducted without risk to lives, and with minimum risk to property, infrastructure, and resources.
  - Frequently Flooded Areas:
    - Development regulations shall be adopted that prohibit intensive uses such as urban subdivisions, multifamily dwellings, commercial buildings, and industrial parks in the floodplain.
    - The construction of critical facilities (i.e., schools, hospitals, police, fire, and emergency response installations, nursing homes, and installations which produce, use or store hazardous materials or hazardous waste) should be prohibited within the 100-year floodplain.
  - Flood-proofing of substantial improvements and new structures in frequently flooded areas shall be required.
  - Where the effects of hazards can be mitigated, appropriate design standards shall be required for site development and livestock sanctuary areas within the 100-year floodplain.
- Geologically Hazardous Areas:
  - Critical facilities (i.e., schools, hospitals, police, fire, and emergency response installations, nursing homes, and installations which produce, use, or store hazardous materials or hazardous waste) should be prohibited in geologically hazardous areas.
  - Development proposals in designated geologically hazardous areas, where applicable, shall include a geotechnical report and a mitigation plan for development activities, with the amount of information required based on the severity of the geologic hazard and the susceptibility of the development on or off site.
  - Independent third party review of geotechnical reports for development in designated geologically hazardous areas may be required by the planning director when the report is found to be deficient with the review to be paid for by the applicant as a way of expediting development permits.
  - Any development should be carried out in a way that will not cause or exacerbate hazardous geological conditions.
  - Public or private utility service or extensions (sewer, water, natural gas, and electric) should be discouraged in geologically hazardous areas and carefully sited to avoid potential damage to the utility or properties.
  - When residential development is proposed in areas subject to geologic hazards it should be clustered and the development designed to minimize risk to human life, property, and the natural environment.

The Shoreline Master Program plan element also includes several policies related to hazardous areas.

The following should be located, designed, and maintained to avoid, or if necessary, withstand 100-year frequency flooding, storm tides or surges, and winds without becoming hazards and without the placement of massive structural defense works:

- Marinas and launch ramps and their equipment, structures, and craft;
- Residential development and accessory uses;
- Transportation facilities and corridors; and
- Utilities and their associated structures.

## Benefits of Integration

The reference to Hazard Mitigation Plan in the Comprehensive Plan will help to ensure that the two documents are consistent and will increase the likelihood that the hazard mitigation projects are implemented. Additionally, by including policies to encourage low intensity/density uses, prohibit construction of critical facilities, and improve development standards in frequently flooded and geologically hazardous areas, the plan is reducing the County’s risk to these hazards by decreasing the potential for damage.

## Thurston County, Washington



### Background

Thurston County is located at the southern end of Puget Sound in Washington. The County includes land forms varying from coastal lowlands in the north to cascade foothills in the southeast. Generally, the County is a region of prairies and rolling lowlands broken by minor hills and a few peaks. The local economy is greatly influenced by state government, but other major industries include the manufacturing, agricultural forestry and fisheries, and trade and services sectors. Thurston County has been among the fastest growing counties in the state since the 1960s. According to the 2010 Census, the population is 252,264.

The most prevalent natural hazards in the County have been flooding, earthquakes, storms, and landslides. As the population of Thurston County has increased, so has the potential for exposure to natural hazards, putting residents at an increased risk. In addition to endangering the health and safety of the population, these hazards jeopardize the County’s economic vitality and the quality of environment.

### Examples of Integration

The Thurston County Comprehensive Plan (2008) identifies flooding, winter storms, volcanic eruption, lahar flows, landslides, and earthquakes as natural hazards. The plan also includes a map of geologic hazard areas and floodplains to better delineate the location of these hazards.

The Comprehensive Plan includes goals, objectives, policies, and action needs for geologic hazard areas and frequently flooded areas in the Natural Environment plan chapter.

### GEOLOGIC HAZARD AREAS

**GOAL**

**Minimize the loss of life and property from landslides and seismic, volcanic, or other naturally occurring events, and minimize or eliminate land use impacts on geologically hazardous areas.**

**OBJECTIVES**

To designate and manage geologic hazard areas to avoid loss of life and damage to structures by guiding development away from geologic hazard areas and by regulating uses and activities that occur within or near such areas in a manner that minimizes the potential for damage or loss of life.

**POLICIES**

- The county should designate and provide for the protection and management of geologic hazard areas based on best available science and cumulative impact assessments of existing and planned land and resource uses within and near geologic hazard areas.
- The county should restrict development and resource use within or near areas susceptible to significant damage from erosion, landslides, earthquakes or lahar flows, as necessary to protect life, property, and wildlife habitats (e.g., streams and marine waters downslope).
- The county should cooperate with other jurisdictions and agencies to implement the “Natural Hazards Mitigation Plan for the Thurston Region,” TRPC 2003, or as hereafter amended.
- The county should protect the public from natural hazards, minimize the need for emergency rescues and replacement of public facilities damaged by natural forces, and avoid public subsidy of private development located in areas vulnerable to damage from natural events by minimizing the amount of development at risk.
- The county should delineate landslide hazards, the path of potential lahar flows, and other natural hazard areas with the greatest degree of accuracy possible. Reevaluate land use regulations in light of the refined mapping and make changes as warranted, consistent with public safety and best available science.
- The county should collaborate with other jurisdictions and agencies to gain a better understanding of earthquake hazards in the county and devise appropriate mitigative measures to minimize the loss of life and property.

**ACTION NEEDS:**

- Review and amend as necessary the geologic hazard areas section of the Critical Area regulations at least every five years to reflect best available science, relevant new information, the results of project monitoring and evaluation, and cumulative impact assessments of existing and planned future land and resource uses within and near geologic hazard areas.
- Update maps depicting liquefaction susceptibility and create a map identifying areas with strong ground motion with the greatest level of accuracy possible.
- Evaluate areas of groundwater flooding, unstable soils, and steep slopes to identify areas where additional infiltrated stormwater might intensify known flooding and landslide hazards.
- Evaluate potential earthquake damage in the county using HAZUS software or other appropriate computer model.
- Evaluate critical county-owned facilities to identify their vulnerability to seismic events.
- Develop a public outreach program to provide information related to earthquake preparedness.

**FREQUENTLY FLOODED AREAS**

**GOAL**

**Protect life and structures from flood hazards and retain the flood storage, transmission capacity, and habitat value of floodplains.**

**OBJECTIVES**

To provide the highest degree of flood protection at the least cost.

**POLICIES**

- The county should provide the highest degree of flood protection at the least cost through identification and accommodation of natural flooding and channel migration processes that pose hazards to life or property. Protection and management should be based on best available science and cumulative impact assessments of existing and planned future land and resource uses within the floodplains, channel migration zones, and watersheds.

- The county should prohibit development and emplacement of fill in floodways and floodplains, except to the minimum extent necessary to accommodate public infrastructure and utilities that cannot be accommodated elsewhere and to stabilize channels against erosion in order to protect existing agricultural lands, public roads and bridges, public infrastructure, utilities and significant private structures, and to achieve habitat enhancement. Any development in the floodways should be designed to avoid habitat degradation. Stream bank stabilization, if necessary, should be of a type that maintains or enhances habitat functions. Rip-rap and other hard armoring should only be used if there is no effective alternative, based on sound engineering principles, to protect existing structures or public facilities.
- The county should provide for land uses such as forestry, open space, public recreation, existing agriculture and water-dependent uses in areas subject to river flooding to minimize risks to life and structures and help retain or enhance habitat functions. Other uses and development in the floodplain should be restricted to minimize public safety risks (e.g., through compensating design features) and loss of habitat function.
- The county should minimize disruption of long-term stream channel migration processes that allow formation of essential habitat features by prohibiting construction of new structures in channel migration zones and minimizing streambank stabilization.
- The county should actively participate in the multi-jurisdictional flood hazard reduction efforts within the Chehalis River Basin.
- The county should regulate uses in and around areas where groundwater periodically surfaces as necessary to avoid property damage and protect groundwater quality.
- The county should maintain the county's enrollment in the Community Rating System through the National Flood Insurance Program.
- Map floodways, floodplains, channel migration zones and areas subject to high groundwater flooding with the greatest degree of accuracy possible.
- Install and maintain flood elevation poles and gauges along major rivers and within designated groundwater flood hazard areas.
- Create maps depicting projected flood inundation from possible failure of the Skookumchuck Dam on the Skookumchuck River and the Alder and La Grande dams on the Nisqually River.
- Develop management programs to avoid or minimize flooding risks for existing and future land uses. This could include a range of measures including regulation and compensation for the removal of structures subject to frequent flooding.
- Prioritize properties in the floodplain to purchase in the event federal money becomes available for that purpose.
- Prioritize residences in the 100-year floodplain that the county would help elevate if state or federal monies become available for that purpose.
- Identify structures and properties subject to repeated flooding that are not already listed by FEMA.

There is also a policy in the Transportation section to ensure that the location of transportation facilities will minimize the disruption of natural habitat, floodplains, wetlands, geologically hazardous areas, resource lands, and other environmentally sensitive areas.

## Benefits of Integration

The incorporation of mitigation considerations into the Comprehensive Plan's goals, objectives, policies, and actions will help to ensure that proper planning is undertaken to reduce hazard risk in Thurston County. Additionally, providing information on and identifying the location of the natural hazards to which the County is vulnerable will encourage their consideration during the land use and development process.

### ACTION NEEDS:

- Review and amend as necessary the frequently flooded areas section of the Critical Area regulations at least every five years to reflect best available science, relevant new information, the results of project monitoring and evaluation, and cumulative impact assessments of current and planned future land and resource uses within and near frequently flooded areas.

## References

Federal Emergency Management Agency. (2013). Integrating hazard mitigation into local planning: Case studies and tools for community officials. Retrieved from

<http://www.fema.gov/library/viewRecord.do?id=7130>

Federal Emergency Management Agency. (2013). Mitigation ideas: A resource for reducing risks to natural hazards. Retrieved from

<http://www.fema.gov/library/viewRecord.do?id=6938>

Florida Department of Community Affairs. (2005). Protecting Florida's communities: Land use planning strategies and best development practices for minimizing vulnerability to flooding and coastal storms. Retrieved from

<http://www.floridajobs.org/community-planning-and-development>

Godschalk, D. (2009). Safe growth audits. *Zoning Practice*, 26 (10). Retrieved from

<http://www.planning.org/zoningpractice/>

Livingston County Department of Planning. (1999). Comprehensive plan/hazard mitigation interface: Integration of emergency management into the community planning process. Retrieved from

<http://co.livingston.mi.us/planning/>

Schwab, J. (Ed.). (2010). Hazard mitigation: Integrating best practices into planning. Retrieved from

<http://www.fema.gov/library>

Schwab, J. (2011). Integrating hazard mitigation into the comprehensive plan. *Planning Advisory Service QuickNotes*, 32. Retrieved from

<http://www.planning.org/pas/quicknotes/>



# Appendix – Hazard Mitigation and Comprehensive Plan Integration Scoring Tool

State		Jurisdiction	Total Score: / 24		
	Question	Criteria	Score	Page #	BP?
<b>Existing Conditions</b>					
1	Are existing natural hazard areas described?	0 = not mentioned 1 = described with narrative text 2 = described with data/maps			
2	Are data/maps of hazard areas sufficient for homeowners to determine if their property is within boundaries?	0 = no 1 = yes			
3	Is risk assessment/impact information from the hazard mitigation plan included?	0 = not mentioned 1 = referenced in plan 2 = incorporated into plan			
<b>Land Use</b>					
4	Does the future land use map clearly identify natural hazard areas?	0 = not mentioned 1 = identifies flood hazards 2 = identifies 2 or more hazards			
5	Do the land-use policies discourage development or redevelopment within natural hazard areas?	0 = not mentioned 1 = policies limit/restrict development 2 = policies prohibit development			
6	Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?	0 = not mentioned 1 = yes			
<b>Transportation</b>					
7	Does the transportation plan limit access to hazard areas?	0 = not mentioned 1 = yes			
8	Is transportation policy used to guide growth to safe locations?	0 = not mentioned 1 = yes			
9	Are movement systems designed to function under disaster conditions (e.g., evacuation)?	0 = not mentioned 1 = yes			

State		Jurisdiction	Total Score: / 24		
	Question	Criteria	Score	Page #	BP?
<b>Environmental Management</b>					
10	Are environmental systems that protect development from hazards identified and mapped?	0 = not mentioned 1 = open space mapped 2 = environmental systems mapped			
11	Do environmental policies maintain and restore protective ecosystems?	0 = not mentioned 1 = policies to maintain/restore open space 2 = policies to maintain/restore ecosystems			
12	Do environmental policies provide incentives to development that is located outside protective ecosystems?	0 = not mentioned 1 = yes			
<b>Public Safety</b>					
13	Are the goals and polices of the comprehensive plan related to those of the local Hazard Mitigation Plan? o = not mentioned	1 = generally related to mitigation 2 = explicitly reference mitigation plan			
14	Is safety explicitly included in the plan's growth and development policies?	0 = not mentioned 1 = included as a plan goal 2 = included in plan policies			
15	Does the monitoring and implementation section of the plan cover safe growth objectives?	0 = not mentioned 1 = mentioned 2 = mentioned in detail			
<b>Comments</b>					

Describe any best practices (e.g., examples of hazard data/mapping, hazard risk/impact information, goals/policies that address specific hazards, implementation of policies related to mitigation):

