

# Appendix 1

## Best Natural Hazards Management Practices in Comparator Cities

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## Introduction

The City of McMinnville has contracted with Winterbrook Planning to prepare a natural hazards inventory and related management program options consistent with Statewide Planning Goal 7 (Natural Hazards). The inventory and management program focuses on four natural hazards that are mapped in the McMinnville Addendum to the Yamhill County Natural Hazards Mitigation Plan:

- flooding,
- landslides,
- earthquakes, and
- wildfires.

McMinnville has identified a list of comparator Oregon cities: Albany, Ashland, Bend, Grants Pass, Newberg and Redmond.

As part of the Goal 7 Natural Hazards Program work scope, this memorandum reviews and summarizes comprehensive plan policies and land use regulations related to the identified Goal 7 natural hazards from the six comparator cities. Each city begins with a review of comprehensive plan policies, followed by a review of development code regulations.

The policy and code analysis and references are intended to summarize and inform for the purpose of high-level comparison of the comparator cities to each other and McMinnville, to the extent practicable within the project scope. This document is not, and is not intended to be, an exhaustive review of every aspect of each city's comprehensive plan, development code, building code, and local interpretation in relation to natural hazards.

## Albany

### Comprehensive Plan Policies and Measures

Albany's Comprehensive Plan, last amended in 2017, contains policies and measures related to the following hazards:

- Floodplain
- Slope (Hillside Development)

Comprehensive Plan Chapter 2: Special Areas contains Albany's Goal 7 policies. Albany's latest Plan update to Goal 7 policies, objectives or maps was adopted in 2010.

Wildfire hazards are not addressed. Geologic hazards beyond hillside development are not addressed.

### Floodplain Policies and Measures

Albany's floodplain policies are aimed at consistency with federal (FEMA, NFIP) regulations. Development is restricted to a few specific uses (not including residential) within floodways, and requires a floodplain development permit for development within the Special Flood Hazard Area outside of the floodway (100-year floodplain) . Albany provides several floodplain-related policies:

- Policy 1. Continue to participate in the National Flood Insurance Program and comply with applicable standards.

- Policy 2. Review any development that could potentially affect the floodway or increase the area subject to the Special Flood Hazard Area (100-year floodplain), unless otherwise exempted. [Ord. 5746, 9/29/2010]
- Policy 3. Restrict new development (including fencing, grading, fill, excavation, and paving) from locating within floodways that would result in an increase in base-year flood levels. If it can be determined that there will be no increase in base-year flood levels, then the following uses may be considered: [Ord. 5746, 9/29/2010]
  - a. Public and private parks and recreational uses.
  - b. Other uses which would not involve the construction of permanent or habitable structures.
  - c. Water-dependent structures such as docks, piers, bridges, and floating marinas.
- Policy 4. Concurrent with new development, and when appropriate, secure dedications and easements adequate for channel maintenance and conveyance of storm water along natural drainageways and where identified on adopted master plans, secure easements for public open space, and future recreation use along all floodways and natural permanent drainageways.
- Policy 5. Recognize that development within areas subject to flooding is subject to regulations to protect life and property and that certain types of development may not be allowed.
- Policy 6. Ensure that development proposals in the flood fringe and adjacent to drainageways are consistent with Federal Emergency Management Agency (FEMA) and other applicable local regulations in order to minimize potential flood damage. Development proposals in areas subject to flooding may be reviewed according to the following criteria:
  - a. Proposed development activities shall not change the flow of surface water during flooding so as to endanger property in the area. Special engineering reports on the changes in water flow and potential damage which may be caused as a result of proposed activities may be required. If necessary, local drainage shall be improved to control increased runoff that might increase the danger of flooding to other property.
  - b. Impacts on significant fish and wildlife habitat have been considered and appropriate protection measures included in project design.
  - c. Problems of ponding, poor drainage, high water table, soil instability, or exposure to other flood hazards have been identified and mitigated. Evaluations and mitigating measures shall be based on a base year flood and wet season characteristics.
  - d. If adjacent to a designated floodway, the development shall be designed to use the natural amenities of the floodway including open space, scenic views and vegetation in accordance with an approved site plan.
- Policy 7. Locate and construct all public utilities and facilities such as sewer, gas, electrical, and water systems to minimize or eliminate flood damage. Require that new or replacement water supply systems and/or sanitary sewer systems be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and require on-site waste disposal systems to be located to avoid impairment of them or contamination from them during flooding.
- Policy 8. Locate and construct critical facilities to minimize or eliminate flood damage and to facilitate emergency operations. Critical facilities include, but are not limited to schools, nursing homes, hospitals, police, fire and other emergency responders, and installations that produce, use or store hazardous materials. Construction of new critical facilities shall be permissible within the SFHA if no feasible alternative site is available. New critical facilities must be

floodproofed to ensure that toxic substances will not be displaced by or released into floodwaters. Access routes elevated to or above the level of the base flood elevation shall be provided to all critical facilities to the extent possible. [Ord. 5746, 9/29/2010]

- Policy 9. Ensure that any filling or construction within the floodplain meets the following criteria:
- Require that a floodplain development permit is issued prior to any grading, fill, excavation, or paving activity, unless otherwise exempted, and that all grading, fill, excavation, or paving is engineered and compacted to applicable standards. Grading, fill, excavation, or paving areas for dwellings shall have engineering certification that loading rates are adequate for dwellings. [Ord. 5042, 4/14/1993; Ord. 5746, 9/29/2010]
  - b. The lowest finished floor elevation shall be built at least one (1) foot above the base-year flood level. Special engineering reports or structural work may be required.
  - c. Require property owners or developers to file a elevation certification approved by the local community permit official, registered professional engineer, architect, or surveyor indicating elevation of the surrounding grade or lowest habitable floor (including basement) of all new residential structures. This information shall be maintained to indicate compliance with Federal Emergency Management Agency (FEMA) regulations.
- Policy 10. For construction, remodeling, or major repairs to structures (including prefabricated and mobile homes) within the floodplain, review building permits to ensure that:
  - a. Building location and grading are designed to protect the structure during a base year flood.
  - b. Construction materials and utility equipment are resistant to flood damage.
  - c. Construction methods and practices will minimize flood damage.
  - d. Where appropriate, structures are designed or modified to prevent flotation, collapse, or lateral movement of the structure.
- Policy 11. Development approval within the flood fringe shall be reviewed to protect property and public safety and significant natural values.
- Policy 12. The City may provide density bonuses which encourage the protection and preservation of flood fringe areas.
- Policy 16. Encourage open space alternatives to urban level development in areas subject to flooding such as park and recreation areas, agriculture, natural areas and wildlife habitat.

Albany's comprehensive plan measures do not add notable substance to floodplain policies.

#### Hillside Development Policies and Measures

Albany's hillside development policies apply to slopes over 12% and provide for density reduction and cluster development in steep slope areas:

- Policy 13. Prior to annexation of hillside areas, adopt hillside development regulations for slope areas in excess of 12% in order to protect against geologic mass movement, excessive erosion and storm water runoff, and protection of important natural vegetation.
- Policy 14. Require land divisions and planned developments in slope areas to: [Ord 5042, 4/14/1993]
  - a. Minimize cut and fill requirements.
  - b. Ensure that the location and design of streets, structures, and other development give full consideration to natural contours, drainage patterns, and vegetation features of the site.
  - c. Protect against temporary and long-term erosion.

d. Control storm drainage to minimize the amount and rate of storm water flowing onto adjacent property and city streets.

- Policy 15. The City may reduce standard densities (increases in minimum lot sizes and lot area per unit) and alternatively encourage cluster development through the PUD process, with greater slopes receiving the greater density reduction and cluster development incentive.

Albany has several measures that guide implementation of hillside development policies:

- Measure 6. Require proposed hillside development to provide for the preservation and, if possible, enhancement of the site’s natural features during all phases of the design and development process. This includes consideration of soils, vegetation, hydrology, wildlife habitat, views and visual orientation, both from the site and to the site, and unusual or unique natural features.
- Measure 10. Require that all excavation and fill work and structural foundation work be approved by a registered engineer whenever the slope is greater than 30% or where there exists probability of geologic hazards such as perched water tables and/or landslide areas. Where appropriate, such approval shall include information from a soils engineer and engineering geologist.
- Measure 11. Increase minimum lot sizes (or minimum lot area per unit) on hillside areas, allowing higher densities for cluster developments approved through Planned Development as outlined in the following table:

Slope %	Standard Dev.	(RS 6.5 Lot)	PUD Devel.	(RS 6.5 Avg)
13 to 20	1.25	8125	1.00	6500
21 to 25	1.50	9750	1.15	7475
26 to 30	2.00	13000	1.40	9100
31 & above	3.00	19500	2.00	13000

### Goal 7 Land Use Regulations

Albany’s Development Code, Article 6 Natural Resource Districts, regulates development within the Floodplain Overlay District and Hillside Development Overlay District. Cluster Development regulations found in Article 11 allow on-site density transfer from natural resource districts defined in Article 6 and including mapped floodplain and hillside areas in exchange for a minimum of 20 percent site preservation as natural area.

### Floodplain

Floodplain standards in Article 6 restrict development to specific uses within the floodway and require a Floodplain Development Permit for development within the Special Flood Hazard Area (100-year floodplain) or floodway. Development (including residential) and subdivisions are allowed or conditionally allowed within the Special Flood Hazard Area. A variance process is available to all floodplain standards as a safety valve. General floodplain development and land division standards are included below:

- 6.110 Site Improvement, Land Division and Manufactured Home Park Standards. Site improvements, land divisions, and manufactured home parks in the Special Flood Hazard Area (100-year floodplain) shall be reviewed by the Planning Division as a part of the land use review process. An application to develop property that has floodplain on it, but where no

development is proposed in that floodplain will be processed as otherwise required in this Code. In the case of a land division, “no actual development” means the floodplain area has been excluded from the land division. This can be done by setting the property aside for some other purpose than later development (for example, as a public drainage right-of-way). [Ord. 5746, 9/29/10]

In addition to the general review criteria for site improvements, land divisions and manufactured home parks, applications that propose actual development within the Special Flood Hazard Area shall also be subject to the following standards: [Ord. 5338, 1/28/98; Ord. 5746, 9/29/10]

- (1) All proposed new development and land divisions shall be consistent with the need to minimize flood damage and ensure that building sites will be reasonably safe from flooding.
- (2) All new development and land division proposals shall have utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.
- (3) On-site waste disposal systems shall be located and constructed to avoid functional impairment, or contamination from them, during flooding.
- (4) All development proposals shall have adequate drainage provided to reduce exposure to flood damage.
- (5) Any lot created for development purposes must have adequate area created outside of the floodway to maintain a buildable site area meeting the minimum requirements of this Article.
- (6) Any new public or private street providing access to a residential development shall have a roadway crown elevation not lower than one foot below the 100-year flood elevation.
- (7) All development proposals shall show the location of the 100-year flood contour line followed by the date the flood elevation was established. When elevation data is not available, either through the Flood Insurance Study or from another authoritative source, and the development is four or more acres or results in four or more lots or structures, the elevation shall be determined and certified by a registered engineer. In addition, a statement located on or attached to the recorded map or plat shall read as follows: “Development of property within the Special Flood Hazard Area as most currently established by the Federal Emergency Management Agency or City of Albany may be restricted and subject to special regulations by the City.” [Ord. 5338, 1/28/98]

Floodway has more restrictive standards for uses allowed and engineering requirements:

- 6.100 Floodway Restrictions. No development is allowed in any floodway except when the review body finds that the development will not result in any increase in flood levels during the occurrence of the 100-year flood. The finding shall be based upon applicant-supplied evidence prepared in accordance with standard engineering methodology approved by FEMA and certified by a registered professional engineer and upon documentation that one of the following criteria has been met: [Ord. 5875, 10/28/16]
  - (1) The development does not involve the construction of permanent or habitable structures (including fences). [Ord. 5746, 9/29/10]
  - (2) The development is a public or private park or recreational use or municipal utility use.
  - (3) The development is a water-dependent structure such as a dock, pier, bridge, or floating marina.

## Hillside Development

Hillside Development standards in Article 6 apply to sloped areas over 12% as identified on Plate 7 of the Comprehensive Plan (unless the applicant's surveyor or engineer can show the property does not contain 12% or greater slopes). For all slopes over 12%, a geotechnical report is required. Article 6 does not refer to the table provided in Comprehensive Plan Chapter 2, Goal 7, Measure 11 (above).

## Ashland

### Comprehensive Plan Policies

The City of Ashland's Comprehensive Plan, last updated in 2019, contains policies related to the following hazards:

- Floodplain
- Hillside Development
- Wildfire

Ashland has mapped these hazards in its Physical and Environmental Constraints map set, including:

- Floodplain Corridor Lands Map
- Hillside Lands & Severe Constraints Map
- Wildfire Lands Map

Comprehensive Plan Chapter 4: Environmental Resources, contains Ashland's Goal 7 policies. Ashland's latest Plan update to Goal 7 policies is unclear; Chapter 4 indicates a print date of 2005.

Geologic hazards beyond hillside development (e.g., existing inactive fault lines) are identified in the plan but not addressed by specific plan policies.

### Floodplain Policies

Ashland builds on federal floodplain regulations with additional self-identified and mapped floodplain areas.<sup>1</sup> Floodplain and downstream impact protections are emphasized in comprehensive plan policies:

- Policy 27. The City shall continue to participate in the National Flood Insurance Program, complying with all applicable standards.
- Policy 28. In flood prone areas, allow alternatives to urban development, such as agriculture, open space, parks, wildlife habitat, natural areas and recreational uses through the physical and environmental regulations in the City code.
- Policy 29. Development in any flood prone area is not a guaranteed right, but depends upon whether the benefits to the public outweigh problems which would be caused by development, especially problems which may occur upstream or downstream during flooding.

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<sup>1</sup> "The Planning Commission and the Citizen Planning Advisory Commission met to review data from July to November 1988. The city planning staff, assisted by Rogue Council of Government staff Eric Dittmer and Wes Reynolds, gathered available data and photographs of floods, conducted field work, and established base maps for the new flood maps. Historian Kay Atwood compiled all journalistic records of flooding in historic times. After the last meeting, final maps and ordinance proposals were produced.

The study resulted in the definition of a floodplain corridor larger than the FEMA 100-year floodplain on Ashland and Clay Creeks. The ordinance prohibits division of land and restricts new construction and fill in all defined floodplains in the city." Ashland Comprehensive Plan p.23

- Policy 30. New development (including fill) shall be allowed in floodways only upon the finding that obstruction of flood waters is minimized. Non-structural solutions to flooding are preferable to structural solutions.
- Policy 31. Fill of flood fringe areas shall require a permit as specified in the physical and environmental constraints regulations and fill shall be engineered and compacted to City standards. Fills shall be kept to the minimum necessary to achieve project purposes.
- Policy 32. Apply special physical and environmental restrictions to all areas of Ashland which are identified as flood-prone, streams in the federal study, and other significant drainage ways.
- Policy 33. All existing natural drainage ways as identified on the physical and environmental constraints map shall be left in a natural state or modified only after City approval.
- Policy 34. As proposed with active streambeds, an analysis of potential runoff from upstream hard-surface areas shall be conducted, and streambed profiles shall be adapted to accommodate the flow to prevent flooding of adjacent residences. The City shall acquire easements to maintain the carrying capacity of said streambeds.

#### Hillside Development (Areas of Steep Slope) Policies

Ashland limits lot creation and development in areas of very steep slope. These policies include a density limit of 2 du/acre on areas of 30% or greater slope:

- Policy 39. Develop erosion control standards to ensure that development of these forested areas will not cause erosion problems.
- Policy 40. Restrict creation of new lots on land that is greater than 40% slope, unless a buildable area of less than 40% slope is available on each lot.
- Policy 41. Zone all lands which have a slope generally greater than 30% for development that will have no more than 2 dwelling units per acre or 20% lot coverage by impervious surfaces.

#### Wildfire Policies

Ashland takes a proactive approach to wildfire protection, identifying wildfire hazards related to the urban-wildland interface areas and proposing several policies to protect life, property, and environmental resources:

- Policy 46. Require installation and maintenance of a 40-foot fuel break around each dwelling unit or structure.
- Policy 47. Require multi-dwelling unit developments to install and maintain a perimeter fuel break to prevent fire from entering the development, or to prevent a fire spreading from the development and threatening the Ashland Watershed. (Width of break is dependent on topography, aspect, vegetation, types and steepness of slopes.)
- Policy 48. Where vegetation needs to be maintained for slope stability in a fuel break area, require plantings of fire-resistant or slow-burning plants. The City shall make a list of such plants available to the public. (See "Wildfire Hazard Management in the Urban/Wildland Interface in Southern Oregon," by Claude Curran - May 1978.)
- Policy 49. Require more than one ingress/egress route or road widths wide enough to accommodate incoming fire apparatus and evacuating residents simultaneously in an emergency situation.
- Policy 50. Require roofs to be constructed of fire-resistant materials. Wood shake or shingle roofs would not be allowed.



- Policy 51. Encourage road placement to function as fire breaks in urban/wildland interface developments.
- Policy 52. Require chimneys of wood-burning devices to be equipped with spark arrester caps and/or screens.
- Policy 53. Install all new electrical distribution circuits in the urban/wildland interface underground if technically feasible.
- Policy 54. The City shall encourage and support education/ information programs dealing with wildfire hazards in the urban/wildland interface. Information shall be made available through the City Building and Planning Departments to developers and builders wishing to build in the urban/wildland interface.

### Goal 7 Land Use Regulations

Ashland’s natural hazards land use regulations are contained in the Ashland Land Use Ordinance, Chapter 18.3.10, Physical and Environmental Constraints Overlay. These areas have a blanket onsite density transfer option for sites with “unbuildable” areas, with a maximum density of no more than two times the permitted density of the underlying zone.<sup>2</sup>

### Floodplain

Ashland has prepared a Flood Plain Corridor Lands Map. This map includes, as described in Section 18.3.10.060:

- 1. All land contained within the 100-year Flood Plain as defined by the Federal Insurance Administration and identified in the Flood Insurance Map (FIRM) adopted by the City Council as provided for in AMC 15.10.
- 2. All land within the area defined as Flood Plain Corridor Land in maps adopted by the Council as provided for in section 18.3.10.070 Official Maps.
- 3. All lands which have physical or historical evidence of flooding in the historical past.
- 4. All areas within 20 feet (horizontal distance) of any stream identified as a Riparian Preservation Creek on the Physical and Environmental Constraints Floodplain Corridor Lands map adopted pursuant to section 18.3.10.070 Official Maps.
- 5. All areas within ten feet (horizontal distance) of any stream identified as a Land Drainage Corridor on the Physical and Environmental Constraints Floodplain Corridor Lands maps adopted pursuant to section 18.3.10.070 Official Maps.

Development and land division is limited in flood plain corridor lands, including standards for fill, residential and non-residential building elevation above flood levels (or floodproofing for non-residential development), structure placement, building envelopes, and local streets and utility connections. Residential development and land divisions are allowed but limited to minimize impact to the floodplain. Ashland also has a building code chapter (Chapter 15.10) dedicated to flood damage prevention.

### *Severe Constraint Lands – Floodplain*

Ashland identifies areas within the floodway channels as having characteristics that “severely limit normal development.” These areas are unbuildable to the extent possible while avoiding a taking on lots of record.

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<sup>2</sup> See Section 18.3.10.120 Density Transfer

### Hillside Development

Ashland has prepared a Physical and Environmental Constraints Hillside Lands map. Hillside Lands are lands that are subject to damage from erosion and slope failure, and which include areas that are highly visible from other portions of the city. Hillside areas include all lands defined as Hillside Lands and which have a slope of 25 percent or greater.

Hillside regulations require a geotechnical report for all development on Hillside Lands, and include requirements for terracing and revegetation, limits on fill slope height, tree protection,<sup>3</sup> and building envelope and design standards.<sup>4</sup>

### Severe Constraint Lands – Slope

Ashland identifies areas with slope greater than 35 percent as having characteristics that “severely limit normal development.” These areas are unbuildable to the extent possible while avoiding a taking on lots of record.

### Wildfire

Wildfire Lands are identified on the Physical and Environmental Constraints Wildfire Lands map. The Wildfire Hazard Zone is shown below, with recent historical fire context:



<sup>3</sup> E.g., per Section 18.3.10.090.D.5 “Development shall be designed to preserve the maximum number of trees on a site.”

<sup>4</sup> Including several “recommendations” intended to encourage visual integration of the development into the hillside and natural environment.

Any development or land division within these areas is required to prepare a Fire Prevention and Control Plan, and establish and maintain a fuel modification area (generally crown separation, tall brush removal, tree limbing, etc.).

Ashland integrates natural resource, water quality, and hillside considerations to wildfire requirements:

- l. Where necessary for erosion control, slope stability, riparian and wetland preservation and enhancement, performing functions considered beneficial in water resource protection, or aesthetic purposes, existing vegetation may be allowed to be retained consistent with an approved Fire Prevention and Control Plan, or upon written approval of the Staff Advisor in consultation with the Fire Code Official.
- m. Fuel modification in areas which are also classified as Hillside Lands or Water Resource Protection Zones shall be included in the erosion control measures outlined in section [18.3.10.090](#), Development Standards for Hillside Lands, and management plan for water resource protection zones in section [18.3.11.110](#).

## Bend

### Comprehensive Plan Policies

The City of Bend's Comprehensive Plan, last updated in 2018, contains general policies related to the following hazards:

- Floodplain
- Geologic
- Hillside Development
- Wildfire

Comprehensive Plan Chapter 10: Natural Forces, contains Bend's Goal 7 policies. Bend's latest Plan update to Goal 7 policies was completed with the 2016 Comprehensive Plan update.

#### Floodplain Policy

- Policy 10-12. The city shall continue to apply their Flood Plain zoning regulations along the Deschutes River and Tumalo Creek based on the best available data.

#### Geologic Policies

- Policy 10-13. The city shall encourage the Oregon Department of Geology and Mineral Industries to complete an assessment of faults in the Bend area.
- Policy 10-14. The city shall review the construction plans for buildings that are proposed to be built across or along identified fault lines.

#### Hillside Development (Steep Slope) Policies

Bend provides erosion control and slope stability policy direction for slopes greater than 10 percent, and policy options to reduce minimum density or require cluster development in areas with slopes over 20 percent as "Steep Slopes" policies:

- Policy 10-15. The city shall require development on slopes in excess of 10 percent to employ measures to minimize the hillside cuts and fills for streets and driveways.
- Policy 10-16. The location and design of streets, structures and other development features on slopes in excess of 10 percent shall give full consideration to the natural contours, drainage

patterns, and vegetative features of the site to protect against temporary and long-term erosion.

- Policy 10-17. In areas where the natural slope exceeds 20 percent, the city may reduce the minimum residential density (allow larger lots) or alternatively, may require cluster development through the PUD process to preserve the natural topography and vegetation, and improve fire protection.

#### Wildfire Policy

Bend is a signatory to the Greater Bend Community Wildfire Protection Plan, providing an education-based strategy for wildfire reduction.

Bend has a policy to adopt strategies to reduce wildfire hazard. Of note, this may include defensible space buffers to land included in the UGB and annexed:

- Policy 10-18. The City will adopt strategies to reduce wildfire hazard to lands inside the City and included in the Urban Growth Boundary. These strategies may, among others, include the application of the International Wildland-Urban Interface Code with modifications to allow buffers of aggregated defensible space or similar tools, as appropriate, to the land included in the UGB and annexed to the City of Bend.

#### Goal 7 Land Use Regulations

Bend's natural hazard land use regulations are contained in the Bend Development Code (Title 10) and Gradients, Excavation and Stormwater Management (Title 16). The development code contains specific floodplain regulations in the Floodplain Combining Zone overlay, and integrates both floodplain and steep slope into the "sensitive lands" (or "sensitive areas" in Title 16) definition.

Bend allows onsite density transfer from sensitive lands including the 100-year floodplain, but limits density transfers to areas exceeding 25 percent slope.<sup>5</sup> Development code interaction with "sensitive lands" is also discussed below.

Bend Code Title 16 provides additional engineering permitting requirements for grading and erosion control on steep slope.

#### Floodplain

Bend regulates floodplain through the Floodplain Combining Zone. The Floodplain Combining Zone applies to FIRM 100-year flood and floodway areas and requires a permit for any development in the zone. Regulation in floodplain areas includes elevation requirements for residential and non-residential development (or floodproofing for non-residential development), and requirements for subdivisions and development:

- BDC 2.7.640.J. Land Development Standards in a Flood Hazard Area.
  1. In addition to the terms of subsections (J) and (K) of this section, a subdivision or other land development, including all utility facilities, within an FP Zone shall be designed, located, and constructed to minimize flood damage, including special provisions for adequate drainage to reduce exposure to flood hazards.
  2. A land development which will alter or relocate a watercourse shall be designed, constructed and maintained to retain the flood carrying capacity of the watercourse.

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<sup>5</sup> Bend Development Code Section 3.5.100

3. Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or five acres (whichever is less).

Within the floodway, development requires additional engineering analysis:

- BDC 2.7.640.M. Floodways. Located within areas of special flood hazard established in subsection (B)(1) of this section, Application of FP Zone, are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles, and erosion potential, the following provisions apply:
  1. Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional civil engineer is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

Variances from zone standards are allowed as a safety valve:

- BDC 2.7.640.P. Technical Variances. A technical variance from the requirements of this section may be granted by the Hearings Body for new construction and for improvements to existing structures which could not otherwise be authorized, provided the construction or improvements are to be erected or installed on a parcel of land one-half acre or less in size, contiguous to or more or less surrounded by lots with existing structures constructed below the minimum floor elevation established for flood protection purposes. A parcel of land in excess of one-half acre in single ownership on the effective date of the ordinance codified in this code is not excluded from the granting of a technical variance, but the burden of proof required for issuing the variance increases as the size of the property under single ownership increases, and the variance shall be granted only if required to equalize circumstances, considering previously developed land adjacent to the parcel for which a variance is sought.

Floodplains are also included in sensitive lands, as discussed below.

### Slope

Bend's regulation of steep slope areas has implications for lot and parcel size, and is included in grading and erosion control requirements.

- BDC 3.1.200.C. General Requirements for Lots and Parcels. [...]
  2. On steep slopes, increased lot or parcel sizes may be required to avoid excessive cuts, fills and steep driveways.

Bend regulates development on steep slope through general construction requirements<sup>6</sup> for a clearing, grading, and erosion control permit if altering or creating a slope exceeding 20 percent. Steep slopes are included in sensitive lands, as discussed below.

### Sensitive Lands

Sensitive lands include both floodplain and steep slope areas. Sensitive lands regulations impact minimum density and density transfer.

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<sup>6</sup> Bend Code Title 16, Section 16.10.020 Clearing, Grading and Erosion Control on Construction Sites

- Section 1.2 Definitions: Sensitive lands means wetlands, significant trees, steep slopes, floodplains and other natural resource areas designated for protection or conservation by the Bend Comprehensive Plan or the State of Oregon. [emphasis added]

“Steep slope” is not defined in the Development Code, but is defined in Title 16:

- 16.05.060 Definitions and Acronyms: Steep slope means slopes that are greater than 10 percent. As noted above, the “Steep Slopes” policies in the comprehensive plan apply to slopes over 10 percent.

Therefore, “sensitive lands” in the context of natural hazards would logically include areas of 10 percent or greater slope and floodplain.

- BDC 2.1.600 Residential Density C.2. Minimum housing densities are calculated as follows:
  - a. The area subject to minimum housing density is the total site area excluding any land to be developed with or dedicated for neighborhood commercial uses, public and institutional uses, and miscellaneous uses that do not include a dwelling unit; **sensitive lands**; fire breaks; and canals and their associated easements.
- BDC 3.5.100 Density Transfers C. Density Transfer Authorized. Allowed housing units may be transferred from one portion of a property to another portion of the same property, or from one property to another contiguous property. The density transfer shall protect sensitive land areas as listed below either by dedication to the public or a land trust, or by a nonrevocable conservation easement. Sensitive land areas include:
  1. Land within the 100-year floodplain;
  2. Land or slopes exceeding 25 percent;
  3. Drainage ways;
  4. Wetlands;
  5. Identified Areas of Special Interest;
  6. Goal 5 Resources;
  7. A stand or grove of significant trees as defined in BDC Chapter 3.2.

## Grants Pass

### Comprehensive Plan Findings

The City of Grants Pass Comprehensive Plan, last amended in 2015, contains findings<sup>7</sup> related to the following hazards:

- Floodplain
- Geologic
- Hillside Development (Slope)
- Soils

Comprehensive Plan Chapter 5: Areas Subject to Natural Hazards Index, contains Grants Pass Goal 7 findings. Grants Pass latest Plan update to Goal 7 policies was completed with the 2009 Comprehensive Plan update.

Grants Pass participated in crafting the Rogue Valley Integrated Community Wildfire Protection Plan, which provides educational guidance for wildfire protection in the region.

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<sup>7</sup> The Grants Pass Comprehensive Plan uses Findings instead of Policies.

## Floodplain Findings

Grants Pass floodplain findings include soft guidance for designating floodplain areas as open space, encouraging stormwater solutions, and advocating for density transfer in floodplain areas. The City used federal guidelines to adopt a floodplain ordinance.

- Finding 6. Land use regulations can minimize the loss of life and property due to the flooding. Floodprone land that is designated as open space for parks, wildlife areas and floodways can enhance the livability of the community while reducing future potential losses of life and property from flooding. Land use regulations can also be used to set aside land areas for the detention of storm water. Storm water detention areas such as wetlands, grassed waterways and woodlands may reduce existing and future flooding conditions. Density transfer is a method to encourage the preservation of storm water detention areas without affecting the revenue potential of developments in such areas.
- Finding 7. The National Flood Insurance Program is intended to encourage local government to adopt and enforce land use practices within floodprone areas to the degree necessary to reduce the risk to acceptable levels as set forth in the program. The City of Grants Pass has adopted a floodplain ordinance that adopts by reference the federal engineering report entitled "The Flood Insurance Study for the City of Grants Pass." That ordinance specifies that development in the floodplain may not raise the elevation of the 100-year flood by more than one foot, and, therefore, all new development must construct the level of the first livable floor at least one foot above the 100-year flood elevation.

## Geologic Findings

Grants Pass determined that the existing fault line is inactive and the region is geologically dormant.

- Finding 2. There are two geologic formations in the Grants Pass UGB area. The overlying formation is composed of recent stream deposits of sand, silt and gravel. The underlying formation is a large mass of igneous material that is composed of quartz diorite. There are several major faults in Josephine County but only one within the UGB area: a north-south fault that is parallel to McLean Drive, and a north-south fault east of Interstate 5 in the vicinity of Terrace Drive. No recent movement of any faults has been detected in Josephine County. There are no earthquake epicenters. The region is geologically dormant.

## Hillside Development (Slope) Findings

Grants Pass identified slopes greater than 15 percent on the Slope Hazards map and found that development on slopes between 15 and 35 percent should be reviewed by a soils scientist and an engineer, while development on slopes over 35 percent should require geotechnical review.

- Finding 3. The slopes in the UGB area range from 0% to greater than 60%.
- Finding 4. There is a low potential for earthflows for slopes less than 15%. Moderate potential for earthflows exist between 15% to 35%, although areas of unusually wet or unstable soil can increase that potential. Slopes over 35% generally have a high to extreme potential for earthflows, especially when the integrity of the slope is disturbed by removal of vegetation, excavation and construction.
- Finding 5. The slopes greater than 15% are identified on the Slope Hazards map. Generally, these slopes are located at the edge of the UGB in the Northwest, Northeast and Harbeck-Fruitdale subareas.

- Finding 6. The most effective method for the city and county to minimize the hazards of development on steep slopes is to review the development process in these areas. Developments that are proposed on slopes between 15% and 35% should be reviewed by a soil scientist and an engineer in order to reduce the hazard potential. Developments that are proposed on slopes in excess of 35% should be required to have the development plans reviewed by a licensed engineering geologist in order to ensure that soil erosion and earth movement hazards are minimized.

#### Soil Hazard Findings

Grants Pass delved into soil characteristics and identified situations where soils analysis should be encouraged.

- Finding 7. Soils are composed of decomposed rock and organic material and are basically defined by the content of rock particles and organic matter, and structure. Soil types vary according to geographic area due to the diversity of weathering forces, topography, climate and vegetation. There are forty-one different soil types in the UGB area each with distinct characteristics which make them either more or less suitable for urban developments. Table 5.20.4 identifies the soils and their general characteristics related to urban development. These characteristics are erosion factor, road construction, buildings with or without basements, shrink-swell potential and corrosivity. The information in Table 5.20.4 is derived from the soil data of the U.S. Soils Conservation Service. The ratings for each soil should be considered general guidelines. Where necessary clarification is required, then a site specific soil analysis should be performed by a soil scientist.
- Finding 8. The single most important potential soil hazard is erosion. Preventive measures for soil stability on erodible soils is often the best safeguard. Such preventive measures are:
  - traps to keep top soil on the site
  - leave natural vegetation in place
  - reducing surface water run-off with vegetative planting and keeping natural water retention areas
- Finding 9. Other important soils-related hazards such as shrink-swell and road construction can be mitigated by forewarning builders and developers early in the development process. Site specific analysis of soils should be encouraged in all developments with slopes in excess of 35%.

#### Goal 7 Land Use Regulations

Grants Pass natural hazards land use regulations are contained in the Grants Pass Development Code, Article 13: Special Purpose Districts, which describes requirements for development within the Slope Hazard District and Flood Hazard District.

#### Floodplain

The Grants Pass Flood Hazard District includes FIRM 100-year floodplain and floodway areas, and requires a permit prior to any development within the District. Development is required to be anchored, elevated (or floodproofed for non-residential development), and use flood resistant materials. Development and land divisions are required to meet the following standards:

- 13.256 Subdivision and Development Proposals, Partitions, and Planned Unit Developments. No proposed subdivision or partition of land or planned unit development plan, or other development located within an area of special flood hazard shall be approved without meeting



the requirements of this article. All of the applicable mapping and certification requirements of this article shall be met at the Tentative Map, Plat or Plan stage of review for subdivisions, partitions, and planned unit developments (See also Article 17, Lots and Creation of Lots, and Article 18, Planned Unit Development.)

- (1) All development proposals, including subdivision proposals, shall be consistent with the need to minimize flood damage;
- (2) All development proposals, including subdivision proposals, shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage;
- (3) All development proposals, including subdivision proposals, shall have adequate drainage provided to reduce exposure to flood damage; and
- (4) Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for development proposals, including subdivision proposals, which have the potential for 5 dwelling units or more or contain 1 acre or more, whichever is less.

Variances are available as a safety valve but are held to a high standard of review (multiple pages of standards).<sup>8</sup>

### Slope

The Grants Pass Slope Hazard District encompasses areas of at least 15 percent slope and contains two classes of slope: Class A (between 15 and 25 percent) and Class B (greater than 25 percent).

Development within the Slope Hazard District requires a Steep Slope Development Report and Grading and Erosion Plans. Class A documentation requires a licensed engineer stamp, while Class B requires a geotechnical engineer or engineering geologist stamp.

Restrictions on development within the Slope Hazard District include erosion control measures and retaining wall height is limited to 20 feet.

## Newberg

### Comprehensive Plan Policies

The City of Newberg's Comprehensive Plan, last updated in 2020, contains policies related to the following hazards:

- Floodplain
- Hillside Development / Geological

Comprehensive Plan Chapter II.F: Areas Subject to Natural Hazards, contains Newberg's Goal 7 policies. Newberg's latest Plan update to Goal 7 policies was an update to floodplain policies in 2010.

### Floodplain Policies

Newberg has straightforward policies to comply with federal and state floodplain and greenway protections.

- Policy 1. The City will coordinate with the Federal Emergency Management Agency to ensure continued compliance with federal flood plain regulations.

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<sup>8</sup> See GPDC Section 13.246.

- Policy 2. The City will adopt the most current Federal Emergency Management Agency Flood Insurance Rate Maps, the Flood Insurance for Yamhill County to ensure that property owners may participate in the National Flood Insurance Program.
- Policy 3. The City will adopt floodplain development standards to:
  - minimize public and private losses,
  - protect human life and health,
  - minimize expenditure of public money and costly flood control projects,
  - minimize damage to public facilities, and
  - help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard,
  - to ensure property owners may participate in the National Flood Insurance Program. (Ordinance 2010-2719, March 1, 2010)
- Policy 4. The largest floodplain area within the Urban Growth Boundary is located within the Willamette Greenway. As such, this area will be subject to Greenway plans and regulations.

#### Hillside Development / Geological Policy

Newberg identifies “hazardous areas” as areas with slopes 20 percent or greater, or with geological limitations. Development may be permitted in hazardous areas if consistent with sound engineering and planning criteria.

- Policy 5. In other areas of potential or existing hazards, development shall be subject to special conditions. Reasonable development may be permitted in these areas when it can be shown, based on sound engineering and planning criteria, that adverse impacts can be mitigated and kept to a minimum. Hazardous areas shall be considered to be lands with slopes 20% or greater, potential and existing slide areas, fault areas, and areas with severe soil limitations.
- Policy 6. The City will discourage development on hazardous slope areas and natural resource areas in the Riverfront District. (Ordinance 2002-2564, April 15, 2002)

#### Goal 7 Land Use Regulations

Newberg natural hazards land use regulations contained in the Newberg Development Code are limited to floodplain, covered by Chapter 15.343, Areas of Special Flood Hazard Overlay.

Sloped areas are regulated by Title 13 Public Utilities and Services, which “may require” additional erosion and sediment controls on slope of 10 percent or more.

#### Floodplain

Newberg’s Areas of Special Flood Hazard Overlay District applies to areas identified by FIRM maps as within the 100-year floodplain or floodway. Development within this District requires a Floodplain Development Permit. New development requires anchoring, flood resistant materials, and elevation (or floodproofing for non-residential development). Land divisions are required to minimize flood damage:

- NDC 15.343.040.A.4. Tentative Subdivision and Partition Plat Proposals.
  - a. Where floodplain development is proposed or reasonably likely, all tentative subdivision and partition plat proposals shall be consistent with the need to minimize flood damage.
  - b. All tentative subdivision and partition plat proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage.

c. All tentative subdivision and partition plat proposals shall have adequate drainage provided to reduce exposure to flood damage.

d. For any proposed affected structure, proposed subdivision or partition, and other proposed floodplain development which contains at least 50 lots or five acres (whichever is less), flood elevation data shall be provided.

Of note, there is significant overlap between the Flood Hazard overlay and other applicable layers of development restriction – notably the stream corridor district that protects riparian areas and associated wetlands, and the Willamette River Greenway.

## Redmond

### Comprehensive Plan Policies

The City of Redmond’s Comprehensive Plan, last updated in 2020, contains general policies related to non-specific natural hazards, and does not identify floodplain, slope, or fire hazards.

Comprehensive Plan Chapter 7: Natural Hazards, contains Redmond’s Goal 7 policies. Redmond does not appear to have updated its Goal 7 policies since plan acknowledgment in 1981.

### Goal 7 Policies

- Policy 1. Areas subject to natural disasters shall be evaluated as to the degree of hazard present.
- Policy 2. Plans taking into account known areas of natural disasters and hazards shall be considered as a major determinant, the carrying capacity of the air, land and water resources of the planning area. The land conservation and development actions provided for by such plans shall not exceed the carrying capacity of the planning area.
- Policy 3. When locating developments in areas of known natural hazards, the density or intensity of the development shall be limited by the degree of the natural hazard.
- Policy 4. Natural hazards that could result from new developments, such as runoff from paving projects and soil slippage due to weak foundation soils, shall be considered, evaluated and provided for.

### Goal 7 Land Use Regulations

Redmond’s Development Code (City Code Chapter 8) contains relatively few specific regulations related to natural hazards. This is logical, as the Redmond Urbanization Study indicates:

“Redmond has no land that is unavailable for development due to physical constraints: steep slopes, wetlands, riparian areas, and floodways. This is due to the city’s location and the fact that the dry canyon is mostly in public ownership.”<sup>9</sup>

However, evaluation of hazards may be required during site and design review:

- RDC 8.3030 Special Studies, Investigations and Reports. Special studies, investigations and reports may be required to insure that the proposed development of a particular site does not adversely affect the surrounding community, does not create hazardous conditions for persons or improvements on the site. These may include traffic impact studies impact of contaminated

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<sup>9</sup> P. 3-9 Redmond Urbanization Study (ECONorthwest, 2005)

soils, soil conditions, flooding of waters and excessive storm water runoff, tree preservation, and other concerns of the development's impact on adjacent properties or public facilities. Redmond also has regulations related to Goal 7 hazards associated with Master Development Plans in Article I Section 8.0300. Grading regulations in Article III Section 8.2720 relate to slope. Flooding and floodplains are regulated through stormwater and building codes.

### Floodplain

Redmond does not appear to have floodplain regulations adopted as part of the development code. Flooding, erosion control, and floodplain regulations are regulated through the city's stormwater regulations in the City Code, Chapter 4 – Utilities, and also regulated through the building code in Chapter 9 – Building and Fire Codes.

### Slope

In Redmond, Master Development Plans are detailed development plans required for phased development, area plans within urban holding zones, and areas requesting annexation. Master Development Plans are required to map *and plan* for natural hazard areas as a submittal requirement:

- 8.0300.3.C.7. Natural Hazard Areas. Inventory areas subject to natural hazards, particularly steep slopes, and program urban development that is suitable for the identified hazard areas;

In addition, Master Development Plans are required to address and implement Great Neighborhood Principles, where open spaces and green design criteria may also interact with natural hazard areas:

- 8.0300.3.C.13.c. Open spaces, greenways, recreation. All new neighborhoods shall provide useable open spaces with recreation amenities that are integrated to the larger community. Central parks and plazas shall be used to create public gathering places where appropriate. Incorporate significant geological features such as rock outcroppings, stands of clustered native trees, etc. into the design of new neighborhoods. Neighborhood and community parks shall be developed in appropriate locations consistent with policies in Redmond's Parks Master Plan.
- 8.0300.3.C.13.I. Green Design. Environmentally friendly and energy efficient design is encouraged for public and private infrastructure, architecture and building orientation, open spaces and natural areas and transportation facilities. In addition, the planting of native, drought-resistant trees is encouraged to provide shade and to minimize water usage.

Redmond's grading requirements also require mitigation of steep slopes:

- 8.2720.1. Slopes shall be less than or equal to 3 to 1 (horizontal to vertical) unless slope reinforcement and low maintenance surfaces are provided. Cut slopes as steep as 1 to 1 are permitted in native rock material if that material is suitable to stand at the slope without raveling. Toe of full slopes steeper than 3 to 1 and top of cut slope shall be no closer than 2 feet from the property line.
- 8.2720.5. Foundations should be stepped or other measures used to minimize cuts and fills. Slopes steeper than 3:1 shall be landscaped, terraced, or receive other treatment to reduce the visual impact and minimize the need for maintenance.