City of McMinnville
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EXHIBIT 4 – STAFF REPORT

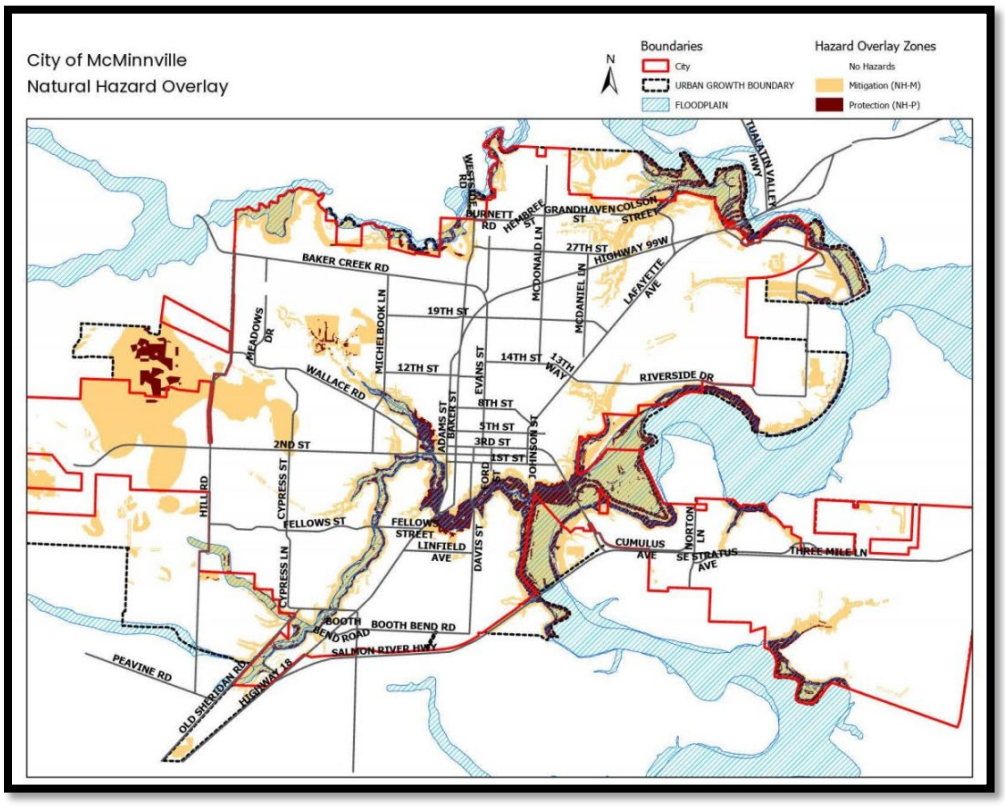
DATE: **March 19, 2026**
TO: **Planning Commission Members**
FROM: **Heather Richards, Community Development Director**
SUBJECT: **Deliberation – Docket G 3-22, Natural Hazards**

STRATEGIC PRIORITY & GOAL:

COMMUNITY SAFETY & RESILIENCY
Proactively plan for & responsively maintain a safe & resilient community.

GROWTH & DEVELOPMENT CHARACTER
Guide growth & development strategically, responsively & responsibly to enhance our unique character.

Report in Brief:
This is the continuing deliberation after a public hearing conducted on February 19, 2026, regarding the City's legislative work associated with Oregon Land Use Goal #7 - Natural Hazards.



Background:

The Planning Commission hosted a public hearing on February 19, 2026, to consider the following proposed amendments to the McMinnville Comprehensive Plan, Volumes I, II, and III.

- Amendment to the McMinnville Comprehensive Plan, Volume I – Background Elements, adopting the *2021 Natural Hazards Inventory and Management Program Options and Recommendations* and its Appendices (Attachments 1, 2, 3, and 4 to this staff report).

- Amendment to the McMinnville Comprehensive Plan, Volume II – Goals and Policies, adding a new Chapter XI, entitled *Natural Features* (Attachment 5 to this staff report).

- Amendments to the McMinnville Municipal Code, Chapters 17.48, *Flood Area Zone*, and Chapter 17.49, *Natural Hazard Overlay Subdistricts* (Attachment 6 to this staff report).

- Amendment to the McMinnville Zone Map, adding the Natural Hazard Mitigation Zone (NH-M) and the Natural Hazard Protection Zone (NH-P) (Attachment 7 to this staff report).

The first evidentiary public hearing was conducted on April 6, 2023. The Planning Commission then hosted several more public hearings in 2023, until the City needed to put this project on hold to work on state-mandated housing planning.

A website page has been developed for this effort: Natural Hazards | McMinnville Oregon

Discussion:

After hearing public testimony on February 19, 2026, the Planning Commission voted to close the public hearing and started deliberations.

They asked city staff to come back with two recommendations:

1) Nomenclature for the overlay zone that would not be a liability for property value and insurance provisions; and

2) Adding a provision to the assessment language that identified impacts of proposed development on adjacent sites.

Impact on Adjacent Properties:

Staff proposes amending 17.49.070 to include the highlighted language below.

17.49.070 Required Natural Hazard Mitigation Reports. Depending on the natural hazards present on a particular property, the applicant for land development shall be responsible for preparing one or more of the following studies within the NH-M and NH-P Subdistricts.

A. Geological Site Assessment (also known as an Engineering Geologic Report) is an overview of existing geological conditions that includes recommendations for mitigation measures. The Site Assessment shall be completed and stamped by a Certified Engineering Geologist, licensed by the Oregon Board of Geologic Examiners. At a minimum, the Geological Site Assessment shall follow Oregon

State Board of Geologic Examiners (OSBGE)'s guideline for preparing Engineering Geologic Reports and include the following elements:

1. **Relevant landslide and earthquake hazard information from the McMinnville Natural Hazards Inventory;**
2. **A field investigation of the site and vicinity including a description of geologic hazards that may be present on the site;**
3. **An analysis of the geological suitability of the site for proposed development – this analysis shall include the potential hazard impact of property within 200 feet of the subject property measured from the property boundaries;**
4. **A description of any unusual or extreme geologic processes at work on the site, such as rapid erosion, landslide hazard, flood hazard, rockfall, subsidence, debris run-out, or other features;**
5. **A description of any geologic hazards that may affect the proposed land use, including but not limited to slope stability, debris flow, flooding, topography, erosion hazard, shallow groundwater, springs, expansive soils, subsidence, fault rupture, landslide hazard, rockfall, debris run out, or any other geologic hazard discovered by the investigation;**
6. **Identification of any areas of the site that should be avoided for human-occupied structures;**
7. **An analysis of the feasibility of developing the site for the proposed land use(s);**
8. **Identification of any mitigation measures needed to address any anticipated geologic problems; and**
9. **Recommendations regarding the need for follow-up studies, such as a Geotechnical Engineering Report.**

B. Geotechnical (Soils Engineering) Report is prepared and stamped by a Licensed Civil Engineer, licensed in the Specialty of Geotechnical Engineering by the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS). The Geotechnical Report usually makes specific recommendations to avoid or mitigate geological hazards. At a minimum, the Geotechnical Report shall include the following elements:

1. **Data regarding the nature, distribution and strength of existing soils on the site.**
2. **Analysis, conclusions, and recommendations for grading procedures and associated drainage requirements.**
3. **Design standards for corrective measures, including buttress fill, when necessary.**
4. **A professional opinion on the adequacy of the development site for the intended use considering the proposed grading in relation to soils engineering factors, such as slope stability, and the impact to property within 200 feet of the subject site measured from the property boundary.**
5. **The location of proposed development and public facilities; and**
6. **Relevant information from the McMinnville Natural Hazards Inventory.**

The potential impact area was already a required element of the application per 17.49.060(D). Please see below.

17.49.060 Natural Hazard Subdistrict Application Requirements.

Development applications for all properties within the NH-M or NH-P Subdistricts shall accurately indicate the site-specific locations of specific types of natural hazard areas based on City GIS maps in relation to the proposed development. City planning staff will assist the applicant by providing GIS maps showing city information sources listed below. Development applications within or partially within natural hazard subdistricts shall include:

A. **A site plan showing the proposed development on the site, drawn to a standard scale and including an illustrated scale for use in reductions.**
B. **Topography showing 2-foot contour intervals and slopes of:**
   1. **15 to 24.9 percent; and**
   2. **25 percent and greater.**
C. **The location of existing and proposed infrastructure necessary to serve the proposed development. Such infrastructure includes streets, driveways, water, sanitary sewer, and storm drainage.**
D. **The potential hazard impact area showing land uses and tree cover within 200 feet of the subject property.**
E. **A title block, north arrow, and bar scale.**
F. **Date(s) of field check(s).**
G. **A grading plan, if grading is to occur, showing existing and finished contours on the site, at two-foot contour intervals. Grading plans can be accepted with greater contour intervals with the approval of the City Engineer or the Building Official, per their appropriate authorities, if the size of the site or elevation changes across the site are such that two-foot contours do not clearly demonstrate the intent of the grading plan.**
H. **Information sources, such as soil survey maps and applicable McMinnville Natural Hazard and Natural Resource inventory maps.**
I. **Relevant City maps applicable to the site and impact area including the Zoning Map, natural hazard, and natural resource subdistrict maps.**
J. **Aerial photos, including their date and scale.**
K. **Depending on the type of natural hazard or natural resource identified on a proposed development site, the applicant shall be responsible for:**
   1. **Showing the precise location of each type of inventoried natural hazard or natural resource present on the development site;**
   2. **Submitting required flooding, seismic, geological and/or wildfire hazard mitigation studies as prescribed in Section 17.49.060; and**
   3. **Demonstrating compliance with recommended mitigation measures pursuant to required hazard studies.**
L. **The location and size of significant and landmark trees within 25 feet of any proposed disturbance area. If development is proposed within a wildfire area, the location and size of significant and landmark trees must be shown within 50 feet of the outer limits of above-ground construction.**
M. **Any other submittal requirements identified for development in areas with specific types of natural hazards, as specified in this chapter.**

Overlay/Sub District Nomenclature:

Some suggestions for Planning Commission consideration are outlined below.

Proposed Overlay Name	Proposed Sub-District Area Names
Natural Stewardship Overlay	Managed Development Area (MDA) Stewardship Area (SA)
Natural Resilience Overlay	Resilience Management Area (RMA) Resilience Protection Area (RPA)
Managed Development Overlay	Managed Development Area (MDA) Limited Development Area (LDA)
Areas of Special Interest	Managed Development Area (MDA) Limited Development Area (LDA)
Sensitive Lands Overlay	Risk Reduction Area (RRA) Hazard Protection Area (HPA)
Community Resilience Overlay	Resilience Management Area (RMA) Resilience Protection Area (RPA)

Attachments:

1. Draft Proposed Code Amendments
2. Draft Proposed Comprehensive Plan Amendments, Chapter XI
3. Natural Hazard Overlay Map
4. 2021 Natural Hazards Inventory and Management Program Options and Recommendations
5. Appendix 1, Best Natural Hazards Practices
6. Appendix 2, Natural Hazard Overlay Methodology
7. Appendix 3, REVISED Natural Hazard Inventory
8. Oregon Land Use Goal #7

Staff Recommendation:

Staff recommends the Planning Commission vote to recommend adopting the proposed Natural Hazards planning program to the McMinnville City Council.

"I MOVE THAT THE PLANNING COMMISSION RECOMMEND THAT THE CITY COUNCIL ADOPT THE MCMINNVILLE NATURAL HAZARDS PLANNING PROGRAM PER DOCKET G 3-22 AS AMENDED BY THE PLANNING COMMISSION ON MARCH 19, 2026."

ATTACHMENT 1

PROPOSED AMENDMENTS TO THE MCMINNVILLE MUNICIPAL CITY CODE – TITLE 17, ZONING ORDINANCE

New proposed language is represented by **red, bold font**, deleted language is represented by ~~strikethrough font.~~

ZONING*

Chapters:

* Prior ordinance history: Ord. 3380 as amended by Ords. 3392, 3441, 3497, 3557, 3565, 3603, 3614, 3633, 3677, 3694, 3707, 3742, 3764, 3803, 3817, 3888, 3898, 3925, 3933, 3966, 3967, 3968, 3983, 3995, 4001, 4011, 4017, 4025, 4043, 4046, and 4066.

Chapter 17.06

DEFINITIONS

17.06.015 General Definitions.

Buildable Land – buildable land is land within the city limits that is vacant and developed land likely to be redeveloped, that is suitable and available for development. Land is generally considered "suitable and available" unless it:

A. Is severely constrained by natural hazards as determined by Chapter 17.49 of the McMinnville Municipal Code;
B. Is subject to natural resource protection measures determined under Statewide Planning Goals 5, 6 or 15;
C. Has slopes of 25 percent or greater;
D. Is within the Flood Plain Zone; or
E. Cannot be provided with public facilities.

Natural Features (Significant) – distinctive or unique natural features including, but not limited to, watercourses, riparian corridors, wetlands, wildlife habitats documented for rare animal species (those that are proposed for listing or are listed under State or Federal law), rare plants (those that are proposed for listing or are listed under State or Federal law) and native plant communities, steep slopes, prominent topographic features, such as ridgelines and rock outcrops wooded areas identified for protection in McMinnville's adopted tree grove inventory, significant and landmark trees.

17.06.045 Tree Related Definitions. For the purpose of Trees (Chapter 17.58), the following definitions shall apply.

Hazardous Tree – A tree or part thereof growing on private or public property which endangers, obstructs or impairs the free and full use of a public area, including **but not limited to use by** utilities **(including electric conductors and facilities)** within these areas **whether or not the tree** is afflicted with or weakened by a disease or injury.

~~**Historic Tree** – Selected trees placed on an inventory based on the age, species, location, and historic significance.~~

Landmark Tree – Selected trees placed on an inventory based on the age, species, location, and historic significance.

Major Pruning – Removal of over 20 percent of the tree's canopy, any tree topping, or disturbances of over 10 percent of the root system.

Public Tree – A tree located within a public right-of-way or on public land, such as a city park.

Repeated or Excessive – Two incidents within any three-year period requiring removal or repair of a public sidewalk.

Significant Tree – ~~Selected trees placed on an inventory based on the age, species, and location.~~ **Trees located on public and private land within the McMinnville UGB that are either (1) 36 inches or greater dbh, or (2) Oregon white oak trees 15 inches dbh or greater. Significant trees do not include hazardous, diseased, dead, or nuisance trees as determined by the Planning Director in consultation with a Certified Arborist, or to the extent necessary to comply with the Oregon Public Utilities Commission Safety Rules (OAR Chapter 860, Divison 24) or the City's Water and Light Department Electric Wildfire Mitigation Plan.**

Tree – Any woody plant having a trunk ~~five~~**six** inches or more in diameter 4.5 feet above ground level at the base of the trunk. If a tree splits into multiple trunks below 4.5 feet, the trunk is measured at its most narrow point beneath the split.

Chapter 17.48

F-P FLOOD AREA ZONE

Sections:

17.48.060 Use Limitations.
17.48.070 Use of Other Base Flood Data.
17.48.080 Endangered Species Act Requirements

17.48.005 Purpose. The purpose of a floodplain is to establish and regulate land uses in those areas designated as hazardous due to periodic flooding in order to protect the community from financial burdens through flood damage losses. Further, this zone is intended to protect natural floodways and drainage ways from encroachment by uses and/or indiscriminate land filling or diking which may adversely affect the overall stream and downstream flood levels, **wetland water quality or flood control values, tree canopy, native vegetation and water quality.** Finally, the floodplain zone shall set aside an area which shall, for the most part, be preserved in its natural state or farmed to provide open spaces, natural habitats, and recreational places. (Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).

17.48.010 Established—Area Included. In accordance with Section 17.09.010, all property within the corporate limits of the City lying within Special Flood Hazard Areas (100-year flood) identified by the Federal Insurance Administration in the report entitled "The Flood Insurance Study for Yamhill County, Oregon and Incorporated Areas," (effective date March 2, 2010), and accompanying Flood Insurance Rate Maps (FIRM) is declared to be flood area zone property and subject to the requirements of this Chapter. (Ord. 4921 §4A, 2010; Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).

17.48.020 Boundaries Indicated on Map. The boundaries for the zone established by Section 17.48.010 shall be indicated on the McMinnville Zoning Map. (Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).

17.48.025 Definitions. For the purpose of this section refer to Section 17.06.030 for Flood Area related definitions. (Ord. 4952 §1, 2012).

17.48.030 Permitted Uses. In an F-P zone, the following uses and their accessory uses are permitted (subject to the provisions of Section 17.48.060 **and Chapter 17.49 Natural Hazard Subdistricts**):

A. Farming;
B. ~~Public~~ Park and recreation facility, not requiring the use of any structure;
C. Sewage pump station. (Ord. 4684 §1, 1998; Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).

17.48.040 Conditional Uses. In an F-P zone, the following uses and their accessory uses may be permitted, subject to the provisions of Section 17.47, Section 17.48.045, Section 17.4and Chapters **17.49**, 17.72 and 17.74:

A. Boat landing and launching facility;
B. **Park and** ~~open land~~ recreation facility requiring the use of any structure;
C. Removal of sand, gravel, topsoil, or rock;
D. Landfill or diked land, including culvert and bridge installations, subject to the following procedures:

1. Preliminary submittal of the proposal shall be made to the Planning Department, which shall check the proposal to ensure its compliance to the ordinance. Said proposal shall then be submitted to the Planning Commission.
2. The City shall provide written notice to the City Recorder's office in adjacent communities, Yamhill County, and the Oregon Department of Land Conservation and Development prior to any alteration or relocation of a watercourse (i.e., stream channel), and shall submit a copy of that notification to the Federal Insurance Administration.
3. The Planning Department shall prescribe the form and information required for applications made for any conditional use listed in this subsection. No application shall be accepted unless it complies with such requirements and is verified as to the correctness thereto. There shall be included, as a part of the application, an accurate map. Such plans shall be in triplicate, drawn at a scale of not larger than one inch equals fifty feet nor smaller than one inch equals five hundred feet, and shall show:
    a. 100-year flood projection elevation on the subject site. State source of information.
    b. Property boundaries and dimensions.
    c. Ground elevations shown by contour lines of not less than two-foot vertical intervals. State source of information.
    d. Existing and proposed structures.
    e. Dimensions and elevations of existing and/or proposed fill.
    f. Location of stream channel in relationship to items "a" through "e" above.
    g. A typical valley cross-section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sectional areas to be occupied by the proposed fill and high-water information.
    h. Profile showing the slope of the bottom of the channel or flow line of the stream, and the slope line of the proposed fill.
    i. Specifications of fill material, grading, channel improvement or maintenance plans, dimensions, and restoration of completed project.
    j. **The location of applicable natural hazard on or adjacent to the subject site.**

E. Weapons Training Facility subject to the following conditions:
1. The property on which the facility is located must be owned or leased by a Federal, State, or local government agency for the exclusive use of public safety personnel engaged in firearms or other related training;
2. The facility must be located no closer than 2,640 feet (one-half mile) to any land planned and zoned for residential use; and
3. Only those firearms or weapons authorized by a government agency and utilized for law enforcement related purposes shall be allowed within the area approved for a weapon training facility. Possession of other firearms or weapons at a weapon training facility site shall be considered a violation of this ordinance.

F. Wireless communications facilities, not to include antenna support structures and their associated facilities, subject to the provisions of Chapter 17.55 (Wireless Communications Facilities). (Ord. 4921 §4C, 2010; Ord. 4732, 2000; Ord. 4684 §2, 1998; Ord. 4559 §1, 1994; Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).

17.48.045 Conditional Use Factors. The Planning Commission shall consider the following factors and special conditions when making a decision regarding a conditional use in the floodplain zone:

A. Factors to be Considered:
   1. The danger to life and property due to increased flood heights or velocities caused by any proposed fill.
   2. The danger that materials may be swept onto other lands or downstream to the injury of others.
   3. The importance to the community of the service provided by the proposed facility.
   4. The availability of alternative locations not subject to flooding.
   5. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.
   6. The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.
   7. The compatibility of the proposed use with the potential of the site and the surrounding floodplain area for open space, natural habitats, and recreational places.
   8. The impact of the proposed use on fish, wildlife habitat**.**
   9. **The danger to life and property from landslides, wildfire or earthquakes due to excavation, vegetation, vegetation removal and construction of the proposed use.**
   10. Such other factors which are relevant to the purposes of this section.

B. Special Conditions. Upon consideration of the factors listed above and the purposes of this section, the Planning Commission may attach such conditions to the granting of a conditional use permit as it deems necessary to further the purposes of this portion of the zoning ordinance. The following such conditions, but not exclusively limited thereto, may be included:
   1. Limitations on periods of use and operation, and upon the area to be filled and the elevation of the fill as well as to the kinds of material which may be so emplaced.
   2. Imposition of operational controls, sureties, and deed restrictions.
   3. Requirements for construction of channel modifications, dikes, levees, and other protective measures.
   4. Limitations on the removal or destruction of critical fish and wildlife habitat including any area of riparian vegetation. (Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).
   5. **Limitations imposed by applicable natural hazard overlay zones per Chapter 17.49.**

[17.48.050 Signs. Moved to Chapter 17.62 (Signs), by Ord. 4900 November 5, 2008.]

17.48.060 Use Limitations. In an F-P zone, the following limitations shall apply:

A. No residence shall be constructed;

B. A lot shall not be less than one acre in area;

C. Within the floodway and flood fringe, no encroachment will be allowed which causes any increase in the flood height or which would result in hazardous velocities (see floodway schematic). To demonstrate compliance with this requirement, the applicant shall submit an engineering certification stating the proposed development will not impact the pre-project base floodway and flood fringe elevations. The certification shall be signed and sealed by a professional engineer and be supported by the appropriate technical data and studies, which are typically based upon the standard step-backwater computer model utilized to develop the 100-year floodway and flood fringe shown on the appropriate Federal Insurance Rate Map (FIRM) and tabulated in the adopted Flood Insurance Study. (Ord. 4921 §4D, 2010; Ord. 4684 §3, 1998; Ord. 4128 (part), 1981; Ord. 3380 (part), 1968).

17.48.070 Use of Other Base Flood Data. When base flood elevation data has not been provided (FIRM zones A), the applicant shall provide alternative base flood elevation as available from a Federal, State, or other source in order to comply with this chapter. (Ord. 4921 §4E, 2010)

17.48.080 Endangered Species Act Requirements. Certain fish, wildlife and plant species within the city may be protected by the federal Endangered Species Act (ESA) and therefore:

A. Before granting any development or building permit within the F-P zone, the applicant shall submit a Flood Habitat Assessment Report from a qualified expert indicating that the applicable requirements of the Endangered Species Act are satisfied;

B. All mitigation recommendations contained within the qualified report shall be included as permit conditions of approval; and

C. No authorization granted through this section shall be constructed to guarantee compliance with Endangered Species Act.

This whole chapter is new to the McMinnville Municipal Code

Chapter 17.49

NATURAL HAZARD OVERLAY SUBDISTRICTS

Sections:

17.49.000 Natural Hazard Subdistricts Generally. Natural Hazard Subdistricts (NH Subdistricts) implement the Natural Hazard Policies of the McMinnville Comprehensive Plan and are intended to protect life and property from inventoried natural hazard areas pursuant to Statewide Planning Goal 7 – Natural Hazards.

- **A. NH Subdistricts are based on adopted natural hazard inventories – which include maps showing significant resource sites and supporting reports documenting the criteria and methods used to determine local resource site significance.**
- **B. NH Subdistricts implement McMinnville Comprehensive Plan Chapter XI Natural Features policies related to Natural Hazards.**
- **C. NH Subdistrict boundaries appear on the official City Zoning Map.**
- **D. NH Subdistrict standards apply in addition to standards of the underlying base zone. In cases of conflict, the more restrictive NH Subdistrict standards control.**

17.49.010 Definitions. The following definitions apply within the NH-P and NH-M Subdistricts.

- **A. Landmark and Significant Trees. Please see definitions in Chapter 17.06.045, Definitions.**
- **B. Native Plants. "Native plant species" are those listed on the Portland Plant List, which is incorporated by reference into this chapter.**
- **C. Fire Resistant Plants. Fire-resistant plants burn at a relatively low intensity, slow rates of spread and with short flame lengths.[1] In addition to listed species, fire-resistant tree and plant species may be determined based on the professional opinions of licensed landscape architects, certified arborists or foresters. Fire-resistant vegetation has the following characteristics:**
  1. **Growth with little or no accumulation of dead vegetation (either on the ground or standing upright).**
  2. **Non-resinous plants.**
  3. **Low volume of total vegetation (for example, a grass area as opposed to a forest or shrub-covered land).**
  4. **Plants with high live fuel moisture (plants that contain a large amount of water in comparison to their dry weight).**
  5. **Drought-tolerant plants (deeply rooted plants with thick, heavy leaves).**
  6. **Stands without ladder fuels (plants without small, fine branches and limbs between the ground and the canopy of overtopping shrubs and trees).**
  7. **Plants requiring little maintenance (slow-growing plants that, when maintained, require little care).**

[1] A handbook entitled *Fire-resistant Landscape Plants for the Willamette Valley* (OSU Extension Service, 2015) provides a list of fire-resistant shrubs and plants applicable to the McMinnville area.

8. **Plants with woody stems and branches that require prolonged heating to ignite.**

Note: This list may be modified based on the professional opinions of licensed landscape architects, certified arborists, or foresters.

D. Fuel Reduction Area. An area where vegetation or material capable of allowing a fire to spread unchecked has been treated, cleared or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operations. Establishment of a fuel reduction area does not include stripping the ground of all native vegetation.

E. Highly Flammable Trees and Plants. Plant species that have characteristics which make them more volatile by encouraging easy ignition and the spread of fire through their foliage due to low moisture content, dense dry leaves, needles, grass-like leaves, or volatile resins and oils. Highly flammable trees and plants generally include coniferous and resinous trees and shrubs.[2] In addition to listed species, highly flammable tree and plant species may be determined based on the professional opinions of licensed landscape architects, certified arborists, or foresters.

F. The McMinnville Natural Hazards Map. A map that identifies earthquake, steep slope, landslide, wildfire, and flood hazard areas within the McMinnville Urban Growth Boundary. This generalized, composite map is based on the McMinnville Natural Hazards Inventory – adopted _____ 2026, by Ordinance No. _____.

G. Certified Engineering Geologist. A registered geologist who is certified in the specialty of engineering geology under provisions of ORS 672.505 to 672.705.

H. Geotechnical Engineer. A professional engineer, registered in the State as provided by ORS 672.002 to 672.325, who by training, education and experience is qualified in the practice of geotechnical and soils engineering practices.

I. Routine Maintenance. Regular upkeep of physical properties (i.e. trees, vegetation, right-of-way improvements, land, buildings, and equipment, including recurring, preventive and on-going maintenance necessary to delay or prevent the failure of physical properties including but not limited to the removal and or replacement of such properties with like (size, form) materials.

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[2] Highly flammable trees and plants include at least the following:

A. Trees (including but not limited to):Acacia (*Acacia* sp.); Arborvitae (*Thuja* sp.); Cedar (*Cedrus* sp.); Cedar/Cypress (*Chamaecyparis* sp.); Cypress (Cupressus sp.); Douglas fir (*Pseudotsuga menziesi*); Fir (Abies sp.); Hemlock (Tsuga sp.); Juniper (*Juniperus* sp.); Pine (*Pinus* sp.); Sequoia (*Sequoia* sp.); Spruce (*Picea* sp.); and Yew (*Taxus* sp.).

B. Shrubs (including but not limited to): Blackberry (*Rubus armeniacus*); Juniper (*Juniperus* sp.)' Laurel sumac (*Malosma laurina*); Oregon grape (*Mahonia aquifolium*); Rosemary (*Rosmarinus* sp.); Scotch broom (*Cytisus scoparius*); and Wild Lilac (*Ceanothus* sp.).

C. Grasses and Ground Cover (including but not limited to): Dry annual grasses; Large bark mulch; and Pampas grass (*Cortaderia selloana*).

17.49.020 Purpose and Intent of the Natural Hazard Subdistricts.

The purpose and intent of this chapter are to comply with the McMinnville Comprehensive Plan, minimize the cumulative risks associated with inventoried natural hazards, while allowing reasonable economic use of land within the McMinnville city limits.

A. Comprehensive Plan. This chapter is designed to implement the Natural Hazard Policies found in Chapter XI Natural Features of the McMinnville Comprehensive Plan.

B. Reasonable Economic Use. This chapter is intended to allow reasonable economic use of property while establishing standards to avoid or mitigate cumulative risks related to earthquake liquefaction and shaking hazards, steep slope and landslide hazards, wildfire hazards and flood hazards. The burden of proof shall be on the applicant to bring forth evidence in support of the application and to provide sufficient information on which any decision has to be made on the application. Exceptions to this Chapter for reasonable economic use purposes shall be allowed by the City pursuant to the review criteria below:

1. **The application of this chapter would deny all reasonable economic use of the property;**
2. **No other reasonable economic use of the property has less impact on the landslide hazard area;**
3. **The proposed impact to the landslide hazard area is the minimum necessary to allow for reasonable economic use of the property;**
4. **The inability of the applicant to derive reasonable economic use of the property is not the result of actions by the applicant after the effective date of this chapter, or is predecessor; and**
5. **The proposal does not pose a significant threat to the public health, safety, or welfare on or off the development proposal site.**

C. Disclaimer. The degree of Natural Hazard protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger hazard events can and will occur on rare occasions. Landslide risks may be increased by man-made or natural causes.

1. **Areas impacted by other natural hazards may differ from those shown on the McMinnville Natural Hazards Map.**
2. **This Chapter does not imply that land outside the natural hazard areas or that uses permitted within such areas will be free from earthquake, steep slope, landslide, wildfire or flooding hazards. Nor does it imply that land outside of mapped hazard areas will be free from damage in a hazard event.**
3. **This Chapter shall not create liability on the part of the City of McMinnville, any officer or employee thereof, or the Federal Insurance Administration, for any hazard damages that result from reliance on this chapter, or any administrative decision lawfully made based on the provisions of this chapter.**

4. Compliance with the minimum standards established by this chapter is not intended to relieve any private party from liability for the design or construction of development which causes damage or injury by aggravating an existing and known hazard.

17.49.030 Applicability and General Provisions. The Natural Hazards Subdistricts apply to the mapped Natural Hazard Mitigation and Natural Hazard Protection overlay zones within the city limits. The provisions of this chapter apply to public and private development proposed within these overlays:

A. The following standards apply to public facilities, planned developments, land divisions, and new construction within the city limits:
   1. Oregon Structural Specialty Code Seismic Standards. All land within the McMinnville UGB is subject to moderate to severe earthquake shaking and liquefaction hazards. Oregon Structural Specialty Code and Residential Specialty Code seismic requirements shall apply to new construction in all city zones.
   2. City Erosion Control Standards. Any Storm Drainage Design and Construction Standards, including Erosion Control Standards as adopted or utilized by the City of McMinnville shall apply to all development in all city zones. The erosion control plan shall be prepared by an engineer registered in the State of Oregon. The City Engineer may require special erosion control standards for development:
      a. On slopes of 15% or greater; or
      b. Within the Flood Area Zone; or
      c. Within the NH-M and NH-P Subdistricts.

B. The Natural Hazard - Mitigation (NH-M) Subdistrict. The NH-M Subdistrict includes land with cumulative earthquake, landslide and/or wildfire hazard risk that can be mitigated on-site based on the recommendations of required studies. The NH-M Subdistrict therefore requires geological site assessments, geotechnical studies and/or wildfire impact studies that include recommendations to mitigate earthquake, landslide and/or wildfire risks on development sites.

C. The Natural Hazard – Protection (NH-P) Subdistrict. The NH-P Subdistrict generally applies to the 100-year floodplain and areas with high cumulative earthquake, landslide, wildfire and/or flooding risks (1) that are more difficult to or cannot be effectively mitigated on-site, and/or (2) where the location and density of development may be limited. Where development is permitted, it shall occur consistent with the recommendations of geological, geotechnical and/or wildfire impact studies. The Flood Area (F-P) Zone includes additional standards to avoid and/or mitigate flood hazards.

D. Determination of Site-Specific Natural Hazards and Mitigation Standards.
   1. Determination. The potential presence and severity of natural hazard types (earthquake liquefaction, earthquake shaking, slide hazards and

wildfire hazards) on specific properties is determined by referencing the McMinnville Natural Hazard Inventory GIS database.

A. The McMinnville Natural Hazard Inventory GIS database will be updated based on the best data available, provided either by the state or individual property owner analysis per the provisions of this chapter of the McMinnville Municipal Code.

B. All new data will be reviewed by the Planning Director prior to updating the McMinnville Natural Hazard Inventory GIS database.

C. Impacted property owners will be notified in writing if any updates to the McMinnville Natural Hazard Inventory GIS database impacts their property. If the change has been initiated by the property owner, the database and resulting overlay will be changed administratively. If the change to the database is initiated by the City due to new state or federal data, it will be treated as a legislative zoning map amendment following all of the appropriate noticing and decision-making processes outlined in Chapter 17.72 of the McMinnville Municipal Code,

2. Mitigation. Specific mitigation standards in this chapter depend on the presence (or absence) of specific natural hazards on a development site., and the appropriate mitigation standard associated with that natural hazard. For example:

A. If a dwelling is proposed within a moderate-to-severe wildfire hazard area, the fuel reduction area standards required to mitigate wildfire hazards will apply; or

B. If a dwelling is proposed within the NH-M subdistrict and the underlying hazards identified for that property are soil conditions, a geological site assessment will be required to ascertain construction, erosion control, and related design requirements for that dwelling.

E. Overlap with Natural Resource Subdistricts. Natural Hazard Subdistricts may overlap with Natural Resource Subdistricts, especially near riparian corridors and tree groves. Generally, the review authority shall seek to harmonize subdistrict standards that appear to conflict. However, where standards cannot be read together to achieve a consistent outcome:

1. The more restrictive standards apply, except that,
2. NH-P and NH-M Subdistrict fuel reduction area standards shall prevail in cases of unavoidable conflict with the significant tree and vegetation standards of this chapter.

F. Significant and Landmark Trees. Significant and landmark trees stabilize landslide prone areas and reduce erosion.

1. Significant and landmark trees as defined in Chapter 17.06.045, "Definitions, Trees", shall not be removed from land within Natural Hazard Subdistricts, except as provided in this chapter and Chapter 17.48 Trees.

2. Removal of significant and landmark trees within NH-M and NH-P Subdistricts may be permitted when authorized as part of a land use application subject to the provisions of this chapter, and Chapter 17.48, "Trees".

17.49.040 Permitted and Conditional Uses. The underlying zoning district determines permitted and conditional uses, subject to additional development limitations and standards required in the NH-M or NH-P Subdistricts.

A. Conforming Uses. Existing development within the NH-M or NH-P Subdistrict shall be considered conforming with respect to the development standards of the Subdistrict and may be expanded without meeting the substantive or procedural requirements of Chapter 17.63 Nonconforming Uses.

B. Exempt Uses. When performed per the direction of the City (including the Water and Light Department as applicable), and in compliance with the provisions of the City of McMinnville Construction Standards on file in the Engineering Division, or Water and Light Department with regard to 2 and 7 below for water and electricity, the following shall be exempt from the provisions of this chapter:
   1. Farming activities permitted in the underlying zone.
   2. Public emergencies, including emergency repairs to public facilities.
   3. Stream restoration and enhancement programs outside of wildfire hazard areas.
   4. Invasive vegetation removal.
   5. Additions of up to 50% of the habitable floor area of building(s) constructed before the effective date of this ordinance, or date of annexation within the city limits whichever is later, subject to applicable building safety code standards, including applicable seismic and wildfire safety standards.
   6. Accessory structures that are used for storage of goods.
   7. Routine maintenance, repair, or replacement of existing public facilities projects.

17.49.050 Review Procedures. The natural hazard mitigation and protection standards in this chapter usually are applied in conjunction with a development application. Where a use is proposed within, or partially within, the NH-P or NH-M Subdistrict, the following procedures shall apply pursuant to Chapter 17.72 (Applications and Review Process).

A. Permitted Uses. Where a use is permitted outright in the applicable base zone (for example, residential, commercial, industrial or public uses), compliance with the standards of this chapter is determined by the Community Development or Planning Director, based on required natural hazard studies, as part of the site plan review process (if applicable), and prior to issuance of a building or construction permits.

B. Land Divisions. When land divisions are proposed pursuant to Chapter 17.53 Land Division Standards, compliance with the standards of this

chapter is determined by the Planning Director, based on required natural hazard studies.

C. Planned Developments. When planned developments are proposed pursuant to Chapter 17.51 (Planned Development Overlay), compliance with the standards of this chapter is determined by the Planning Commission, based on required natural hazard studies.

D. Density Transfer. The Planning Commission shall review density transfer from land within the NH-P Subdistrict to buildable land, pursuant to Section 17.49.170 Density Transfer.

E. Conditional Uses and Variances.

1. Where a conditional use is proposed, compliance with the standards of this chapter is determined by the Planning Commission, based on required natural hazard studies, prior to issuance of building or construction permits.
2. Where a variance is requested, compliance with the variance criteria in this chapter is determined by the Planning Commission, based in part on required natural hazard studies, prior to issuance of building or construction permits.
3. Public Facilities. Construction of public facilities within natural hazard areas must follow the recommendations of required natural hazard studies.

17.49.060 Natural Hazard Subdistrict Application Requirements.

Development applications for all properties within the NH-M or NH-P Subdistricts shall accurately indicate the site-specific locations of specific types of natural hazard areas based on City GIS maps in relation to the proposed development. City planning staff will assist the applicant by providing GIS maps showing city information sources listed below. Development applications within or partially within natural hazard subdistricts shall include:

A. A site plan showing the proposed development on the site, drawn to a standard scale and including an illustrated scale for use in reductions.

B. Topography showing 2-foot contour intervals and slopes of:

1. 15 to 24.9 percent; and
2. 25 percent and greater.

C. The location of existing and proposed infrastructure necessary to serve the proposed development. Such infrastructure includes streets, driveways, water, sanitary sewer, and storm drainage.

D. The potential hazard impact area showing land uses and tree cover within 200 feet of the subject property.

E. A title block, north arrow, and bar scale.

F. Date(s) of field check(s).

G. A grading plan, if grading is to occur, showing existing and finished contours on the site, at two-foot contour intervals. Grading plans can be accepted with greater contour intervals with the approval of the City Engineer or the Building Official, per their appropriate authorities, if the

size of the site or elevation changes across the site are such that two-foot contours do not clearly demonstrate the intent of the grading plan.

H. Information sources, such as soil survey maps and applicable McMinnville Natural Hazard and Natural Resource inventory maps.

I. Relevant City maps applicable to the site and impact area including the Zoning Map, natural hazard, and natural resource subdistrict maps.

J. Aerial photos, including their date and scale.

K. Depending on the type of natural hazard or natural resource identified on a proposed development site, the applicant shall be responsible for:

1. Showing the precise location of each type of inventoried natural hazard or natural resource present on the development site;
2. Submitting required flooding, seismic, geological and/or wildfire hazard mitigation studies as prescribed in Section 17.49.060; and
3. Demonstrating compliance with recommended mitigation measures pursuant to required hazard studies.

L. The location and size of significant and landmark trees within 25 feet of any proposed disturbance area. If development is proposed within a wildfire area, the location and size of significant and landmark trees must be shown within 50 feet of the outer limits of above-ground construction.

M. Any other submittal requirements identified for development in areas with specific types of natural hazards, as specified in this chapter.

17.49.070 Required Natural Hazard Mitigation Reports. Depending on the natural hazards present on a particular property, the applicant for land development shall be responsible for preparing one or more of the following studies within the NH-M and NH-P Subdistricts.

A. Geological Site Assessment (also known as an Engineering Geologic Report) is an overview of existing geological conditions that includes recommendations for mitigation measures. The Site Assessment shall be completed and stamped by a Certified Engineering Geologist, licensed by the Oregon Board of Geologic Examiners. At a minimum, the Geological Site Assessment shall follow Oregon State Board of Geologic Examiners (OSBGE)'s guideline for preparing Engineering Geologic Reports and include the following elements:

1. Relevant landslide and earthquake hazard information from the McMinnville Natural Hazards Inventory;
2. A field investigation of the site and vicinity including a description of geologic hazards that may be present on the site;
3. An analysis of the geological suitability of the site for proposed development;
4. A description of any unusual or extreme geologic processes at work on the site, such as rapid erosion, landslide hazard, flood hazard, rockfall, subsidence, debris run-out, or other features;
5. A description of any geologic hazards that may affect the proposed land use, including but not limited to slope stability, debris flow, flooding, topography, erosion hazard, shallow groundwater, springs,

expansive soils, subsidence, fault rupture, landslide hazard, rockfall, debris run out, or any other geologic hazard discovered by the investigation;

6. **Identification of any areas of the site that should be avoided for human-occupied structures;**
7. **An analysis of the feasibility of developing the site for the proposed land use(s);**
8. **Identification of any mitigation measures needed to address any anticipated geologic problems; and**
9. **Recommendations regarding the need for follow-up studies, such as a Geotechnical Engineering Report.**

B. Geotechnical (Soils Engineering) Report is prepared and stamped by a Licensed Civil Engineer, licensed in the Specialty of Geotechnical Engineering by the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS). The Geotechnical Report usually makes specific recommendations to avoid or mitigate geological hazards. At a minimum, the Geotechnical Report shall include the following elements:

1. **Data regarding the nature, distribution and strength of existing soils on the site.**
2. **Analysis, conclusions, and recommendations for grading procedures and associated drainage requirements.**
3. **Design standards for corrective measures, including buttress fill, when necessary.**
4. **A professional opinion on the adequacy of the development site for the intended use considering the proposed grading in relation to soils engineering factors, such as slope stability.**
5. **The location of proposed development and public facilities; and**
6. **Relevant information from the McMinnville Natural Hazards Inventory.**

C. Wildfire Hazard Assessment and Mitigation Plan is prepared, in consultation with the McMinnville Fire Department, by a certified arborist or professional forester with experience in wildfire management. This plan must address wildfire mitigation standards in this chapter and may recommend additional fire safety standards. At a minimum, in addition to site plan requirements, the plan shall include:

1. **The location and dimensions of all existing and proposed structures, parking areas and driveways on the property.**
2. **The location, dimension, and grade of fire apparatus access roads and driveways serving all structures on the property. Grading plans can be accepted with greater contour intervals with the approval of the City Engineer or the Building Official, per their appropriate authorities, if the size of the site or elevation changes across the site are such that two-foot contours do not clearly demonstrate the intent of the grading plan.**
3. **The location and dimensions of all structures on adjoining properties located within 30 feet of a shared property line.**
4. **The location of all existing and proposed fire hydrants.**

5. **Site contours showing two foot intervals detailing elevation and slope.**
6. **A tree and vegetation management plan showing:**
   a. **The location, species and size of existing significant trees and landmark trees, including those to be removed and those to be retained, and whether they qualify as "fire-resistant" or "highly flammable" as defined in this chapter.**
   b. **The location, species and size of shrubs, including those to be removed and those to be retained, and whether they qualify as "fire-resistant" or "highly flammable" as defined in this chapter.**
   c. **Areas where trees will be removed to reduce overlapping tree canopies including a description of the tree species and diameter at breast height (DBH).**
   d. **New trees, shrubs and bushes to be planted including the species, location and size at maturity, and whether they qualify as "fire-resistant" or "highly flammable" as defined in this chapter.**
   e. **The location, species and size of all invasive plants (including trees) to be removed and replaced with native plants.**
7. **The location of and information addressing required fuel reduction area standards as described in Section 17.49.130.**
8. **A schedule and timetable for vegetation removal and thinning to meet fuel reduction area standards.**

D. An Electric Wildfire Mitigation Plan is prepared by the City of McMinnville's Water and Light Department for the electric system as required by state law, ORS 757.966. The Electric Wildfire Mitigation Plan describes the wildfire risk assessment process, mitigation strategies, and response protocols used to minimize the probability of wildfire ignition from the electric system.

17.49.080 Decision Options and Conditions. The Approval Authority may approve, approve with conditions, or deny an application based on the provisions of this chapter. The Approval Authority may require conditions necessary to comply with the intent and provisions of this chapter.

A. Approval Criteria.

1. **In the NH-M subdistrict, new development, redevelopment, or intensification of land use activities shall be sited and designed to minimize site instability and flooding/fire risk on or adjacent to the subject site, consistent with the recommendations of a Geologic Engineering Report and other technical hazard reports/assessments required by this section.**
2. **In the NH-P subdistrict, new development, redevelopment, or intensification of land use activities shall be avoided, and where this is infeasible, mitigation shall be required to lessen or minimize risks. Specifically, the development, as designed and mitigated through the recommendations of a Geologic Engineering Report or other technical hazard reports/assessments, will neither be subject to nor increase known site instability and flooding/fire risk on or adjacent to**

the subject site, due to project design, location on the site, or other reasons.

B. Conditions. The required reports shall include design standards and recommendations necessary for the geologist or geotechnical engineer to provide reasonable assurance that the standards of this section can be met with appropriate mitigation measures. These measures, along with staff recommendations, shall be incorporated as conditions into the final decision approving the proposed development.

C. Assurances and Penalties. Assurances and penalties for failure to comply with mitigation, engineering, erosion control plans required under this section shall be as stated in Chapter 17.03 General Provisions.

17.49.090 Land Divisions. No land division or property line adjustment shall be approved that would result in an unbuildable lot or parcel (*i.e.*, a lot or parcel where a permitted or conditional use could not be allowed because it would be unable meet the standards of this chapter).

17.49.095 Verification of Natural Hazards Boundaries. A property owner may want to verify the Natural Hazards boundaries to determine the true location of a hazard area and its functional values on a site. This may be through a site-specific survey or a simple site visit in those cases where existing information demonstrates that the Natural Hazard significance rating does not apply to a site-specific area. Applications for development on a site located in a Natural Hazard area may request a determination that the subject site is not subject to the standards of Chapter 17.49. Verifications shall be processed as either a Type I or Type II process as outlined below.

A. Type I Verification.

1. Applicants for a determination under this section shall submit a site plan meeting the requirements of Chapter 17.72, as applicable.
2. An applicant may request a Type I Verification determination by the community development director. Such requests may be approved provided that there is evidence substantiating that all the requirements of this chapter relative to the proposed use are satisfied and demonstrates that the property also satisfies the following criteria, as applicable:
   a. No natural features have been disturbed.
   b. No natural features have been changed.
   c. The property does not contain a natural hazard area as identified by the city's local natural hazards area maps.
   d. Evidence of prior land use approvals that conform to the natural hazards overlay districts, or which conformed to the natural hazard area overlay district that was in effect prior to the Natural Hazards code adoption date _____.

B. Type II Verification. Verifications of the Natural Hazards areas which cannot be determined pursuant to the standards of Chapter 17.49.95(A)(1) may be processed under the Type II permit procedure.

1. **Applicants for a determination under this section shall submit a site plan as applicable.**
2. **Such requests may be approved provided that there is evidence that demonstrates in a report prepared by one or more qualified professionals with experience and credentials in natural resource areas, including wildlife biology, ecology, hydrology and forestry, that a resource function(s) and/or land feature(s) does not exist on a site-specific area.**
3. **Verification to remove a recently developed area from the Natural Hazards shall show that all of the following have been met:**
   a. **All approved development in the Natural Hazards area has been completed**
   b. **All mitigation required for the approved development has been successful.**
   c. **The previously identified Natural Hazards area on the developed site no longer exist or have been subject to a significant detrimental impact.**

Natural Hazards – Mitigation (NH-M) Subdistrict

17.49.100 Natural Hazards – Mitigation (NH-M) Subdistrict. The NH-M is intended to mitigate natural hazard impacts based on objective development standards for each applicable hazard type (earthquakes, steep slopes, landslides and wildfires) and the recommendations of required site-specific hazard studies.

17.49.110 Earthquake Mitigation Standards. Buildings and on-site construction projects must meet the seismic standards of the applicable Oregon Structural Specialty Code and Residential Specialty Code seismic requirements per Section 17.49.30.A.

17.49.120 Steep Slope and Landside Mitigation Standards. The following plans and development standards apply to steeply sloped land (15% or greater) within mapped landslide hazard areas on any proposed development site, as determined by the McMinnville Natural Hazards Inventory.

A. Required Plans.

1. **If slopes of 15% or greater exist on the development site, the applicant shall submit an Erosion Control Plan per Section 17.49.30.A.**
2. **If moderate to high landslide hazard areas exist on the development site, the applicant shall submit a Geological Site Assessment per Section 17.49.60.A.**
3. **The City may contract with an independent geologist or geotechnical engineer to review the Geological Site Assessment at the developer's expense.**

B. Development Standards. The applicant's site and building plans shall be consistent with the recommendations of the required Geological Site Assessment, including any changes and conditions required by the review authority after considering the recommendations of the independent peer reviewer.

1. **If the Geological Site Assessment recommends a Geotechnical Engineering Study, building and construction plans shall be consistent with the recommendations of this study.**
2. **Generally, development should avoid lots with an average slope of 25% and greater, except where consistent with the recommendations of the Geological Site Assessment.**
3. **Removal of landmark trees shall be prohibited – except where the review authority determines that there is no reasonable alternative available to achieve project objectives.**
4. **Removal of significant trees shall be the minimum necessary to meet project objectives or to comply with an approved wildfire mitigation plan.**
5. **Drainage shall not be altered such that potential for damage or risk to the proposed project or the natural hazard area is increased. Development shall provide adequate drainage and erosion control**

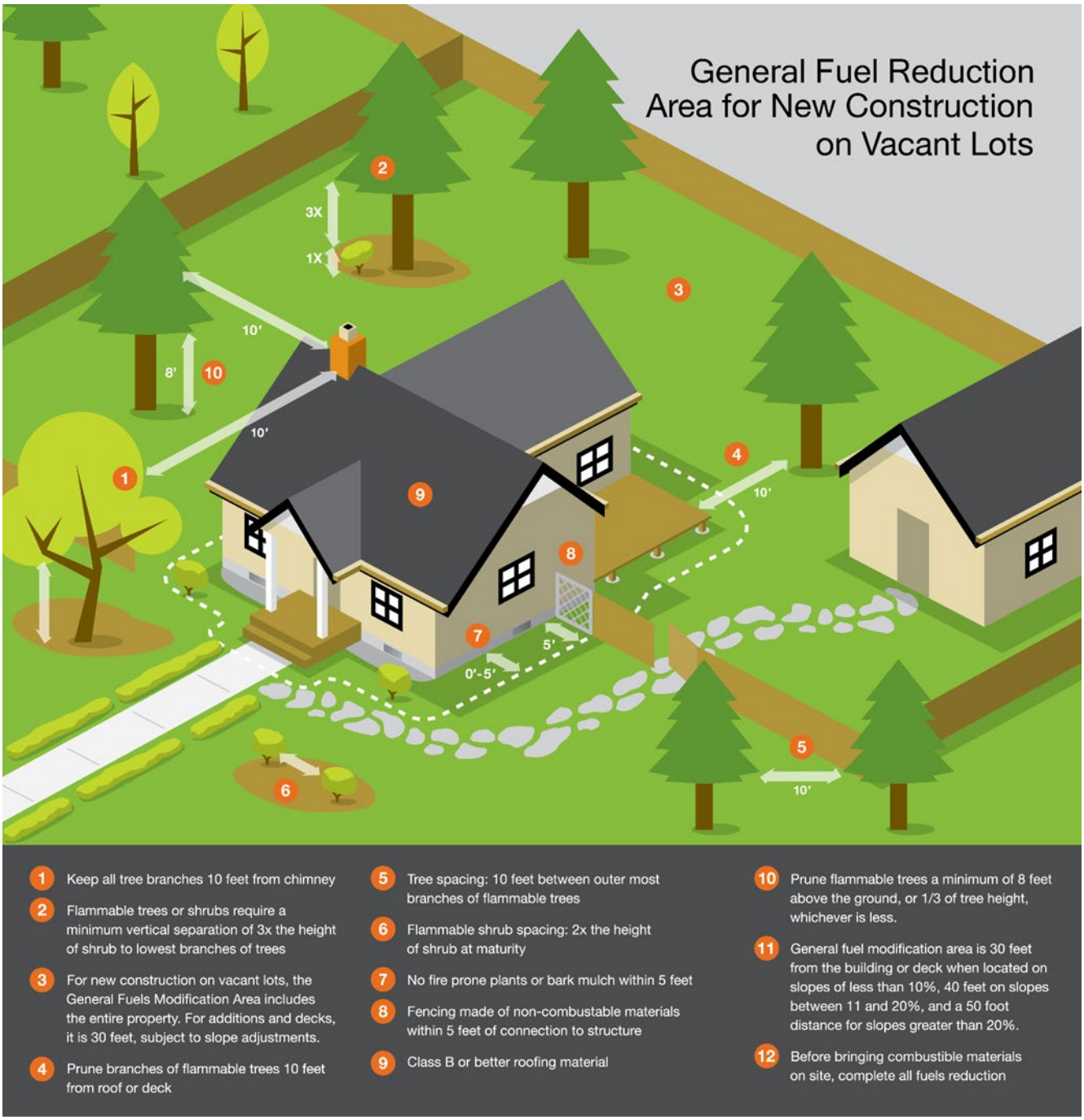
facilities that convey site drainage in a non-erosive manner in order to minimize hazards resulting from runoff, erosion, and other hydrologic impacts to streams, and riparian areas. Such drainage shall not impact adjacent property owners or public areas and shall comply with all building code requirements.

17.49.130 Wildfire Assessment and Mitigation Standards. This section supplements base zone development regulations to mitigate potential impacts of wildfire on land with moderate to severe wildlife areas shown on the McMinnville Natural Hazards Inventory Map.

A. Purpose. These standards balance the need to protect riparian corridors, and landmark and significant trees, while reducing fuel loads and facilitating firefighter access to structures in the event of a wildfire.
   1. The following studies and development standards apply to moderate, high and severe wildfire hazard areas on any proposed development site, as determined by the McMinnville Natural Hazards Inventory.
   2. In limited situations, removal or major pruning of significant trees may be required to meet the standards of this section. Removal of landmark trees shall only be considered as a last resort.

B. Required Wildfire Mitigation Plan. If moderate to severe wildfire hazards exist on or adjacent to a development site, or when a development site abuts a significant tree grove, the applicant shall prepare a Wildfire Mitigation Plan as prescribed by Section 17.49.070.C. The plan shall apply for the following land use applications:
   1. When a new habitable building, or an addition to an existing habitable building is proposed.
   2. Applications for Planned Developments and/or Land Divisions.

C. Fuel Reduction Area. To reduce fire spread both from and to structures on the property, and to adjoining properties, the establishment and maintenance of a fuel reduction area shall be required.
   1. The general fuel reduction area shall be measured thirty feet from the exterior walls of habitable structures on development sites with slopes of 10% or less.
   2. In steeply sloped areas, an additional ten feet of fuel reduction area shall be added for each 10% increase in slope. Thus, a 40-foot fuel reduction area would be required for a site with an average slope of 11-20%, and a 50-foot fuel reduction area would be required for a lot with a site with an average slope of 21-30%.



D. Vegetation and combustible materials within the fuel reduction area shall meet the following standards:

1. All standing dead and dying vegetation shall be removed from the property, except when considered ecologically beneficial (*e.g.*, a snag located in a riparian corridor).

2. Newly planted vegetation within 30 feet of any building or deck shall not include highly flammable species. The setback shall be increased by ten feet for each ten percent increase in the average slope of the

property (measured from the proposed building or buildings) over ten percent.

3. Within five feet of a new building, addition, or deck, existing highly flammable vegetation shall be removed. However,
   a. Land divisions and planned developments shall be designed to save landmark trees and minimize impacts on significant trees; and
   b. The placement and design of new buildings on an existing lot shall avoid landmark trees if possible and minimize impacts on significant trees.
4. Within five feet of a new building, addition, or deck, combustible man-made and natural materials are prohibited, including but not limited to bark mulch, stored wood, and accumulation of dry leaves and needles. Exception: Combustible materials may be permitted within five feet of a structure by the Planning Director in consultation with the Fire Marshall, if the portion of the structure adjoining the combustible material is constructed with ignition resistant building materials sufficient to reduce the spread of fire.
5. Tree crowns or limbs shall not extend into the vertical plane of a chimney outlet.
6. Highly flammable significant and landmark trees shall be maintained to provide at least a 10-foot clearance from new structures (and any subsequent additions thereto) measured as follows:
   a. Horizontally from a chimney outlet;
   b. From above the roof of a new building, or addition; and
   c. From the furthest extension of a new building, or addition or deck.
   d. If pruning a tree to meet the above requirements would compromise the health and survival of an existing tree(s), the standards a-c above may be modified by the Community Development or Planning Director in consultation with the Fire Marshall, but at a minimum, the trees shall be pruned to maintain at least eight feet of ground clearance.
7. Canopy spacing of the outermost limbs of highly flammable trees shall be separated by at least 10 feet at mature size within the fuel reduction area.
   a. Groups of trees that form a continuous canopy may be considered as one tree canopy.
   b. Canopy spacing requirements do not apply landmark trees, as defined in Chapter 17.58 Trees, or to fire-resistant trees.
8. Fire-resistant trees (i.e., trees that are not highly flammable) shall be maintained to provide clearance from structures as follows:
   a. 10 feet horizontal clearance from a chimney outlet.
   b. At no time shall tree crowns or limbs extend into the vertical plane of a chimney outlet.
   c. Tree limbs shall be pruned to ensure they do not touch any part of a structure including but not limited to roofs, eaves, and decks.

9. Existing highly flammable trees shall be pruned to provide a ground clearance of a minimum eight feet above the ground, or one-third of the tree height, whichever is less.
10. Existing highly flammable shrubs shall be maintained to provide a clearance from new structures and other flammable vegetation as follows:
    a. Five feet clearance from the furthest extension of a new building, addition, or deck.
    b. Separation from other highly flammable shrubs within the fuel reduction area shall be a minimum of two times the shrub's height at maturity.
11. Newly planted highly flammable shrubs shall be:
    a. A minimum of 30 feet from the furthest extension of any building addition or deck.
    b. Separated from other listed flammable shrubs by a minimum of two times the shrub's height at maturity.
    c. Located outside of the drip line of a highly flammable tree.
12. Where either the tree or vegetation is highly flammable: the vertical clearance between the top of understory vegetation (within the drip line of a tree) and the lowest tree limbs, shall be at least three times the height of vegetation.
13. Existing vegetation may be allowed to be retained consistent with an approved Wildfire Mitigation Plan, or upon written approval of the Planning Director in consultation with the Fire Marshall:
    a. To maintain slope stability;
    b. To preserve or enhance riparian functions and values;
    c. To protect or ensure the health of landmark or significant trees; or
    d. For aesthetic purposes.

E. Fuel reduction in areas steep slope / slide hazard areas, or significant riparian corridors, shall be included in the erosion control measures outlined in Section 17.49.060.

F. The Fuel Reduction Area may be reduced or waived when approved by the Planning Director in consultation with the Fire Marshall, based on a finding that fire risk has been reasonably reduced such as in cases where ignition resistant materials and construction methods, or vegetation type and separation, function to enhance the structure's protection from exterior wildfire exposure.

17.49.140 Reserved for Future Use

Natural Hazard – Protection (NH-P) Subdistrict

17.49.150 Natural Hazards – Protection (NH-P) Protection Subdistrict

The NH-P is intended to avoid, and where avoidance is not feasible, to mitigate natural hazard impacts to life and property from each applicable natural hazard type (earthquakes, steep slopes, landslides and wildfires).

- **A. Use Limitations and Development Standards. The NH-P Subdistrict includes use limitations and development standards to reduce composite risks to life and property associated with earthquakes, steep slopes, landslides, wildfires and flooding within its boundaries.**
- **B. Mitigation Based on Required Studies. To mitigate for unavoidable impacts, proposed development must follow the recommendations of required site-specific hazard studies.**

17.49.160 Use Limitations. The underlying zoning district determines permitted and conditional uses within the NH-P Subdistrict, subject to additional development limitations and standards required by the NH-P Subdistrict. Residential density transfer may be permitted as prescribed in Section 17.49.170. The following use limitations apply to land within the NH-P Subdistrict.

- **A. Creation of New Lots. Creation of new lots on land within the NH-P Subdistrict shall be prohibited, except when based on site-specific natural hazard impact studies and approved through the Chapter 17.48 Planned Development Overlay, or when a new lot or tract will be used solely for conservation of the natural hazard area and the owner agrees to record a deed restriction curtailing development on the conservation lot or tract.**
- **B. Residential Zones. In residential zones, one dwelling unit shall be permitted for each lot-of-record, provided that:**
  1. **There is inadequate space to place a residence with a footprint of 2,000 square feet or less on the lot outside of the NH-P Subdistrict.**
  2. **The recommendations of required natural hazard impact studies are followed.**
  3. **Landmark trees are protected except where there is no reasonable alternative to allow a home with a 2,000 square foot footprint (or less) on a lot-of-record.**
  4. **Impacts on significant trees shall be minimized, recognizing that tree removal may be required to meet Section 17.49.130 Wildfire Assessment and Mitigation requirements and fuel reduction requirements.**
- **C. Large-Format Commercial Development. Large format commercial development as defined in Chapter 17.56 shall not be permitted within the NH-P Subdistrict.**
- **D. Commercial and Industrial Zones. In commercial and industrial zones, existing habitable structures and surface parking areas may be expanded by up to 50% within the NH-P Subdistrict, provided that:**

1. There is inadequate space to expand the structure by 50% outside of the NH-P Subdistrict.
2. The proposed expansion is located outside mapped high risk landslide and wildfire areas and is designed to minimize the building footprint and loss of significant and landmark trees on land within the NH-P Subdistricts.
3. Outdoor storage areas are prohibited within the NH-P Subdistrict.
4. The recommendations of required natural hazard impact studies are followed.

E. Flood Area Zone (F-P Zone). Public uses are permitted within the F-P Zone, provided that:
1. Impacts on significant and landmark trees are minimized.
2. Scenic views are considered, enhanced and maintained.
3. The recommendations of required natural hazard studies are followed.

17.49.170 Residential Density Transfer. A transfer of development density from undeveloped buildable land within the Natural Hazard Protection zone to other property within the city limits is encouraged. Density transfer may occur through the planned development process, as indicated below. The transferring property does not need to be owned by the property owner of the receiving property, but both property owners need to sign the density transfer application to memorialize the transfer.

A. Development Density to Transfer from National Hazard Protection Zone (NH-P). The land area from which density can be transferred excludes developed and unbuildable areas, such as riparian corridors, slopes 15% or greater, and easements. 100% of the development density of identified qualifying land within the NH-P zone may be transferred to any other residential zone.

B. Development Density in Receiving Area. Up to a maximum 20% reduction in average minimum lot size or lot area per unit requirements, is allowed in order to accommodate the density transfer. Developments utilizing a transfer of density will need to apply for a Planned Development pursuant to Chapter 17.51. The receiving area needs to be one parcel prior to subdivision.

C. If Density Transfer is Not Feasible. In situations where density transfer is not feasible, a maximum of one dwelling unit per 2.5 acres may be allowed on land zoned for residential use within the NH-P Subdistrict, consistent with the recommendations of a geotechnical engineering study and any conditions required by the review authority.

D. Recording of Density Transfer. In all cases where a residential density transfer is used, covenants or other legally binding agreements that run with the land shall preclude the further development of the land from which the density is transferred. The covenants or other legally binding agreements shall be recorded before the transferred density may be used.

17.49.180 Earthquake Mitigation Standards. Buildings and on-site construction projects must meet the seismic standards of the applicable Oregon Structural Specialty Code and Residential Specialty Code seismic requirements per Section 17.49.30.A.

17.49.190 Steep Slope and Landside Mitigation Standards. The following plans and development standards apply to when development is authorized pursuant to Section 17.49.160 on steeply sloped land (15% or greater) and to mapped landslide hazard areas on any proposed development site, as determined by the McMinnville Natural Hazards Inventory.

A. Required Plans.
   1. If slopes of 15% or greater exist on the development site, the applicant shall submit an Erosion Control Plan per Section 17.49.30.A.
   2. If moderate to high landslide hazard areas existing on the development site, the applicant shall submit a Geological Site Assessment per Section 17.49.60.A.
   3. The City may contract with an independent geologist or geotechnical engineer to review the Geological Site Assessment.

B. Development Standards. Where development is authorized pursuant to Section 17.49.160 (Use Limitations), the applicant's site and building plans shall be consistent with the recommendations of the required Geological Site Assessment, including any changes and conditions required by the review authority after considering the recommendations of the independent peer reviewer.
   1. If the Geological Site Assessment recommends a Geotechnical Engineering Study, building and construction plans shall be consistent with the recommendations of this study.
   2. Generally, development should avoid slopes of 25% and greater, except where consistent with the recommendations of the Geological Site Assessment.
   3. Removal of landmark trees shall be prohibited – except where the review authority determines that there is no reasonable alternative available to achieve project objectives.
   4. Removal of significant trees shall be the minimum necessary to meet project objectives or to comply with an approved wildfire mitigation plan.
   5. Drainage shall not be altered such that potential for damage or risk to the proposed project or the natural hazard area is increased. Development shall provide adequate drainage and erosion control facilities that convey site drainage in a non-erosive manner in order to minimize hazards resulting from runoff, erosion, and other hydrologic impacts to streams, and riparian areas. Such drainage shall not impact adjacent property owners or public areas and shall comply with all building code requirements.

17.49.200 Wildfire Assessment and Mitigation Standards. Where development is permitted pursuant to Section 17.49.160 (Use Limitations), proposed development within mapped moderate to severe wildfire areas within the NH-P Subdistrict shall be subject to the Wildfire Assessment and Mitigation Stan

ATTACHMENT 2

PROPOSED AMENDMENTS TO THE MCMINNVILLE COMPREHENSIVE PLAN, VOLUME II

(This is a new proposed Chapter)

CHAPTER XI
NATURAL FEATURES

GOAL XI 1: PROTECT LIFE AND PROPERTY FROM INVENTORIED NATURAL HAZARDS, INCLUDING FLOODING, GEOLOGICAL, AND WILDFIRE HAZARDS.

NATURAL HAZARDS

Multi Hazards

Policies:

197.00 ***The City of McMinnville shall adopt and maintain a Natural Hazards Inventory as part of the McMinnville Comprehensive Plan (Volume I). The inventory shall include maps and text that identify the location, type and risk level for three types of natural hazards: geological hazards (including steep slopes, earthquakes and landslides), flood hazards (land within the 100-year floodplain), and wildfire hazards within the UGB).***

197.10 ***The City of McMinnville shall apply public works construction standards, seismic building codes, the Oregon Public Utility Commission Safety Rules, and fire and life safety codes wherever natural hazards are identified in the Natural Hazards Inventory – including limited, moderate, and high combined risk subareas described the Natural Hazards Inventory.***

197.20 ***The City of McMinnville shall establish a Natural Features (NF) overlay comprehensive plan designation to manage the cumulative effects of inventoried natural hazards in "moderate and high combined risk subareas" as described in Tables VII.1 and VII.2 of the Natural Hazards Inventory.***

197.30 ***The NH overlay plan designation shall be implemented by two subdistricts based on cumulative ranking criteria found in Tables VII.1 and VII.2 of the Natural Hazards Inventory:***

1. ***The Natural Hazards Mitigation Subdistrict (NH-M). The NH-M is intended to mitigate hazard impacts based on objective development standards for each applicable hazard type and the recommendations of required site-specific hazard studies.***

2. *The Natural Hazards Protection Subdistrict (NH-P). The NH-P Subdistrict is intended to prohibit most types of development and may allow for residential density transfer. Where development is allowed it shall be subject to objective development standards for each applicable hazard type and the recommendations of required site-specific hazard studies.*

197.40 *The NH-M and NH-P Subdistricts shall include objective development standards for each type of natural hazard identified in the Natural Hazards Inventory, including landslides, earthquakes (liquefaction and shaking), floodplains, and wildfire hazards. Floodplains shall be protected by the underlying F-P Flood Hazard zone and the NH-P Subdistrict.*

1. *Maps showing the location and severity of each type of hazard in each subdistrict are available for public review and impacts on individual properties can be determined by city staff via the City's GIS database.In cases where hazard-specific development standards overlap, the more restrictive standard shall apply.*

2.

197.60 *Based on objective development standards and required hazard studies, the City of McMinnville may impose conditions of land use approval to protect life and property and mitigate natural hazard impacts in natural hazard subareas. Such conditions may include but are not limited to, conservation easements or dedication of hazard areas to the City.*

197.60 *Land division applications shall not create a lot that lacks sufficient buildable area to meet the minimum lot size and development standards applicable in the underlying zoning district.*

197.70 *New residential, commercial, and industrial construction shall be limited within the NH-P Subdistrict with the following exceptions:*

1. *Public facilities and environmental restoration projects may be permitted under objective development standards.*
2. *Residential density transfer from land within the NH-P Subdistrict to contiguous property under the same ownership that is outside both the floodplain and any applicable Natural Resource or Natural Hazard Subdistrict may be allowed.*
3. *The maximum density allowed in the transfer area shall be the maximum density allowed in the next higher residential zoning district. For example, density transfer from the NH-P land with an underlying R1 zone to land outside the Natural Hazards Overlay (NH-P and NH-M) shall be capped at the density allowed in the R2 zone.*
4. *In situations where density transfer is not feasible, a maximum of one dwelling unit per 2.5 acres may be allowed on land zoned for residential use, consistent with the*

recommendations of a geotechnical engineering study and any conditions required by the review authority.

197.80 *In cases where the application of NH-P provisions would prohibit all reasonable economic use of an existing tract of land under common ownership, the City may grant an exception to allow a use permitted in the underlying zoning district that is not permitted in the NH-P Subdistrict. In making this decision, the applicant and City must:*

1. *Consider first whether the exception provisions of Policy 197.70 would relieve the hardship;*
2. *Consider potential uses that are allowed in the NH-P Subdistrict that could provide reasonable economic value;*
3. *Consider alternative development layouts and land use intensity that minimize impacts from natural hazards on people and property and other values associated with natural hazard areas;*
4. *Limit the intensity of the allowed land use to the minimum necessary to retain reasonable economic value of the subject tract; and*
5. *Meet all applicable development standards that apply to natural hazards in the NH-P zone.*

197.90 *The City of McMinnville shall coordinate with Yamhill County to apply McMinnville Comprehensive Plan Chapter XI Natural Features Policies to unincorporated land within the Urban Growth Boundary, including the application of the NH overlay zone (the NH-M and NH-S subdistricts) and related development standards. In cases of conflict with state law governing farm and forest land, state law will prevail over the NH overlay zone standards. For example, agricultural and forest uses allowed in Agricultural and Forest zones shall continue to be allowed; and the more restrictive fire mitigation standards in the County's Forest zones will prevail over the less restrictive City fire mitigation standards.*

197.100 *The City of McMinnville shall coordinate with the Oregon Department of Geology and Mineral Industries (DOGAMI), the Department of Land Conservation and Development (DLCD), the McMinnville Fire Department, the McMinnville Water and Light Department, and Yamhill County in updates of the Yamhill County Multi-Jurisdictional Natural Hazards Mitigation Plan, the McMinnville Addendum to County NHMP, and the Yamhill County Community Wildfire Protection Plan. Updates to these plans will be considered in future updates to Chapter XI of the McMinnville Comprehensive Plan.*

197.110 *The City of McMinnville shall coordinate with the Greater Yamhill Watershed Council to facilitate watershed restoration and improvement projects in natural hazard areas such as floodplains and slide hazard areas. Shared natural hazard mitigation goals include: (1) removal of invasive vegetation species (that increase fuel for wildfires and clog waterways) and replacement with native species that reduce erosion, are more fire resistant and are less likely to clog waterways; and (2) restoration and enhancement of wetlands that provide flood control.*

197.120 Tree removal and major pruning within the Floodplain Zone, the NH-M and NH- P Subdistricts shall be limited to minimize erosion and landslide potential and to maintain water quality

Geological Hazards

Geological hazards appear on the McMinnville Natural Hazards Inventory and include:

1. *Slopes of 25% or more;*
2. *Moderate, high and severe risk earthquake (liquefaction and shaking) risk areas; and*
3. *Moderate and high-risk landslide hazard areas.*

Policies:

198.10 The NH-P and NH-M Subdistricts shall apply to subareas with geological hazards as shown on the Natural Hazards Inventory. Specific geological hazards found in each subdistrict are determined by referencing the McMinnville Natural Hazards Inventory and may be determined for individual properties by referencing the City's GIS database.

198.20 Residential and commercial construction in areas with moderate or high geological risk hazards – as indicated on the Natural Hazards Inventory – shall meet the seismic and slope stability provisions of the Oregon State Building Codes. The Building Official may require a geotechnical engineering study prior to approval of construction.

198.30 The City of McMinnville shall require erosion control measures prior to grading or construction in subareas with:

1. *Slopes of 15% or greater, and*
2. *Landslide hazards in the NH-M and NH-P Subdistricts.*

198.40 The City of McMinnville shall require geological reconnaissance studies with the submission of land development applications where geological hazards are present within the NH-M and NH-P Subdistricts. The recommendations of the geological reconnaissance study shall become conditions of land use approval unless specifically exempted or modified by the review authority.

198.50 Where recommended in a required geological reconnaissance study – or where determined necessary by the City Engineer or Building Official in moderate risk landslide hazard areas that are not included in the NH-M Subdistrict – a geotechnical engineering study may be required prior to grading, land development or construction.

198.60 The City of McMinnville shall retain the services of a qualified geologist or geological engineer to review geological studies prepared for land use applicants.

1. *The City Engineer shall determine whether a second professional opinion is required.*
2. *The costs of peer review shall be borne by the applicant.*

198.70 *The City shall consider adopting standards for public street and utility construction to moderate or higher geological hazard areas.*

198.80 *Because trees contribute to slope stability and reduce erosion, tree removal shall be limited in the NH-M Subdistricts.*

Flood Hazards

Policies

199.00 *Flood hazards areas are located within the designated 100-year floodplain. The City of McMinnville will continue to prohibit most types of development within the 100-year floodplain consistent with the City's F-P Flood Area Zone. Most significant riparian corridors are also located in the F-P Zone.*

199.10 *Land within the F-P Zone is protected by applicable NH-P Subdistrict standards. Natural geological and wildfire hazards associated with the 100-year floodplain, including but not limited to landslide and wildfire hazard areas, are addressed in NH-P Subdistrict development standards.*

199.20 *The City of McMinnville is committed to continued participation in the National Flood Insurance Program (NFIP) through the enforcement of local floodplain management regulations.*

199.30 *The City of McMinnville will work with the Federal Emergency Management Agency (FEMA) to update Flood Insurance Rate Maps (FIRM). The City will request Oregon Department of Geology and Mineral Industries (DOGAMI) debris flow and lidar data be included in FIRM updates.*

199.40 *The City of McMinnville will develop and maintain GIS maps of critical facilities identified in the McMinnville NHMP for all structures and residential development and commercial buildings within the 100-year and 500-year floodplains.*

199.50 *Because wetlands serve an important flood control function, wetland fill and removal shall not be permitted within the 100-year floodplain unless there is no reasonable alternative for a planned public works project.*

199.60 *The City of McMinnville will coordinate with the Greater Yamhill Watershed Council (or its affiliates) regarding stream and river restoration and enhancements projects to restore native vegetation, improve bank stability and improve water quality.*

199.70 *Because trees and vegetation reduce streambank failure and*

improve water quality, tree removal shall be limited in F-P Zone.

Wildfire Hazards

Policies

200.00 Moderate, high and severe wildfire hazard areas appear on the Natural Hazards Inventory and are generally associated with the West Hills and vegetated floodplains. Where wildfire hazards subareas overlap with geological or floodplain hazards, they may be subject to NH-P or NH-M Subdistrict requirements, consistent with the ranking criteria found in the Natural Hazards Inventory and as shown on Natural Hazards Inventory Map VII-1.

200.10 City staff shall coordinate with the McMinnville Fire Department and RFPD to encourage fire safety planning and education – especially in Wildfire Urban Interface zones and designated Fire Reduction Areas in the West Hills. The City of McMinnville shall continue to coordinate wildfire mitigation action items through the Yamhill County Community Wildfire Protection Plan.

200.15 The City of McMinnville shall coordinate with its Water and Light Department (MW&L) to apply the McMinnville Comprehensive Plan, Chapter XI Natural Features Policies, and City Ordinances with the MW&L Electric Wildfire Mitigation Plan and the Oregon Public Utilities Commission Division 24 (Oregon Administrative Rules) Safety Standards. In cases of conflict with state law, the state law will prevail over the local standard.

200.20 Residential, commercial, and industrial development shall be limited in wildfire risk subareas in the NH-P Subdistrict; However, exceptions may be permitted pursuant to Natural Hazard Policies 197.70 and 197.80.

200.30 Development density in moderate to high wildfire risk areas in the NH-M Subdistrict may be limited where necessary to provide adequate space for fuel breaks in areas that are threatened by two or more natural hazards.

200.40 In the NH-P and NH-M Subdistricts with identified wildfire hazards, applicants for land divisions and new development (excluding home remodels or additions) shall prepare a Fire Prevention and Control Plan in coordination with the McMinnville Fire Department or RFPD. The plan shall be prepared by a certified arborist and shall consider necessary tree and vegetation removal, erosion control, and replacement of lost trees and vegetation with native, fire-resistant trees and vegetation.

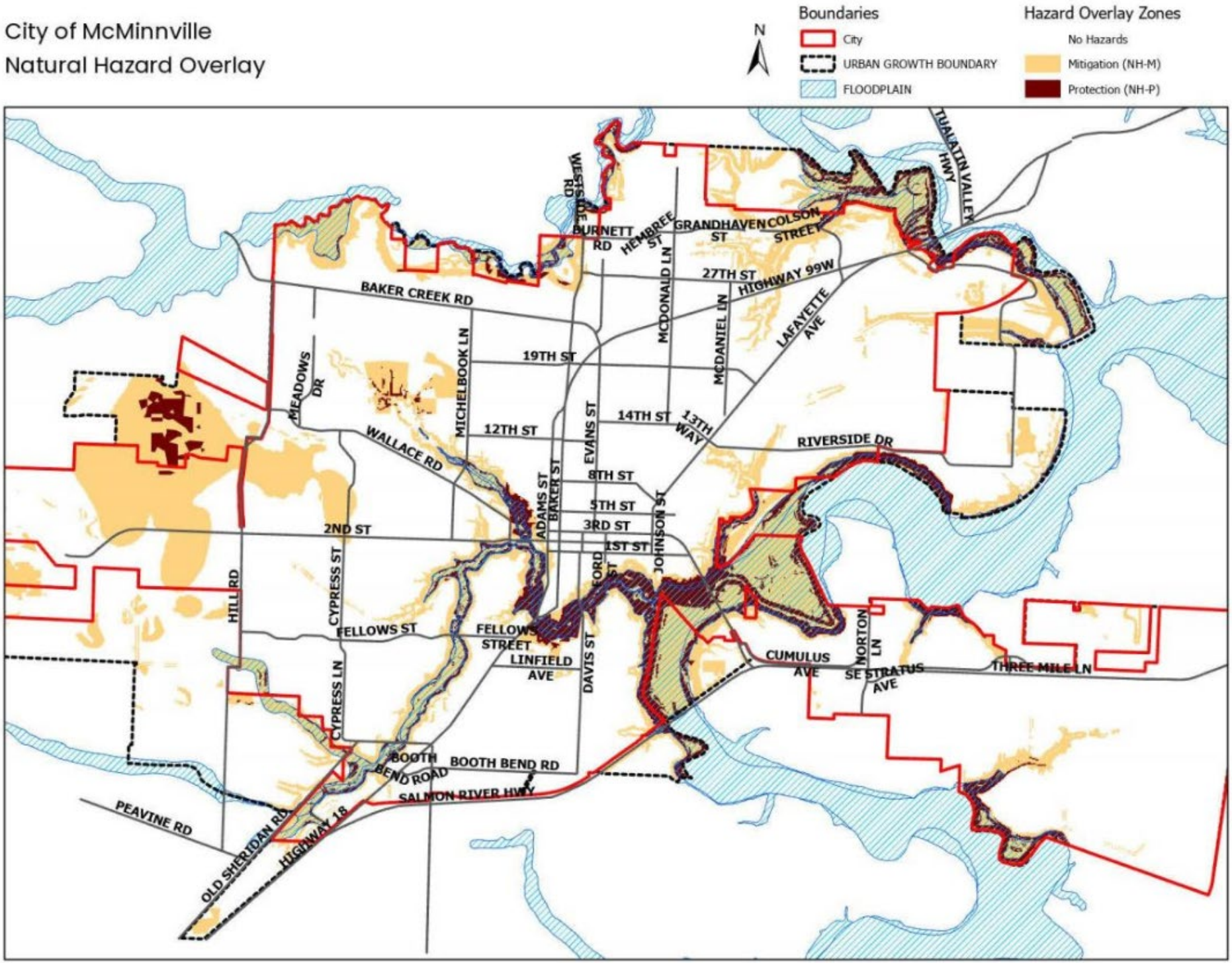
200.50 The maximum density allowed within the NH-P Subdistrict shall be one unit per 2.5 acres or shall be subject to the density transfer provisions of Policy 197.70.

200.60 ***Based on the Fire Prevention and Control Plan, the following wildfire mitigation standards shall be met:***

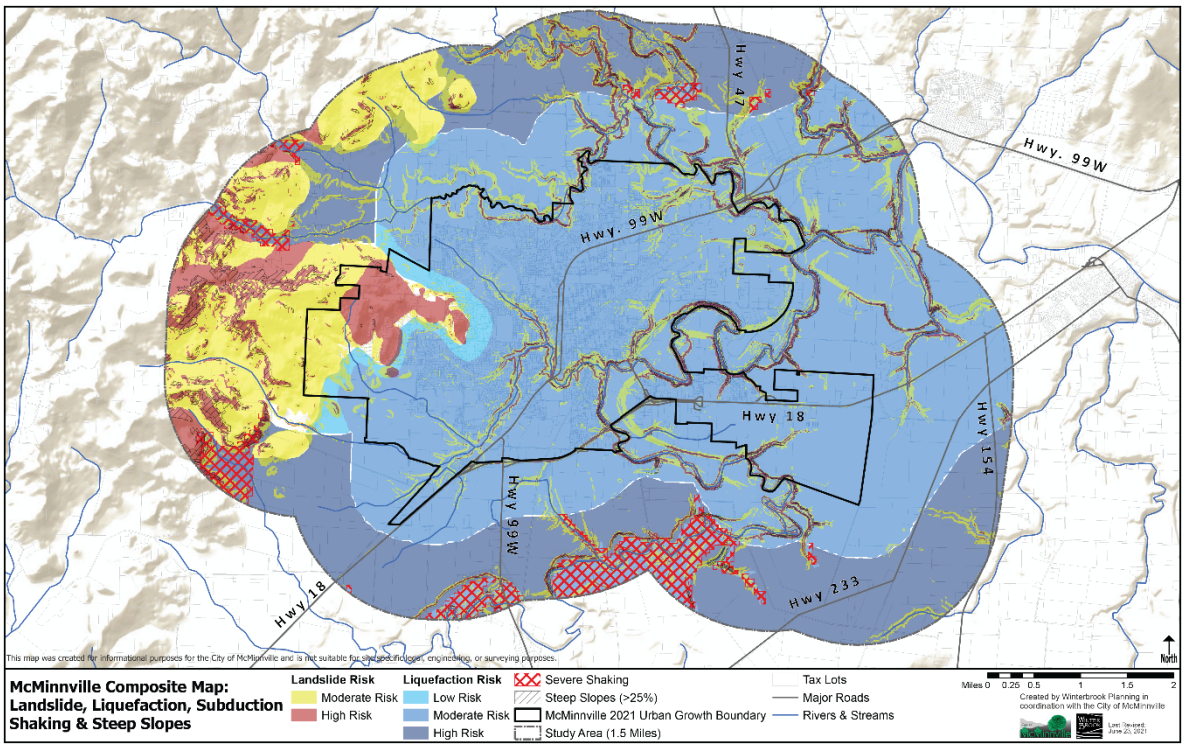
1. ***Installation and maintenance of at least a 40-foot fuel break around each new dwelling or structure.***
2. ***Where vegetation needs to be maintained for slope stability in a fuel break area, require plantings of fire-resistant or slow-burning plants. The City shall make a list of such plants available to the public.***
3. ***Provision of one or more than one ingress/egress route or road widths wide enough to accommodate incoming fire apparatus and evacuating residents simultaneously in an emergency situation.***
4. ***Roofs and siding with fire-resistant materials. Wood shake or shingle roofs are not allowed.***
5. ***Design road placement to function as fire breaks in urban wildland interface developments.***
6. ***Chimneys of wood-burning devices to be equipped with spark arrester caps and/or screens.***
7. ***The electrical distribution and transmission system to be built consistent with the fire mitigation strategies described in the Electric Wildfire Mitigation Plan adopted by MW&L pursuant to ORS 757.966, which includes but is not limited to underground lines where feasible.***
8. ***Sprinkler systems in all dwelling units and occupied buildings.***

ATTACHMENT 3

City of McMinnville
Natural Hazard Overlay



ATTACHMENT 4



Natural Hazards Inventory & Management Program Options and Recommendations

Prepared by:

WINTER BROOK
COMMUNITY RESOURCE PLANNING

Winterbrook Planning | June 24, 2021 | *Draft*

Contents

Appendices

The following appendices support this report.

Appendix 1: Best Natural Hazards Mitigation Programs in Comparator Cities

Appendix 2: Natural Hazard Overlay Methodology

Appendix 3: REVISED Natural Hazard Inventory and Natural Hazard Overly Maps

Figures

Acronyms and Abbreviations

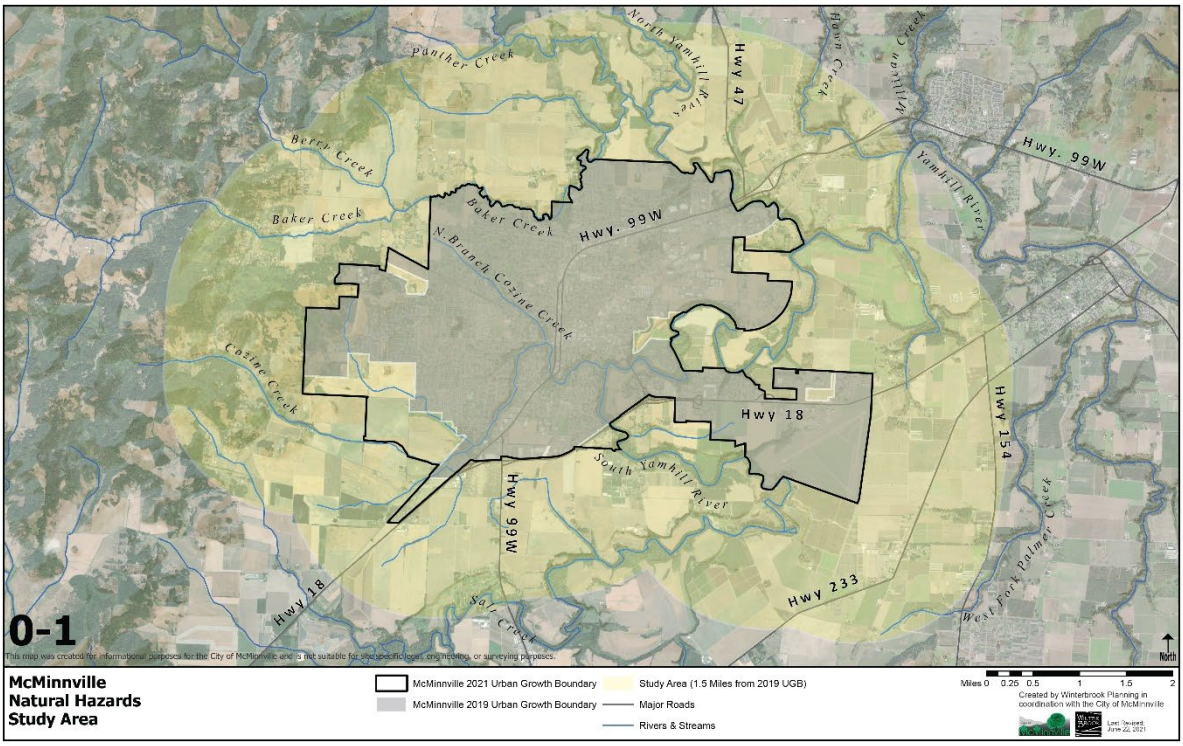
The following acronyms and abbreviations are used in this report.

- **BFE** – Base Flood Elevations
- **Cascadia** or **CSZ —** Cascadia Subduction Zone earthquake
- **CWPP** – *Yamhill County Community Wildfire Protection Plan*
- **DEM** – Digital Elevation Model
- **DOGAMI** – Oregon Department of Geology and Mineral Industries
- **FEMA** – Federal Emergency Management Agency
- **FIRM** – Flood Insurance Rate Map
- **Floodplain** – the 100-year floodplain including the floodway
- **GIS** – Geographic Information System
- **LIDAR** – Light Detection and Ranging
- **McMinnville NHMP** – *McMinnville Addendum to the Yamhill County Natural Hazards Mitigation Plan*
- **NFIP** – National Flood Insurance Program
- **NHO** – Natural Hazards Overlay (Comprehensive Plan Map Overlay)
    - **NH-M Subdistrict** – Natural Hazard Mitigation Subdistrict (Zoning Map Overlay)
    - **NH-P Subdistrict** – Natural Hazard Protection Subdistrict (Zoning Map Overlay)
- **OWRE** – *Oregon Wildfire Risk Explorer*
- **Oregon NHMP –** *Oregon Natural Hazards Mitigation Plan (2020)*
- **RFPD** – Rural Fire Protection Districts
- **SFHA** – Special Flood Hazard Area
- **Study Area** – the Natural Hazard Study Area (including land 1.5 miles from the 2019 UGB)
- **UGB** – McMinnville Urban Growth Boundary
- **UGMA** – Urban Growth Management Agreement
- **WUI Zone** – Wildland Urban Interface Zone

Introduction and Project Summary

In 2020, Winterbrook prepared the initial draft of the McMinnville Natural Hazards Inventory, Management Program Options and Recommendations study. The study area included (a) the McMinnville Urban Growth Boundary (UGB) as it existed in June 2020[1] and (b) the UGB expansion study area within 1.5 miles of the existing UGB[2]. The City considered inventory information provided in the initial draft report during the UGB amendment process. In December 2020, the City Council amended its UGB to include approximately 1,280 acres of land (of which 921 acres were considered "buildable"). The County subsequently adopted, and the Land Conservation and Development acknowledged, the UGB amendment. Figure 0-1 shows the 2021 UGB expansion area in relation to the previously existing 2019 and the Natural Hazards Study Area.

Figure 0-1 McMinnville 2019 UGB, 2021 UGB, and Natural Hazards Study Area



In March 2021, the City contracted with Winterbrook Planning to revise the 2020 Natural Hazards Study to:

a) Focus on the expanded 2021 UGB
b) Include social vulnerabilities described in the *Oregon Natural Hazards Mitigation Plan,* (Oregon NHMP) in the Natural Hazards Composite Ranking System,
c) Amend the proposed Natural Hazard Mitigation and Protection maps accordingly, and
d) Prepare draft amendments to the McMinnville Zoning Ordinance to include natural hazard mitigation and protection subdistrict maps and text.

[1] Referenced throughout this document as the 2019 UGB. (1 and 2 ? where are these referenced?_)
[2] Referenced throughout this document as the 2021 UGB.

This report represents the revised study including an inventory of natural hazards based on available mapping sources, considers alternative management options, and suggests policy and mapping amendments to the McMinnville Comprehensive Plan to systematically address McMinnville's mappable natural hazards within the 2021 UGB.[3]

The revised Natural Hazards Inventory includes a series of GIS (geographic information system) overlay maps showing moderate, high and severe hazard areas within the 2021 UGB and study area. The inventory also includes a description of the following natural hazards and how they may adversely affect life and property:

- **Geological Hazards** (areas subject to landslide, steep slope and earthquake liquefaction and shaking impacts)
- **Flood Hazards** (areas within the 100-year floodplain including the floodway)
- **Wildfire Hazards** (areas that are particularly susceptible to wildfires due to topography, fuel and settlement patterns)
- **Composite Hazards** (areas with one or more overlapping natural hazard categories)

McMinnville Comprehensive Plan

This revised study helps to implement recent amendments to the *McMinnville Comprehensive Plan* (Comprehensive Plan) to incorporate Great Neighborhood Principles and implementing policies.

> **Policy 187.40** **The Great Neighborhood Principles shall guide long range planning efforts including, but not limited to, master plans, small area plans, and annexation requests. The Great Neighborhood Principles shall also guide applicable current land use and development applications.**
>
> **Policy 187.50.1** directly addresses natural features (including Natural Hazard Management):
>
> 1. **Natural Feature Preservation**. Great Neighborhoods are sensitive to the natural conditions and features of the land. a. Neighborhoods shall be designed to preserve significant natural features including, but not limited to, watercourses, sensitive lands, steep slopes, wetlands, wooded areas, and landmark trees.

The existing comprehensive plan addresses flood hazards only – consistent with Federal Emergency Management Agency (FEMA) regulations related to the National Flood Insurance Program (NFIP). The current comprehensive plan does not have a separate natural hazards element. The McMinnville Zoning Ordinance has a separate F-P Flood Hazard Zone that applies to land within the 100-year floodplain. However, the City currently lacks development standards for geological and wildfire hazards. The McMinnville Buildable Lands Inventory (ECONorthwest, 2003) identifies slopes of 25% or greater and floodplains as unbuildable consistent with applicable state law.

[3] Winterbrook addresses relationships among natural hazards and natural resources (such as riparian and upland wildlife habitat and scenic views and viewpoints) in a separate white paper.

McMinnville Natural Hazards Mitigation Plan

Recognizing that McMinnville is subject to several other natural hazards, the City has participated in the preparation of the *McMinnville Addendum to the Yamhill County Natural Hazards Mitigation Plan* (McMinnville NHMP).[4]

The mission of the McMinnville NHMP is:

> ***To promote public policy and mitigation activities which will enhance the safety to life and property from natural hazards.***

The McMinnville NHMP includes the following natural hazard goals related to the management of natural hazards:

> ***GOAL 4: PREVENTIVE:*** *Develop and implement activities to protect human life, commerce, and property from natural hazards. Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.*
>
> ***GOAL 6: IMPLEMENTATION:*** *Implement strategies to mitigate the effects of natural hazards and increase the quality of life and resilience of economies in Yamhill County.*
>
> ***GOAL 7: DEVELOPMENT:*** *Communities appropriately apply development standards that consider the potential impacts of natural hazards.*

The McMinnville NHMP includes a series of GIS hazard maps and recommends specific "measures" to implement these goals. These recommended natural hazard mitigation measures, along with the natural hazard management practices of six comparable Oregon cities, provide the foundation for developing a geographically based natural hazards management program.

Oregon Natural Hazards Mitigation Plan

The Oregon NHMP was amended in 2020 and incorporates social equity factors when ranking natural hazard risks. Broadly, the State risk assessment is based on 3 variables, (1) the probability of the event happening, (2) the physical vulnerability of the event happening, and (3) the social vulnerability of the event happening. The Oregon NHMP groups these factors by county. Winterbrook included the State's ranking for physical and social vulnerabilities with the localized probability of the natural hazard event occurring. This inclusion provides the revised ranking system presented in Chapters V and VI of this report.

Statewide Planning Goal 7 (Natural Hazards)

As recognized by Goal 7 (Natural Hazards), natural hazards pose risks to life and property that can be mitigated by effective planning. Goal 7 requires each local government to identify and develop programs to mitigate impacts for natural hazards.

> *A. NATURAL HAZARD PLANNING:*
>
> *1. Local governments shall adopt comprehensive plans inventories, policies and implementing measures) to reduce risk to people and property from natural hazards.*

[4] The McMinnville NHMP also considers information found in the *Yamhill County Community Wildfire Protection Plan* (Yamhill County CWPP).

2. Natural hazards for purposes of this goal are: floods (coastal and riverine), landslides, earthquakes and related hazards, tsunamis, coastal erosion, and wildfires. Local governments may identify and plan for other natural hazards.

This report meets Goal 7 requirements by (a) inventorying natural hazards and assessing the risks they pose to people and property and (b) recommending a program to mitigate the effects of mapped natural hazards within the McMinnville UGB and study area.

Overlapping Natural Hazards

In this report, Winterbrook also looks at relationships that exist among natural hazards based on a series of geographic information system (GIS) overlay maps.

- For example, McMinnville's West Hills and associated downslope areas are especially threatened by a combination of geological, wildfire and flood hazards.
- In low-lying areas, the Yamhill River and its tributaries are subject to overlapping flooding, slide hazards (bank failures) and wildfires fueled by riparian vegetation in dry conditions.
- Most of the McMinnville study area outside the West Hills is subject to strong or very strong earthquake liquefaction and shaking hazards due to underlying soil conditions.

Recognizing these inter-relationships and the threats posed by natural hazards to people, public infrastructure and private property, Winterbrook proposes a natural hazards mitigation program that addresses the combined impacts of geological, flood and wildfire hazards. The proposed program includes amendments to the McMinnville Comprehensive Plan and Plan Map that would include:

- A new Chapter XI: Natural Features that includes policies addressing multi-hazard, geological, flooding and wildfire impacts and mitigation within the McMinnville Natural Hazards Study Area.
- A new Natural Hazards Overlay Map that would be implemented by two zoning subdistricts – with graduated development standards depending on the combination of and severity of hazards found in specific geographic subareas in the community.

Report Organization

In addition to the Introduction, this report is organized into seven sections:

- **Section I Revised Inventory Methods** and information sources. The study area includes land within the McMinnville 2021 UGB and land within 1.5 miles of the 2019 UGB. The Inventory considers mappable geological, flooding and wildfire hazard areas.

- **Section II Revised Geological Hazards Inventory** is based on the McMinnville NHMP (which in turn is largely based on Oregon Department of Geology and Mineral Industries (DOGAMI) data). The Geological Hazards Inventory focuses on land within the McMinnville study area and includes areas susceptible to landslides, earthquake liquefaction and earthquake shaking. Inventory maps show moderate, high and severe hazard areas and include descriptions of and threats from each type of geological hazard.

- **Section III Revised Flood Hazard Inventory** is based on existing FEMA maps of the 100-year floodplain. This inventory will likely change based on planned updates and improved data sources.

- **Section IV Revised Wildfire Hazard Inventory** is based on the McMinnville NHMP, the Yamhill County CWPP, and application of the *Oregon Wildfire Risk Explorer* to the McMinnville study area.

- **Section V Natural Hazards – Cumulative Impacts Analysis** is based on Winterbrook's analysis of overlapping natural hazards maps to better understand the spatial relationships that exist among McMinnville's geological, flooding and wildfire hazard areas. The revised Section V incorporates social factors from the Oregon NHMP.

- **Section VI Natural Hazards Management Options** is based on the recommendations of the McMinnville NHMP, the management programs of six comparator communities, the McMinnville-specific natural hazards inventory found in Sections II-V, and recognition of the cumulative impacts of overlapping natural hazards in McMinnville's West Hills and lower elevation drainage systems.

- **Section VII Natural Hazards Program Recommendations** is based on information found in Sections I – VI, comments from the McMinnville planning staff, evaluation of natural hazards programs in other communities, and Winterbrook's experience in preparing natural features management plans. Section VII provides the basis for Zoning Ordinance amendments that include text and maps for Natural Hazard Mitigation and Protection Subdistricts.

I. Natural Hazards Inventory Methods

Information Sources

Winterbrook conducted the McMinnville Natural Hazards Inventory in May and June of 2020 using publicly available sources of hazard information from:

- The Oregon Department of Geology and Mineral Industries (DOGAMI). DOGAMI GIS data is publicly accessible via the Oregon HazVu: Statewide Geohazards Viewer;[5]
- The *McMinnville Addendum to the Yamhill County Natural Hazards Mitigation Plan* (McMinnville MHMP); and
- The *Yamhill County Community Wildfire Protection Plan* (CWPP). Wildfire risk information is available for Oregon regions by using the Oregon Wildfire Risk Explorer.[6]
- Winterbrook amended the natural hazards ranking system to incorporate social indicators found in the 2020 Oregon NHMP in April-May 2021.

The McMinnville Natural Hazards Study Area

Working with Senior Planner Tom Schauer in 2020, Winterbrook reviewed GIS data sources for the Natural Hazards Study Area, which included two subareas shown in Figure I-1: (a) land within the McMinnville 2019 UGB and (b) land within UGB expansion study areas – generally 1.5 miles from the 2019 UGB.[7]

Mappable Hazards

In this study, Winterbrook focused on natural hazards within the 2021 McMinnville UGB that are (a) mappable using GIS technology (i.e., flood plains, steep slopes, soils subject to earthquake liquefaction and shaking, landslide areas, and areas susceptible to wildfires) and (b) classified in the McMinnville NHMP (which in turn is based on DOGAMI and CWPP information) as having moderate and high risk. Such areas are potentially subject to natural hazards overlay zones that include development standards to mitigate impacts.

The draft McMinnville NHMP describes and ranks McMinnville's vulnerability to the following mappable natural hazards[8] and suggests hazard-specific mitigation measures for moderate and high-risk hazards:

- Earthquake hazards (crustal and Cascadia Subduction Zone);
- Landslide and erosion hazards (including steep slopes);
- Flood hazards; and
- Wildfire hazards.

Working with City staff, Winterbrook prepared GIS base maps for moderate and high-risk natural hazard areas. As noted above, this analysis relies primarily on statewide mapping information provided by DOGAMI for flood

[5] https://www.oregongeology.org/hazvu/
[6] https://tools.oregonexplorer.info/OE_HtmlViewer/index.html?viewer=wildfireplanning
[7] The 1.5 mile study area represents an area of mutual interest between the city and county and area that was under consideration by the City of McMinnville for potential UGB expansion in 2020.
[8] Since only mappable hazards are subject to overlay zoning overlay regulations, Winterbrook did not consider drought, severe weather and volcanic events in this inventory.

and geological hazards. To map wildfire hazards we used the Oregon Wildfire Risk Explorer to generate several wildfire risks maps.

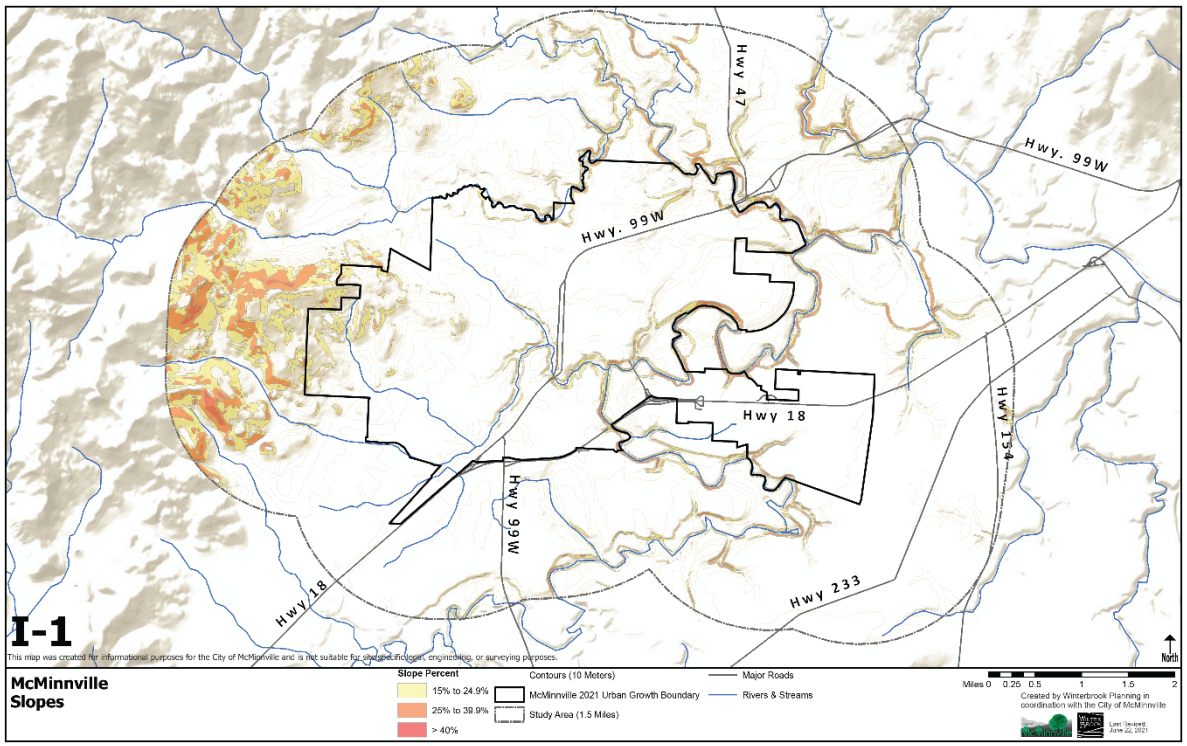
As discussed in Section V of this report, Winterbrook also prepared several composite hazard maps that show spatial relationships among geological, flooding and wildfire hazards. In 2021, Winterbrook worked with Associate Planner Jamie Fleckenstein to incorporate social indicators from the Oregon NHMP into this revised 2021 inventory.

Figure I-1 shows three slope categories within the McMinnville study area that are related to the location and severity of geological, flood (stream bank erosion) and wildfire hazards.

McMinnville Slope Hazards

Steep slopes are associated with wildfire hazards and geological hazards. Slope percentage is used by many jurisdictions to determine whether geological studies should be required prior to development. Slopes of 25% or greater are considered "unbuildable" when preparing buildable lands inventories under state housing rules. (OAR 660-008-005 Definitions) The City of McMinnville also requires sprinkler systems to reduce fire hazards on slopes of 15% or greater. For these reasons, slope percentage is considered in several of the composite maps found in the natural hazards inventory. Steep slopes are found mostly in McMinnville's West Hills and define the banks of the study area streams and rivers.

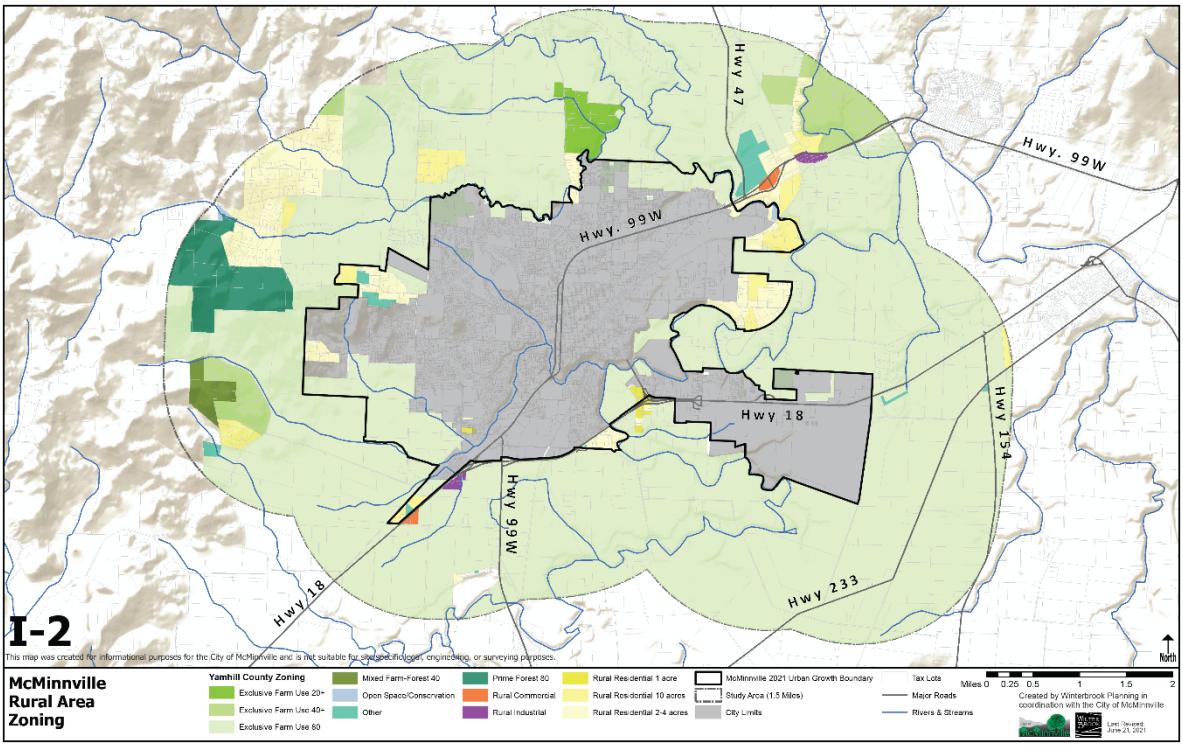
Figure I-1 McMinnville 2021 UGB and Study Areas Slopes



Yamhill County Zoning

Figure I-2 shows Yamhill County zoning outside the McMinnville City Limits. County zoning partially determines land use and density outside the 2021 McMinnville UGB – which in turn is related to hazard vulnerability to life and property. A larger scale and more readable zoning map is available in 11" X 17" format. In Yamhill County land that is zoned for forest use (the Agricultural Forest and Forestry Districts) in the forested West Hills is subject to specific wildfire protection (fuel reduction zones, fire suppression and access) standards for new structures.

Figure I-2 County Zoning within Study Area



II. Geological Hazards Inventory

Section II considers landslide, earthquake and steep slope hazards both individually and in combination.

Data Sources

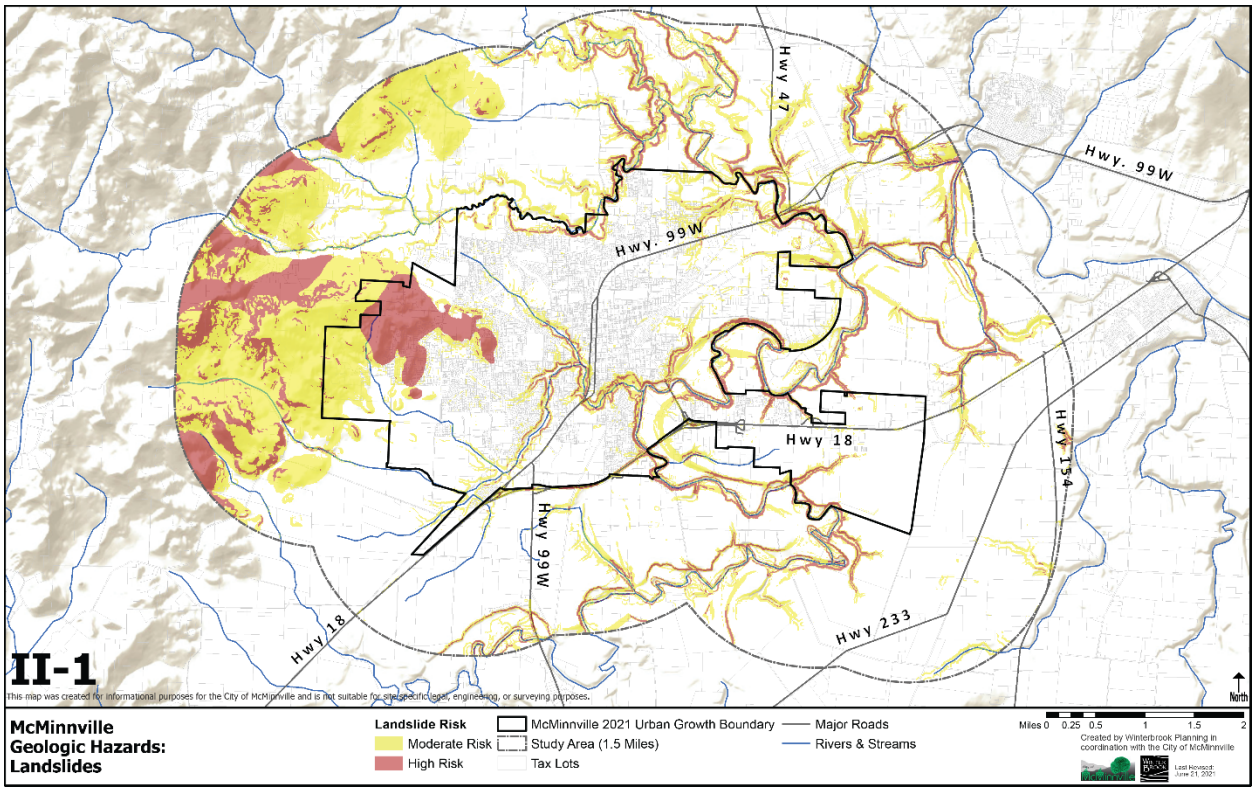
Winterbrook relied on landslide and slope hazard maps available on DOGAMI's Statewide Geohazards Viewer to identify potential landslide and slope hazards:

- DOGAMI: Landslide susceptibility
- DOGAMI: Landslide inventory - Statewide Landslide Information Database for Oregon (SLIDO)
- DOGAMI LIDAR: Hillshade and slope
- DOGAMI: Earthquake shaking and liquefaction risks

Landslide Hazard

The McMinnville NHMP describes and maps areas with moderate and high landslide hazard susceptibility based on the HazVu: Statewide Geohazards Viewer (DOGAMI). Figure II-1 shows moderate and high-risk landslide areas within the study area.

Figure II-1 Geological Hazards: Moderate and High Landslide Risk



Areas that are moderately and highly prone to landslides are found predominately in McMinnville's West Hills and secondarily along Baker Creek, Berry Creek, Cozine Creek and South Yamhill River embankments. Two high-risk landslide areas are located in McMinnville's West Hills: at lower elevation in the western extension of the UGB and at higher elevation in the western extension of the study area. Note that a large band of moderate landslide risk separates these two high-risk areas.

Earthquake Hazards

The McMinnville NHMP and this inventory consider and map the effects of two types of earthquakes:

1. Crustal earthquakes that could emanate from nearby faults and/or zones; and
2. The Cascade Subduction Zone Earthquake.

Potential earthquake hazards include two related and mappable effects: shaking from ground motion and liquefaction due to porous or "soft" soils can result from both types of earthquakes. Earthquakes can also trigger landslides in areas shown on Figure II-1.

Crustal and Cascadia Subduction Zone Earthquakes

The Yamhill County Multi-Jurisdictional NHMP describes the two types of earthquakes and explains their hazardous effects as follows (pp. 4-10 and 4-11):

> *"An earthquake is a sudden motion or trembling of the earth produced by the rupture of rocks due to stresses beyond the rocks' elastic limits. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.*
>
> *The severity of ground motion generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. Ground motion causes waves in the earth's interior, also known as seismic waves, and along the earth's surface, known as surface waves. …*
>
> *In addition to ground motion, several secondary hazards can occur from earthquakes, such as surface faulting. Surface faulting is the differential movement of two sides of a fault at the earth's surface. Displacement along faults, both in terms of length and width, varies but can be significant (up to 20 feet), as can the length of the surface rupture (up to 200 miles). Surface faulting can cause severe damage to linear structures, such as railways, highways, pipelines and tunnels.*
>
> *Earthquake-related ground failure due to liquefaction is another secondary hazard. Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its structure, and causing some of the empty spaces between granules to collapse. Porewater pressure may also increase sufficiently to cause the soil to briefly become fluid.*
>
> *Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet, but up to 12 miles) and loss of bearing strength (soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property.*
>
> *The most common earthquakes that occur in Oregon are crustal, intraplate or great subduction earthquakes. Yamhill County is most susceptible to deep intraplate and subduction zone earthquakes. These are described as follows:*
>
> ***Crustal earthquakes**: These generally occur along shallow faults near the earth's surface. Crustal earthquakes make up the majority of earthquakes in the Cascadia area (western Washington, Oregon and northwestern California) and are a result of fault movement in the Earth's surface. These shallow earthquakes are usually less than 7.5 magnitude and strong shaking generally lasts 20 to 60 seconds. Aftershocks, as well as tsunamis and landslides, are anticipated after a crustal event. The Mount Angel Fault is located approximately 15 miles from Yamhill County, and is responsible for the 5.7 magnitude Spring Break Quake in 1993.*

> ***Great subduction earthquakes****: occur offshore of the Oregon and Washington Coasts along the Cascadia Subduction Zone. This zone is the result of the Juan de Fuca plate being pushed under the North American plate. Earthquakes centered along this zone can be as great as 9.0 magnitude. Geologic evidence demonstrates approximately 500 years between events with the last significant event on January 26, 1700. Aftershocks up to 7.0 magnitude are anticipated to cause additional damage. Liquefaction, tsunamis and landslides are expected as a result of a great subduction earthquake.*

Quoting from the DOGAMI website https://www.oregongeology.org/earthquakes/earthquakehome.htm

> *Earthquake hazards have been recognized as one of the major natural hazards in Oregon since the late 1980s, a result of the geologic research to identify and characterize the Cascadia subduction zone and crustal faults. The March 1993 Scotts Mills earthquake (M5.6) and the September 1993 Klamath Falls earthquakes (M5.9 and M6.0) demonstrated the potential hazards of crustal earthquakes in Oregon.*

According to the McMinnville NHMP (p. MA-37)

> *Within the Northern Willamette Valley that includes Yamhill County, two potential faults and/or zones can generate high-magnitude earthquakes. These include the Cascadia Subduction Zone and the Gales Creek-Newberg-Mt. Angel Structural Zone (including the Newberg Fault).*

Crustal earthquakes can cause serious local damage, as recognized in the Yamhill County Natural Hazard Mitigation Plan (2014):

> *Crustal earthquakes also occur in the Willamette valley although with smaller expected magnitudes (M 5.0-M 7.0). Although these earthquakes are expected to be much smaller than a Cascadia Subduction Zone earthquake, they are more likely to occur close to population centers and are capable of causing severe shaking and damage in localized areas.*

Although crustal earthquakes are more common than great subduction earthquakes (see https://pnsn.org/earthquakes/recent), the Cascadia Subduction Zone (CSZ or Cascadia) earthquake is certain to occur sometime in the future and could occur at any time.

Again, according to the McMinnville NHMP:

> ***Cascadia Subduction Zone***
>
> *The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year. Scientists have found evidence that 11 large, tsunami-producing earthquakes have occurred off the Pacific Northwest coast in the past 6,000 years. These earthquakes took place roughly between 300 and 5,400 years ago with an average occurrence interval of about 510 years. The most recent of these large earthquakes took place in approximately 1700 A.D.*

The city's proximity to the Cascadia Subduction Zone, potential slope instability, and the prevalence of certain soils subject to liquefaction, and amplification combine to give the City a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones, and places McMinnville within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Northwest Oregon region, damage, and shaking is expected to be strong, and widespread - an event will be disruptive to daily life, and commerce, and the main priority is expected to be restoring services to business and residents.

Quoting from the Cascadia Playbook (Oregon Office of Emergency Management, 2018):

> *A Cascadia event is based on the threat of a catastrophic magnitude 9.0 Subduction Zone earthquake and resultant tsunami. Coastal counties will experience a devastating tsunami on top of severe ground shaking (up to five minutes). Shaking intensity will be less in the I-5 Corridor and Southern, Central, and Eastern Oregon, but older buildings may incur extended damage. Expected Impacts*
>
> - *Ground shaking for 4-6 minutes causing massive critical infrastructure damage*
> - *Liquefaction and landslides causing disruption of transportation routes*
> - *Tsunami inundation to coastal areas with as little as 15 minutes warning*
> - *Up to 25,000 fatalities resulting from combined effects of earthquakes and tsunami*
> - *Tens of thousands of buildings and structures destroyed or damaged*
> - *Tens of thousands of people in need of shelter because of destroyed or damaged households*
> - *$30+ billion in economic loss*

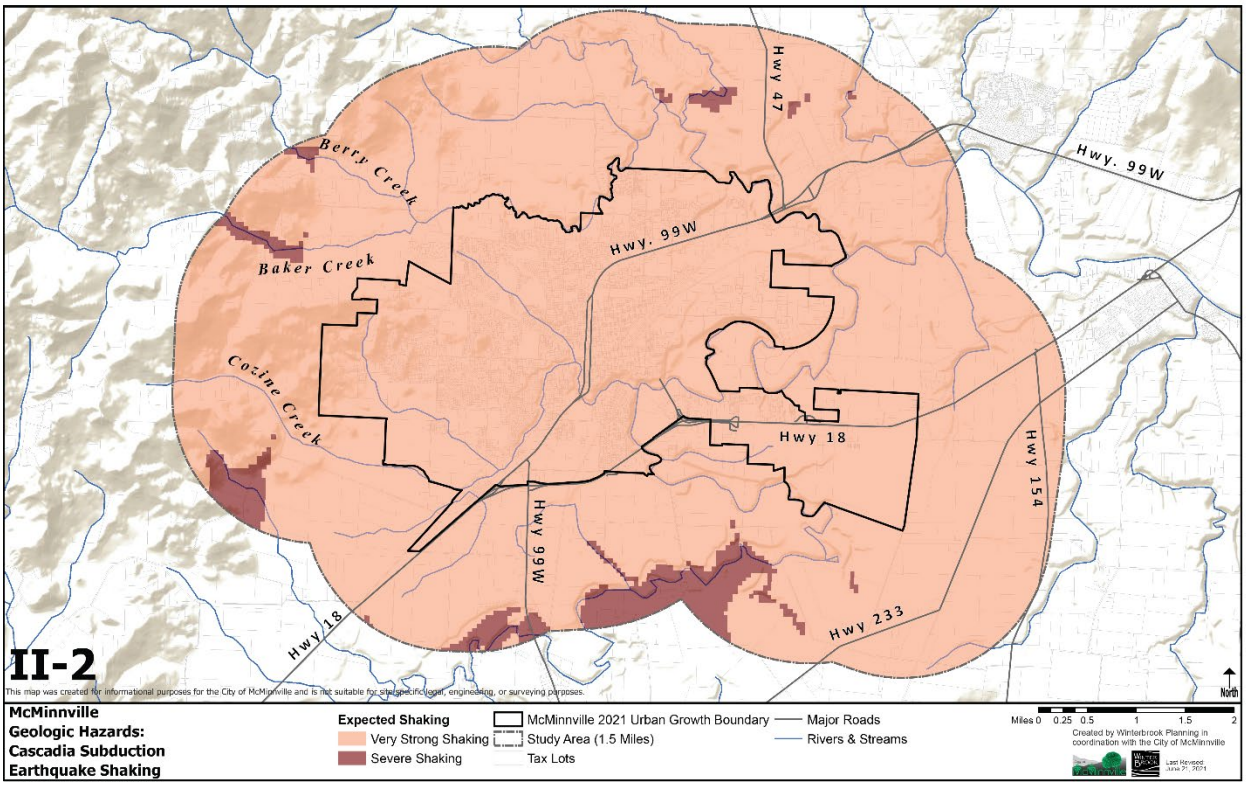
Although coastal communities will experience greater impacts than Willamette Valley communities, McMinnville's location at the base of the Coast Range makes it highly susceptible to Cascadia Subduction Zone earthquake damage. **Because the impacts from the Cascadia Subduction Zone earthquake would be so severe, Winterbrook's analysis and recommendations focus on impacts from the Cascadia event.**

Earthquake Shaking Hazard Areas

DOGAMI provides data and maps for both crustal and subduction earthquakes. Since great subduction earthquakes are more severe and has a high probability of occurring occur over the next 50 years, Winterbrook used DOGAMI subduction earthquake mapping for this analysis.

Figure II-2 shows areas susceptible to "very strong" and "severe" shaking that could result from the Cascadia Subduction Zone Earthquake. As with a crustal earthquake, most of the study area will experience strong shaking in the subduction earthquake. Severe shaking areas include the upper Baker Creek valley and south of Cozine Creek as well as a large area southwest of the airport. The amended UGB did not include severe shaking areas.

Figure II-2 Geological Hazards: Cascadia Subduction Earthquake Shaking Risk

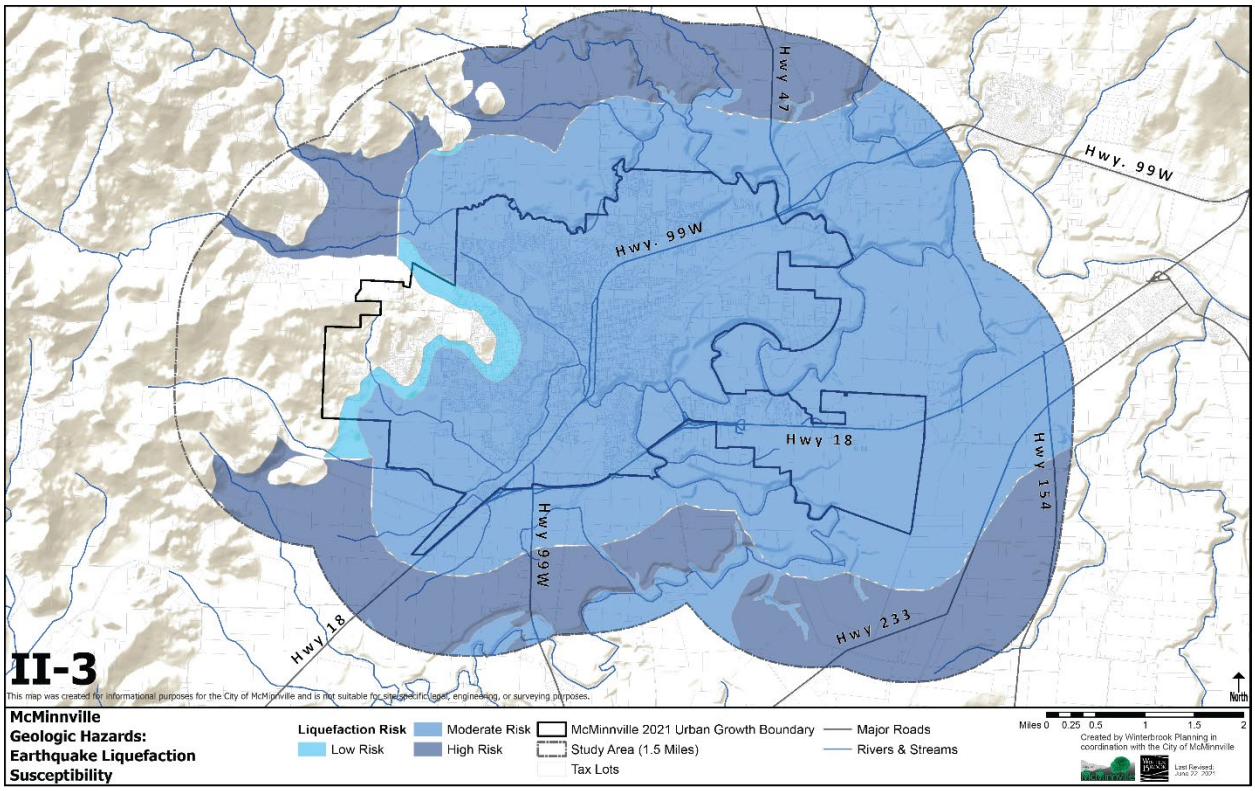


Earthquake Liquefaction Hazard Areas

Liquefaction occurs from both types of earthquakes and results from soft soils. All land within the existing UGB is subject to moderate liquefaction. Areas of moderate liquefaction extend about 0.5 miles north and south of the UGB, and much further beyond the study area boundary east of the UGB.

- Areas of high liquefaction susceptibility extend from 0.5 to 0.75 miles from the UGB to the north and south. The amended UGB did not include high liquefaction areas.
- The West Hills are characterized by high bedrock and less alluvial soil are not subject to liquefaction – except along stream corridors.
- Note the large moderate liquefaction area that extends into the high liquefaction areas southwest of the airport – at the bottom center of Figure II-4. This nodal extension is mapped as a severe shaking area on Figure II-3 which shows the relationship between moderate and high liquefaction and shaking areas.

Figure II-3 Geological Hazards: Earthquake Liquefaction Susceptibility

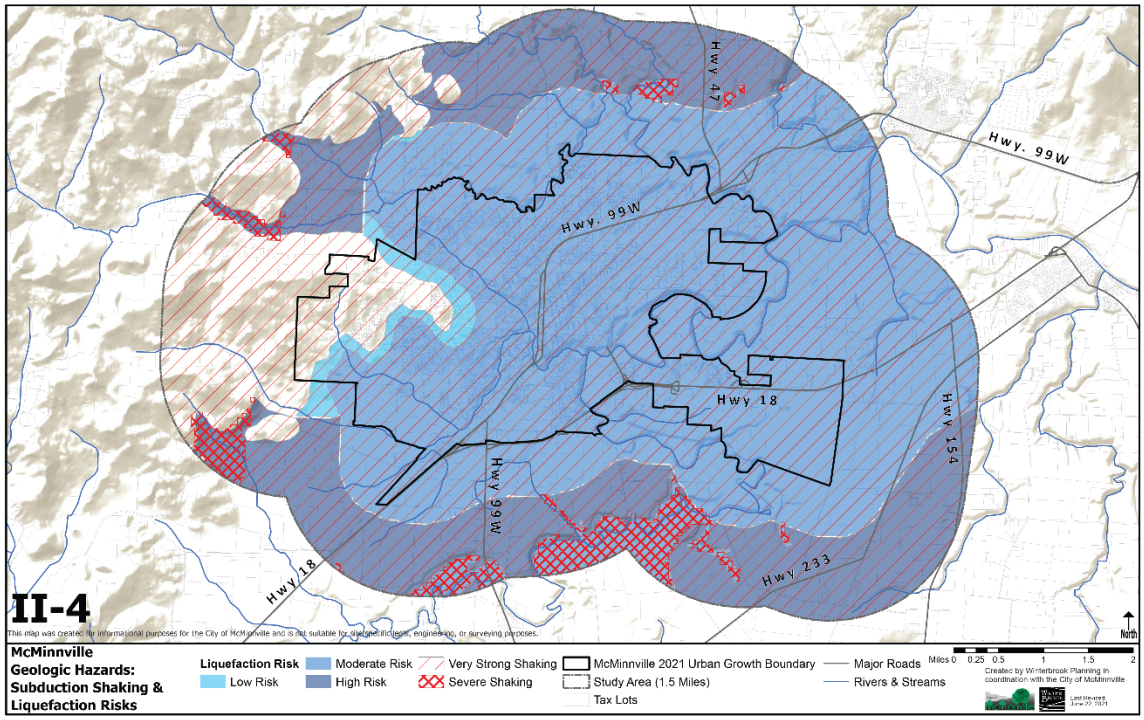


Combined Earthquake Liquefaction and Shaking Hazard Areas

Figure II-4 shows the relationship that exists among high and moderate liquefaction areas and "very strong" and "severe" earthquake shaking areas.

- Note that land within and extending outside the amended McMinnville UGB has moderate liquefaction risk and "very strong" shaking risk.
- However, a large band of high liquefaction risk and "severe" shaking risk is appears the northern and southern areas at a more or less uninform distance from the edge of the study area.
- Finally, note the severe shaking area southwest of the Airport (largely in the South Yamhill River floodplain) shown on Figure II-4 that corresponds roughly with the moderate liquefaction area shown on Figure II-3 above.
- The amended UGB did not include areas with severe shaking risk or high liquefaction risk.

Figure II-4 Geological Hazard: Cascadia Subduction Earthquake Liquefaction and Shaking Risk



Composite Geological Risk Maps

Figure II-5 is a composite map showing slopes of 15% or greater, landslide hazard and earthquake liquefaction hazard areas. We offer the following observations:

- Note the inverse relationship that exists between (a) steep slopes and the moderate to high-risk earthquake risks in the West Hills and (b) moderate to high risk earthquake liquefaction areas to the north, south and east of the UGB.
- Moderate risk geological hazard areas (relatively flat areas with moderate liquefaction hazards and low landslide hazards) are found to the north and south of the UGB. High risk earthquake liquefaction areas are located further to the northwest and south.
- In weighing geological hazard risks, it may be more advisable to direct future urban growth to areas that have areas with moderate geological hazard risk rather than higher risk areas.
- As shown more clearly on 11" by 17" maps accompanying this report, there is rough correlation between 15% and greater slopes and landslide hazard areas, indicating that slope percentage should not be the only threshold for requiring erosion control geotechnical studies.

Figure II-5 Geological Hazards Map: Landslide, Liquefaction, Subduction Shaking and Slopes

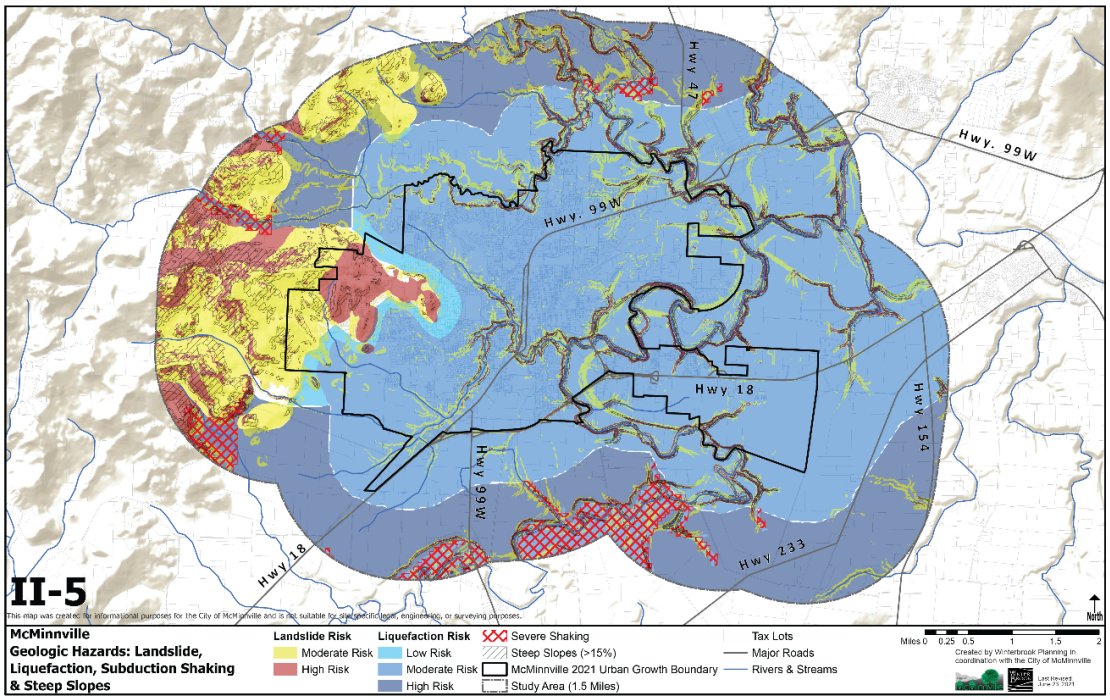
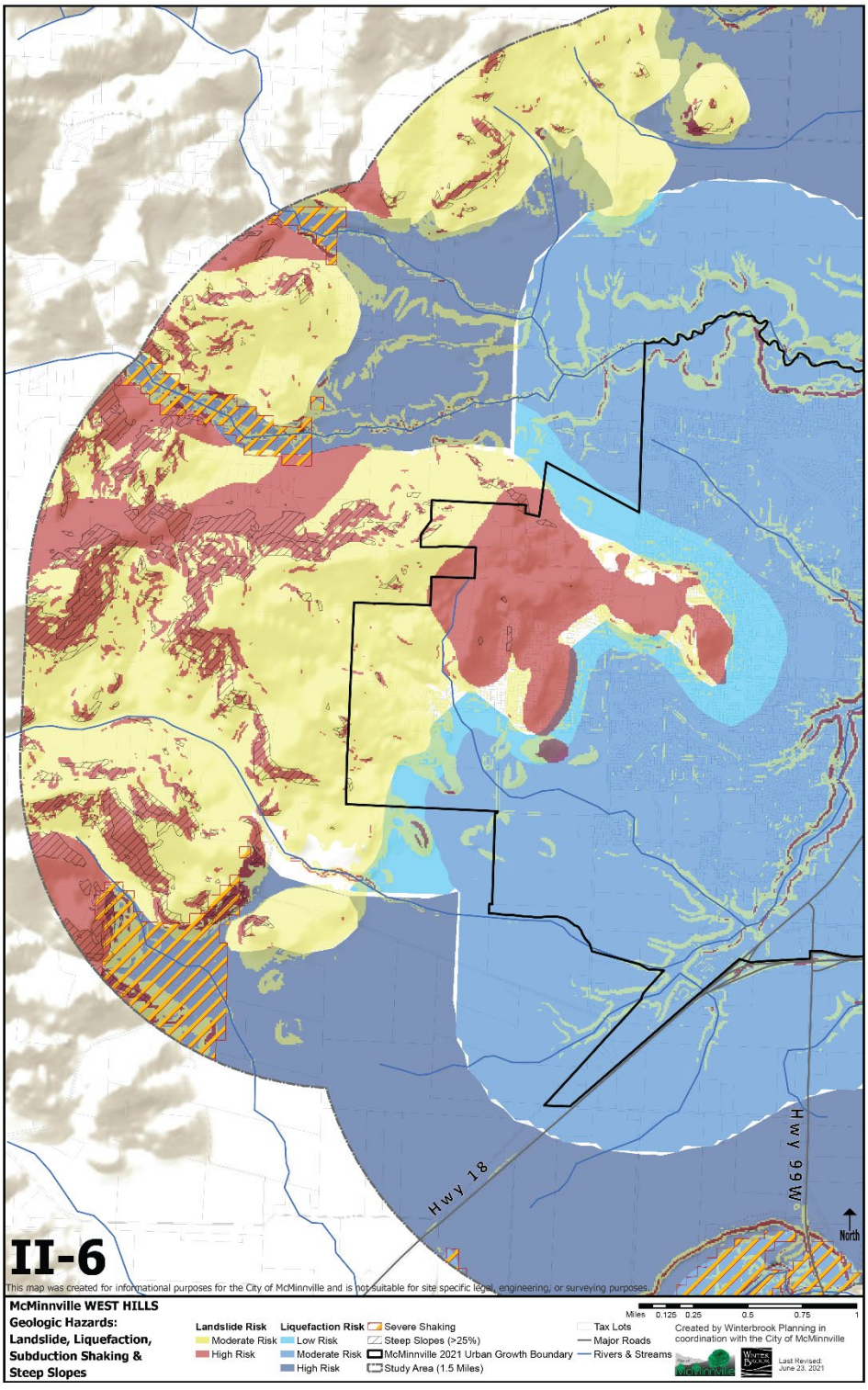


Figure II-6 zooms in on the West Hills to look more closely at the relationships among slopes of 25% and greater, moderate and high-risk landslide liquefactions areas, severe risk landslide shaking areas, and moderate to high risk landslide areas.

Please note the following:

- The high correlation between slopes of 25% or greater and high risk landslide areas.
- The inverse relationship between (a) moderate to high risk landslide areas and (b) high risk liquefaction areas and severe earthquake shaking areas north and south of the West Hills.

Figure II-6 West Hills Geological Map: Steep Slope, Severe Shaking, Landslide and Liquefaction Risk

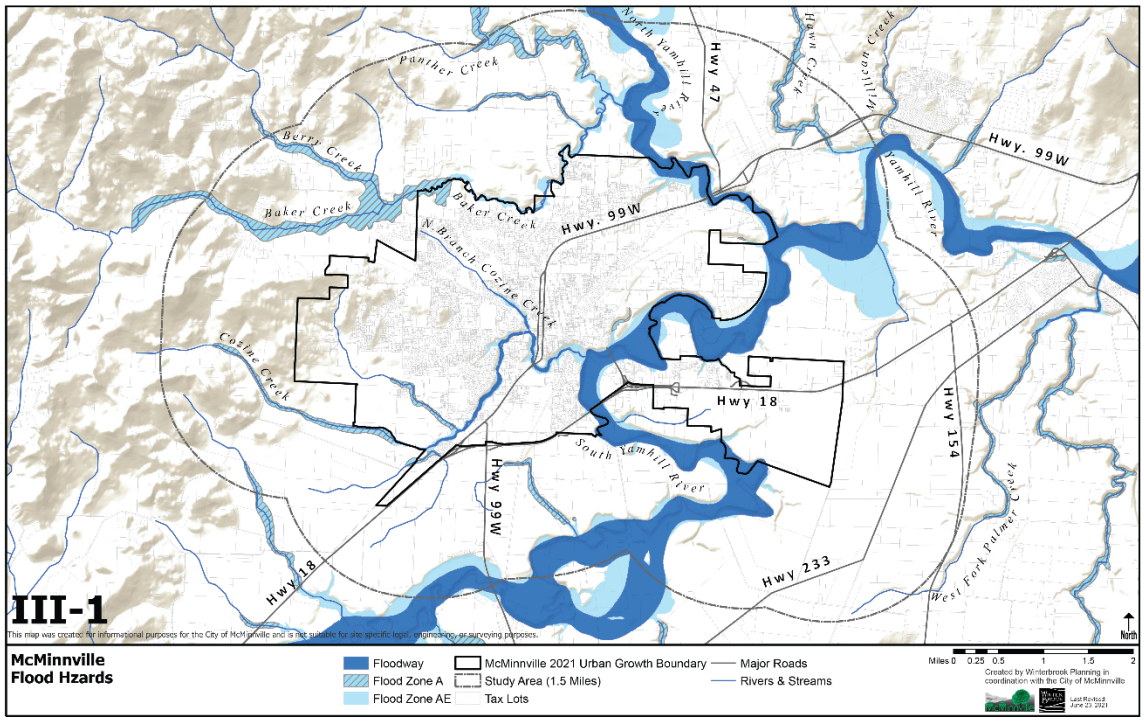


III. Flood Hazard Inventory

Flood Hazard GIS Data Sources and Analysis

Winterbrook relied on flood hazard maps available on DOGAMI's Statewide Geohazards Viewer found in the McMinnville NHMP. Flood hazards include: Zone A, Zone AE, and the Floodway.[9] As shown on Figure III-1, flood hazards within the study area are associated with Cozine Creek, Berry Creek, Baker Creek and the Yamhill River.

Figure III-1 Flood Hazard Map



[9] Winterbrook's understanding is FIRM maps were used as the basis for DOGAMI's statewide inventory.

FEMA Floodway Definition/Description:

A "Regulatory Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided Base Flood Elevations (BFEs), but no floodway has been designated, the community must review floodplain development on a case-by-case basis to ensure that increases in water surface elevations do not occur or identify the need to adopt a floodway if adequate information is available.

About Flood Zones: Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. SFHAs on Figure III-1 are labeled Floodway, Zone A and Zone AE. Zone A indicates areas where base flood elevations (BFE) have not been fully determined. Additional work is required to define the BFEs in in the upper reaches of the Baker, Cozine and Berry Creek floodplains.

IV. Wildfire Hazard Inventory

Wildfire GIS Data Sources

The **Yamhill County Community Wildfire Protection Plan** (CWPP, Revised 2015) identifies two Wildland Urban Interface Zones (WUI Zones). Zone I is comprised mostly of commercial forest land in West Yamhill County. Zone II includes agricultural land, urban areas and forested uplands in East Yamhill County. The McMinnville study area is mostly within Zone II which includes agricultural, forest and rural residential land within the McMinnville study area.

According to the CCWP, Zone II has a "high" county-wide wildfire hazard ranking. However, some Zone II areas are more at risk than others. For example, rural residential forested slopes near the Newberg and McMinnville urban areas are more at risk than unpopulated agricultural land.

The McMinnville NHMP (pp. MA 50-52) summarizes key findings in the Yamhill County CWPP:

> *The location, and extent of a wildland fire vary depending on fuel, topography, and weather conditions. Weather, and urbanization conditions are primarily at cause for the hazard level. McMinnville has not experienced a wildfire within City limits. The city is surrounded by developed land, rivers, and/or irrigated agricultural land. However, some wooded areas are a concern in the case of a wildfire event, particularly in the western part of the city.*

Oregon Wildfire Risk Explorer

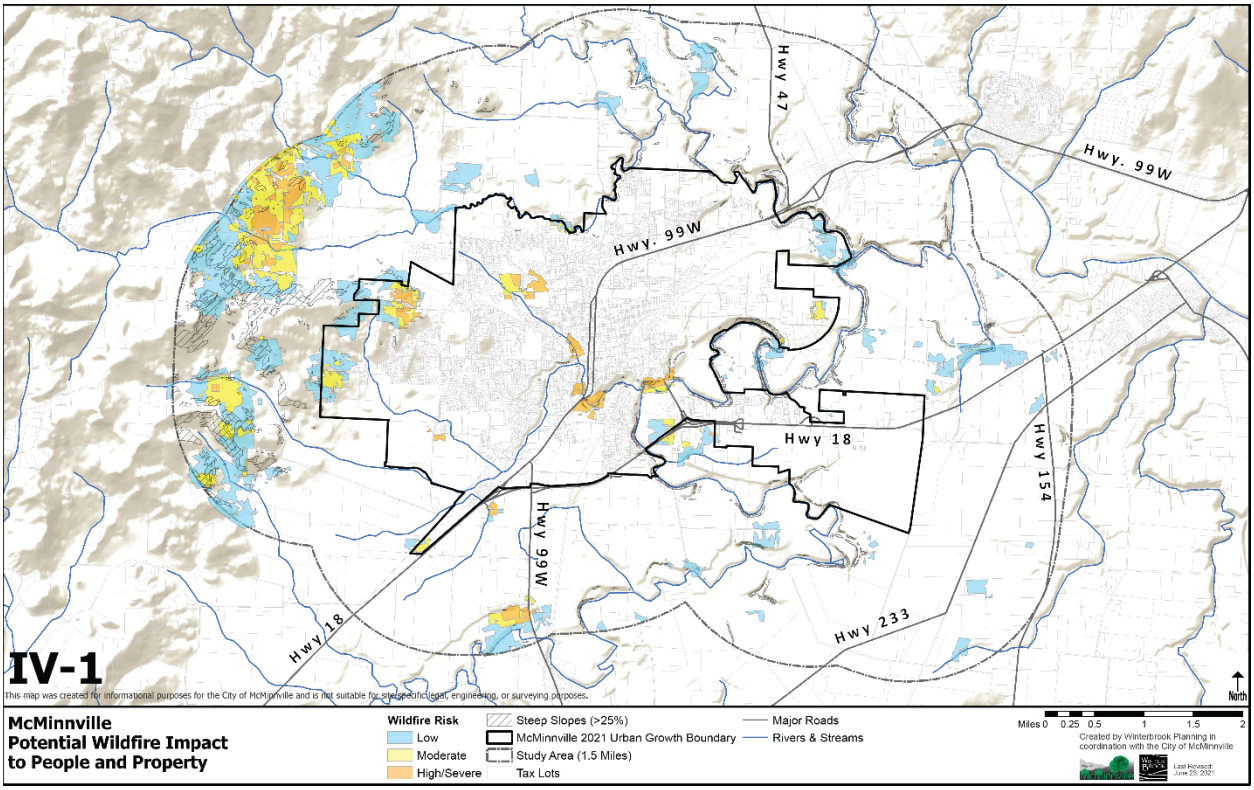
The OWRE Advanced Report provides wildfire risk information for a customized area of interest to support Community Wildfire Protection Plans (CWPPs), Natural Hazard Mitigation Plans (NHMPs), and fuels reduction and restoration treatments in wildfire-prone areas in Oregon. The OWRE Advanced Report provides landscape context of the current fire environment and fire history.

Using the *Oregon Wildfire Risk Explorer*, Winterbrook prepared an *Advanced Report* showing wildfire hazards to potential structures and the people who live and work in them. Figure IV-1 shows Wildfire Hazard to Potential Structures and the general location of McMinnville RFPD Risk Reduction Projects. According to the Risk Explorer:

> ***Hazard to Potential Structures:*** *Hazard to potential structures depicts the hazard to hypothetical structures in any area if a wildfire were to occur. This differs from Potential Impacts, as those estimates consider only where people and property currently exist. In contrast, this layer maps hazard to hypothetical structures across all directly exposed (burnable), and indirectly exposed (within 150 meters of burnable fuel) areas in Oregon. As with the Potential Impacts layers, the data layer does not take into account wildfire probability, it only shows exposure and susceptibility.*

As indicated in the description above, moderate and high risk areas shown on Figure IV-1 correlate highly with rural residential areas shown on Figure I-2. Moderate risk wildfire areas continue into the western extension of the McMinnville UGB. Please note that "Potential Impacts to People and Property" focuses on areas with structures. Thus, areas without structures (mainly in steeply sloped areas) have a lower risk to people and property. Finally, as discussed in Section V, hillsides denuded by recent wildfires are more susceptible to erosion and slide hazards due to loss of stabilizing vegetation.

Figure IV-1 Wildfire – Potential Impacts to People and Property with Steep Slopes



As a reminder, Figure I-2 in Section I of this report shows Yamhill County Zoning in the Natural Hazards Study Area. Yamhill County has effective fire prevention standards for structures in County Prime Forest and Mixed Forest zones.

V. Natural Hazards – Multi-Hazard Cumulative Impacts

Composite Geological Hazard Mapping Approach

The draft McMinnville NHMP mapped and evaluated a series of natural hazards more or less in isolation. The location and severity of each was mapped and assessed and potential community impacts and mitigation measures were identified.

As noted in Section I of this report, Winterbrook used GIS maps and information found in the McMinnville NHMP but focused on mappable natural hazards that exist within the McMinnville study area.

Section II went a step further than the McMinnville NHMP by evaluating relationships that exist among overlapping geological hazards. Figures II-3 through II-5 show overlapping geological hazard maps and a brief analysis of what these overlaps mean in terms of natural hazards planning.

The following composite natural hazards map (Figures V-1 through V-3) show relationships among hazards identified in Section II (Geological), Section III (Flooding) and Section IV (Wildfire).

Figure V-1 on the following page shows that land within the McMinnville UGB – with two notable exceptions – is relatively free of high risk areas. The two exceptions within the UGB include:

1. Flood hazards generally; and
2. High landslide risk hazard areas in the lower slopes of the West Hills and adjacent floodplains.

Most of the land within the amended UGB has moderate (as opposed to high) earthquake liquefaction susceptibility. Hazard conditions outside the UGB tell a different story. The moderate risk liquefaction area extends beyond the amended UGB to the north, northwest, southwest and south for about 0.5 to 0.75 miles before reaching high liquefaction risk areas.

Figure V-1 Composite Map: Landslide, Liquefaction and Flood Hazards

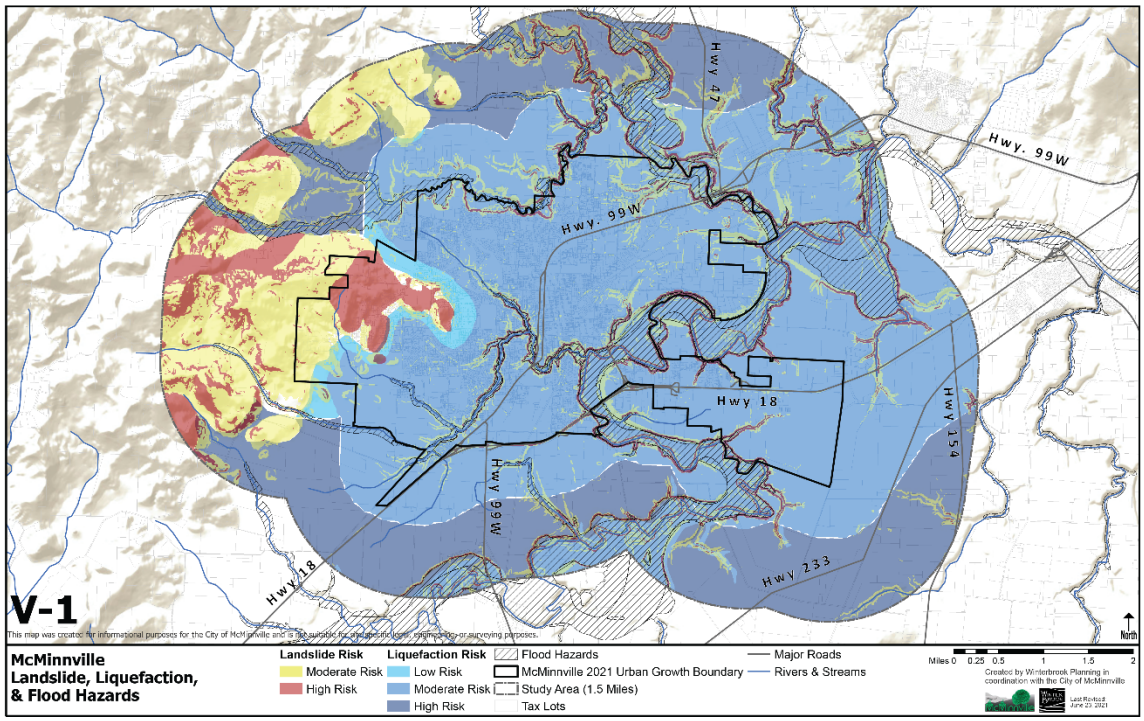


Figure V-1 shows the highest risk areas in the Natural Hazards Study Areas by mapping slopes of 25% and greater; high risk landslide, earthquake liquefaction; and the 100-year floodplain.

- This composite map makes it clear that land within the amended McMinnville UGB is relatively free of high-to-severe hazard risks.
- With the exception of the area served by Highway 18, the UGB has been largely defined by Baker and Cozine Creeks and the North and South Yamhill Rivers. Floodplains in these areas are protected from most types of development by City floodplain regulations.
- The primary high-to-severe hazards within the UGB include high risk landslide hazards in the West Hills and adjacent to protected floodplains.
- As discussed in Section II of this report (and shown on Figure II-4), high risk earthquake liquefaction and severe shaking areas are clearly defined to the west and south of the amended UGB.

To the west of the UGB, there is a moderate risk landslide area that extends to the West Hills' steeply sloped and high landslide risk areas.

Figure V-2 focuses on the West Hills in relation to lowlands west of Hwy 99W. Please note the following:

- The large high risk landslide area within the amended UGB is separated by a moderate risk landslide area just outside the UGB before reaching another band of high-risk landslide area.
- The West Hills are flanked to the north and south by high-risk earthquake liquefaction areas. As described earlier in Section II, Figure II-4 shows severe risk landslide shaking areas in Baker Creek and Cozine Creek alluvial plains.

Figure V-2 Composite Map: West Hill Slope, Landslide, High Earthquake Liquefaction Risk

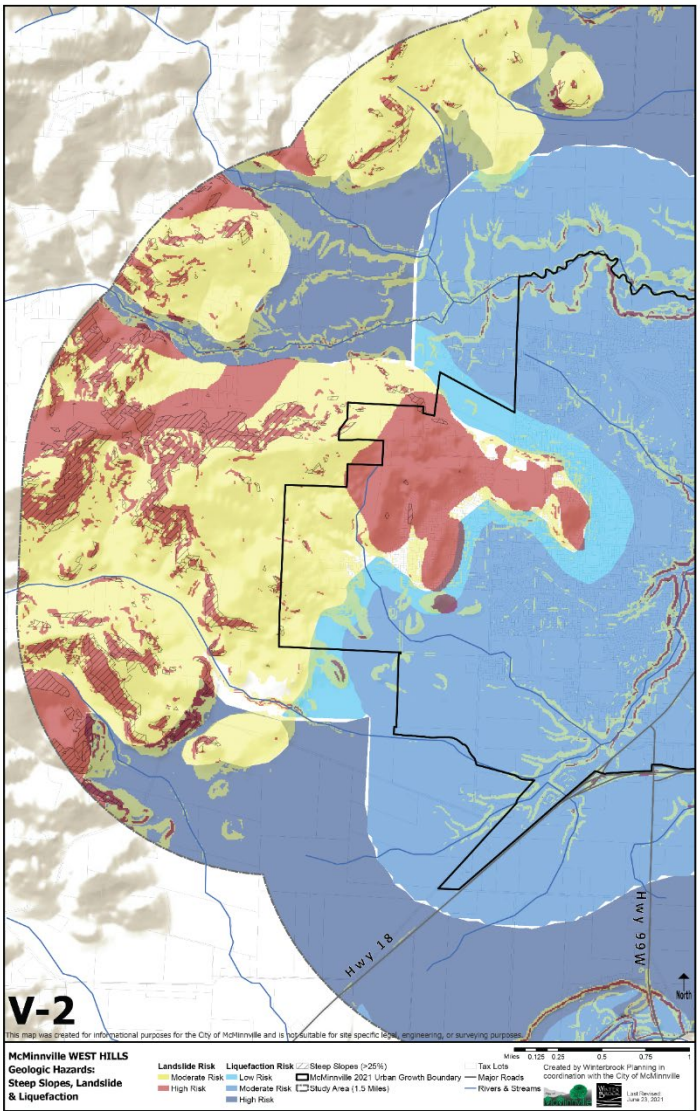


Figure V-3 shows the eastern (Valley) portion of McMinnville study area generally east of Highway 99W. The primary natural hazard in this area is flooding. Landslide hazard areas define the outer boundaries of floodplains that are subject to bank failure in high water conditions or in a major earthquake event. Note the areas of high-risk earthquake liquefaction hazards to the north and south of the UGB. In addition, the Yamhill River floodplain

southwest of the McMinnville Airport contains a severe earthquake shaking hazard area as shown in Section II on Figure II-4.

Figure V-3 Composite Map: East Valley Floodplain, Landslide and Liquefaction Risk

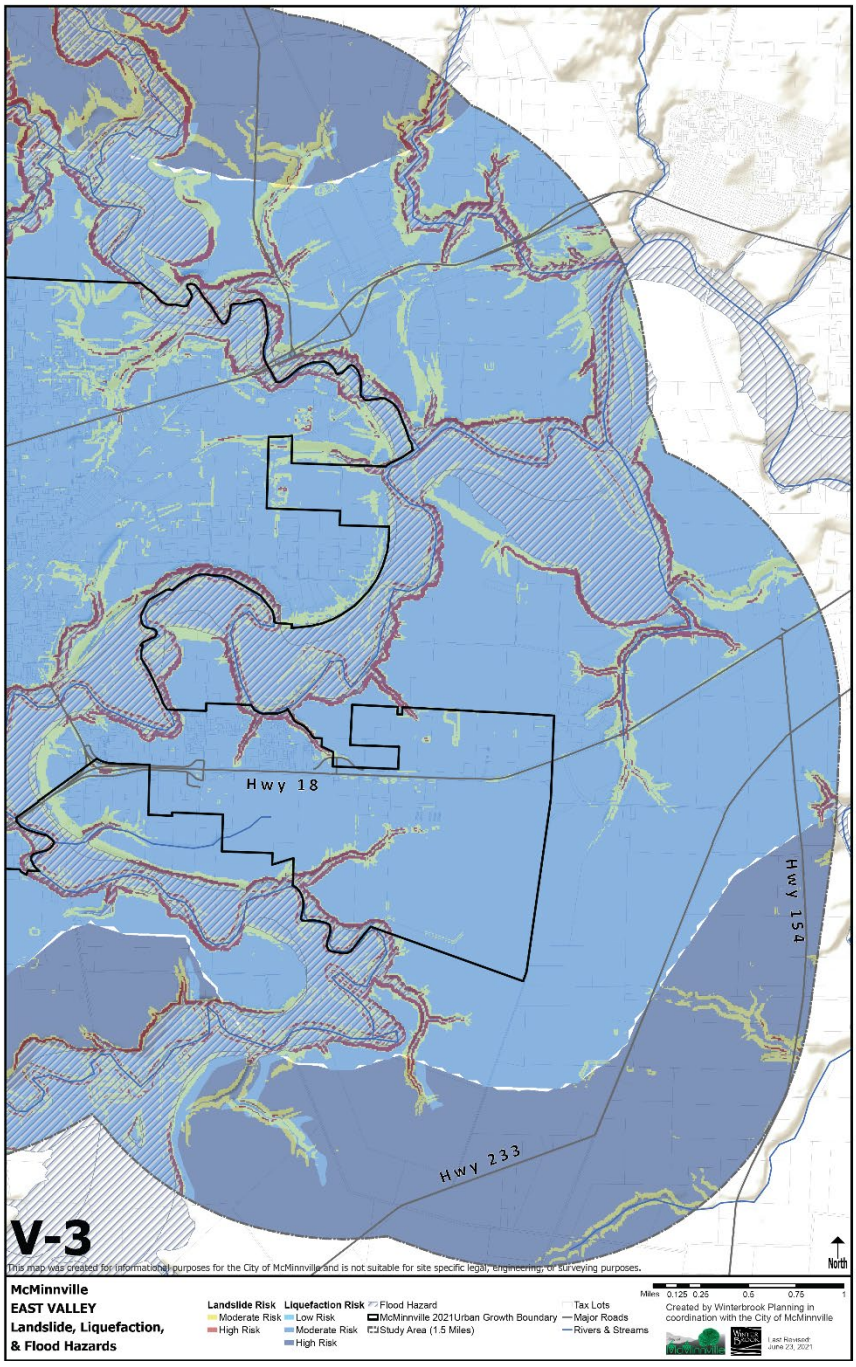


Figure V-4 combines wildfire, landslide and flood hazard risks and focuses on the West Hills and low-lying areas west of Highway 99W.

- Overall, there is some correlation between wildfire and landslide risk Higher wildfire risk areas correlate more with rural residential development in forested hillside areas with limited access.
- Note that low wildfire risk areas correlate with undeveloped areas because wildfire risk focus on impacts to people and structures. Thus, yellow areas shown on Figure V-4 still have wildfire risk – but are unlikely to damage structures; however, the danger still exists from larger scale wildfires.
- Note also that high wildfire risks occur near vegetated stream and river corridors.
- Finally, the CWPP and the McMinnville Fire Department has observed (6/24/20) that grasslands and grain crop areas are also susceptible to wildfire risk.

Figure V-4 Composite Map: West Hills Wildfire, Landslide, and Floodplain Risk

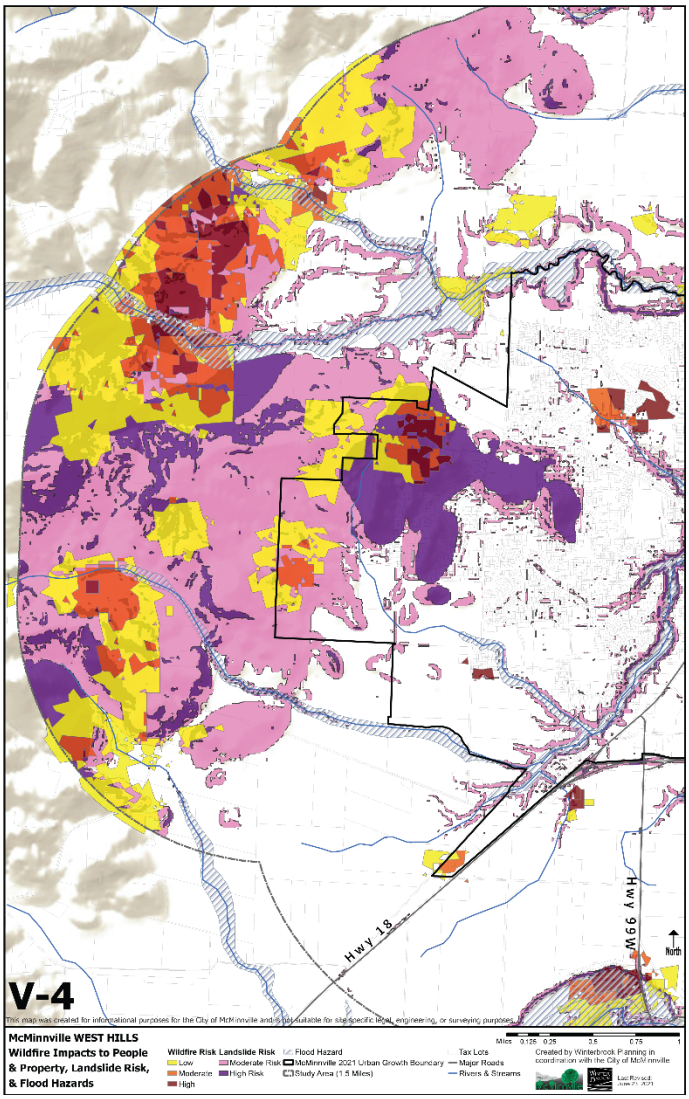
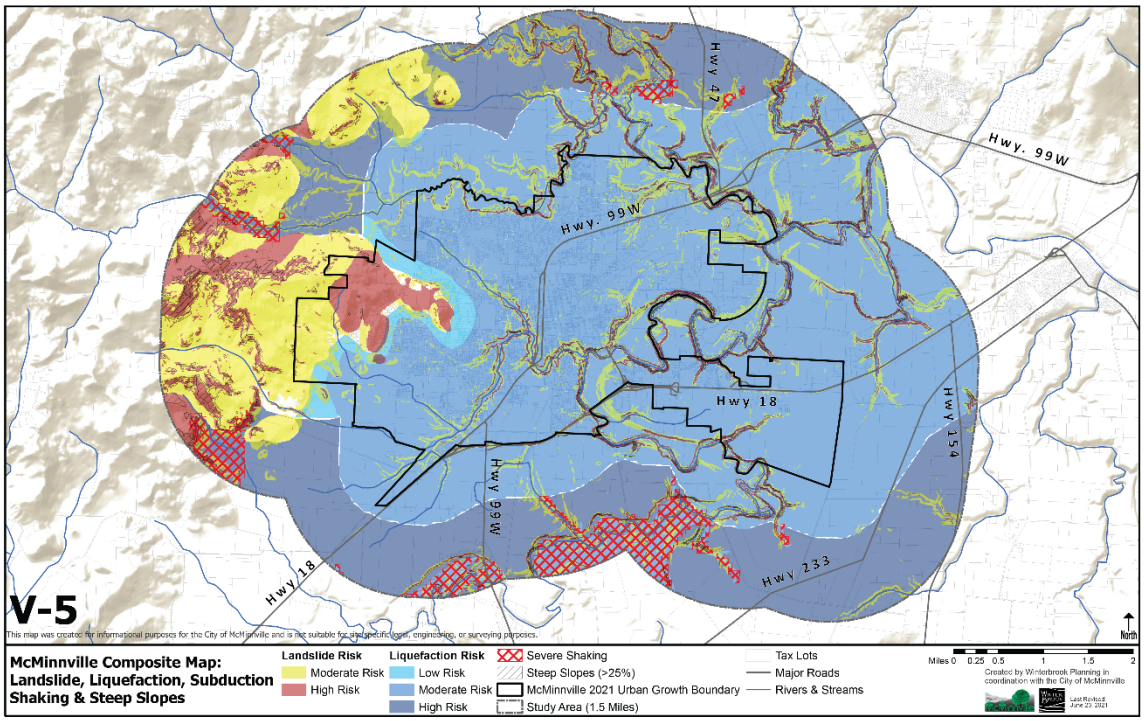


Figure V-5 combines geological hazard risks including landslides, earthquake shaking and liquefaction, and slopes of 25% or greater. As discussed in Section II of this report:

- The entire amended McMinnville UGB is subject to moderate earthquake liquefaction risk and (as shown on Figure II-4) very strong earthquake shaking risk.
- There is a band of moderate geological risk area that extends north, northwest, west, southeast, and south of the amended UGB for about a half to three-fourths of a mile.
- Beyond this relatively buildable band, there are:
    - High risk earthquake liquefaction hazard areas (to the north and south;
    - Severe risk earthquake shaking hazards to the south, southwest and northwest; and
    - High risk landslide areas with slopes of 25% or greater to the west.

Figure V-5 Composite Map: Landslide, Liquefaction, Subduction Shaking, and Steep Slopes



Combined Hazard Risk Summary

Figures II-4 through II-VI and Figures V-1 through V-5 show interrelationships among geological and flooding hazards. In summary:

- Although there is a correlation between slopes of 25% and greater and high landslide risk in the West Hills and therefore should be considered unbuildable – consistent with the findings of the 2020 Buildable Lands Inventory.
- Geological hazards (landslide and earthquake liquefaction / shaking) exist on slopes of 15% or less. Therefore, the composite geological maps are a better indicator than steep slopes to determine where geological studies and erosion control measures should be required.
- The composite geological and flooding maps show landslide hazards at the edge of most floodplains and the presence of high earthquake liquefaction and severe shaking hazards within all floodplain boundaries. Even relatively minor flood events can trigger bank failures in such areas. Since a major subduction

earthquake would undoubtedly trigger bank failures next to the 100-year floodplain, extending protection to adjacent landslide areas makes sense.

- The composite geological maps show an inverse relationship between earthquake risk on the one hand and landslide risk in the West Hills. Except for floodplain areas in the West Hills and Valley, earthquake liquefaction and shaking risk areas tend to end where landslide areas begin.
- Together, these high to severe geological hazards form a continuous ring located from 0.5 to 0.75 miles to the southeast, south, southwest, west, northwest and north of the amended McMinnville UGB.
- The composite wildfire, geological and flooding maps show that moderate and high wildfire hazards are associated with forested rural residential development in the West Hills. Wildfire hazard areas sometimes occur in moderate-to-steep slope hazard areas and vegetated floodplains throughout the study area.

The overlaps that exist among these types of hazards and supports the concept of a combined natural hazards overlay comprehensive plan map designation. As discussed in Section VII of this report, Winterbrook recommends the assignment of one of two natural hazard subdistricts based on combined natural hazard risk scores in specific geographic subareas. The methods for drawing subdistrict maps are discussed in Chapter VII.

VI. Natural Hazard Program Management Options

In Sections II-IV of this report, we inventoried three types of natural hazards:

- Geological Hazards (including landslides and subduction and crustal earthquakes)
- Flooding Hazards
- Wildfire Hazards

In Section V we analyzed the McMinnville NHMP and the Yamhill County CWPP and determined that substantial overlaps exist among these three general types of hazards.

In Section VI we analyze management options for each of these natural hazard categories based on:

1. Recommendations found in the draft 2020 McMinnville NHMP.
2. Management practices in six comparator cities described in Appendix 1.
3. Advanced natural hazards inventory work related to geological and wildfire hazards found in the draft McMinnville NHMP and Winterbrook's experience in preparing comprehensive natural hazard inventories and management programs for other Oregon jurisdictions.

McMinnville NHMP Multi-Hazard Action Items

The McMinnville NHMP includes five relevant "multi-hazard" recommendations that will be followed for each of the three natural hazard categories:

Table VI.1 McMinnville NHMP Recommended Natural Hazard Mitigation Measures

Policy Number	Policy Text	Evaluation
Multi-Hazard #2	Incorporate mitigation planning provisions into community planning processes such as comprehensive, capital improvement, land use, transportation plans, zoning ordinances, community development practices, etc.	**Section VII includes recommendations for amending the McMinnville Comprehensive Plan to include natural hazard inventory and management policies proposed to be implemented in the McMinnville Zoning Ordinance.**
Multi-Hazard #7	Develop and maintain GIS mapped hazard areas within the UGB.	**Sections II-V include a series of geological, flooding and wildfire hazards maps within the McMinnville UGB and within potential UGB expansion areas.**
Multi-Hazard #10	Establish a process to coordinate with state and Federal agencies to maintain up-to-date hazard data, maps and assessments.	**Section VII includes a policy to coordinate with state and federal agencies through periodic updates of the McMinnville NHMP and the Yamhill County CWPP.**

Policy Number	Policy Text	Evaluation
Multi-Hazard #11	Limit (e.g., reduced density, etc.) or prohibit development in high hazard areas.	**Section VI considers options to limit development in medium and high hazard areas – and to prohibit development in some high hazard areas. Section VII includes recommendations for a consolidated Natural Hazards Overlay District that limits or prohibits development depending on the hazard level and cumulative hazard impacts. As proposed, the NHOD would be applied to land within the McMinnville study area to guide future urban growth. Application of the NHOD outside the McMinnville City Limits would require an amendment to the Urban Growth Management Agreement (UGMA) between the City and Yamhill County.**
Multi-Hazard #12	Encourage mitigation practices in developments at risk to natural hazards.	**Section VI considers mitigation options and Section VII recommends specific mitigation measures.**

Geological Hazards

The text below considers (a) McMinnville NHMP geological hazards measures / action items and (b) geological hazards mitigation programs (comprehensive plan policies and development standards) in six comparator cities.

McMinnville NHMP – Recommended Measures

The draft McMinnville NHMP (Table MA-1 McMinnville Action Items) proposes specific mitigation measures / action items for each moderate-to-high risk geological hazards.

Table VI.2 McMinnville NHMP Recommended Geological Hazard Measures

Policy Number	Policy Text	Evaluation
Earthquake #5	Educate property owners about structural and non-structural retrofitting of vulnerable buildings and encourage retrofit.	**Section VII includes a policy recommendation to this effect.**
Earthquake #6	Develop an outreach program to educate and encourage homeowners and tenants to	**Section VII includes a policy recommendation to this effect.**

Policy Number	Policy Text	Evaluation
	secure furnishings, storage cabinets, and utilities to prevent injuries and damage.	
Landslide #1	Utilize technology, geologic resources and other available data (such as DOGAMI LIDAR data) to identify and map potential areas for landslides - high, moderate and low.	**Sections I -V of this report include available GIS data sources and tools to identify and map potential landslide areas – both singularly and in combination with earthquake, wildfire and flooding hazards.**
Landslide #2	Develop a process to limit future development in high landslide potential areas - permitting, geotechnical review, soil stabilization techniques, etc.	**Section VI considers procedural and substantive options to limit development in moderate and high hazard areas. Section VII includes recommendations for a consolidated Natural Hazards Overlay District that includes permitting, geotechnical review and stabilization measures for landslide and earthquake areas.**
Landslide #3	Development in steeply sloped areas (greater than 15%) should be subject to specific development requirements to control erosion.	**Sections II-V identify the importance of steep slopes in determining the location of severity of landslide and wildfire hazards. Section VI considers the use of a 15% slope threshold for triggering specific erosion control requirements. Section VII includes recommendations for a consolidated Natural Hazards Overlay District that includes slope and other geological triggers for erosion control review. This overlay could be applied within the Natural Hazards Study Area to evaluate risk when considering future UGB expansion areas.**
Landslide #4	Complete an inventory of locations where critical facilities, other buildings and infrastructure may be subject to landslides.	**Section VII includes a policy recommendation to this effect.**

Best Geological Hazard Mitigation Practices in Comparator Cities

Winterbrook has provided a detailed summary of comprehensive plan policies and mitigation practices for geological hazards (steep slopes, earthquakes, and landslides) in six comparator communities (Ashland, Grants Pass, Albany, Newberg, Redmond and Bend). **Please see Appendix 1 Best Natural Hazard Mitigation Practices in Comparator Cities.**

The cities of Albany, Ashland, Bend, Grants Pass and Newberg limit development in mapped steeply sloped areas.

- The threshold for application of hillside steep slope standards varies from 12 – 25% slope.
- Most of these cities require the implementation of recommendations from geological studies and erosion control measures prior to development.
- Some cities require reduced residential densities based on slope percentage (slope density ratio).
- Some cities allow for density transfer – often through the planned unit development process.

Table VI.3 summarizes geological hazard management practices by city.

Table VI.3 Summary of Geological Hazard Management Practices by City

City	Percent Slope Threshold	Geotechnical Report Required?	Slope Density Ratio?	Density Transfer Allowed?	Earthquake Impacts Regulated by Zoning?	Other Standards
Albany	12%	Yes	Yes	Yes	Not directly – may be addressed in geotechnical report	Yes – see below
Ashland	25%	Yes	Yes	Yes	Not directly – may be addressed in required geotechnical report	Yes – see below
Bend	10-20%	Maybe	No	Yes	Not directly – may be addressed if geotechnical report required	Yes – see below
Grants Pass	15%	Yes	No	No	Not directly – may be addressed in required geotechnical report	Yes- see below
Newberg	20%	Maybe	No	No	Not directly – may be addressed in required geotechnical report	Yes – see below
Redmond	N/A	Maybe	No	No	Not directly – may be addressed if geotechnical report required	Yes – see below
McMinnville	N/A	No	No	No	No	Yes – see Section VII of this report

- **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

Albany's **Hillside Overlay District** applies to mapped areas of the city (primarily West Albany) with 12% or greater slope. Allowed density decreases as slope increases; however, density transfer is allowed through the PUD process when 20% of the site remains open space. Cut and fill activity should be minimized. A licensed engineer must approve excavation plans and foundation design.

- **Ashland's Physical and Environmental Constraints Overlay Zone** (Chapter 18.62) applies to mapped "Flood Plain Corridor Land, Hillside Land (slopes $\geq$ 25%, or Severe Constraint Land (including wildfire lands, floodways and slopes $\geq$ 35%)).
  - *"The above classifications are cumulative in their effect and, if a parcel of land falls under two or more classifications, it shall be subject to the regulations of each classification. Those restrictions applied shall pertain only to those portions of the land being developed and not necessarily to the whole parcel."*
  - Geotechnical engineering studies are required for development on slopes of 25% or greater.
  - Slopes $\geq$ 35% are considered unbuildable (maximum of 1 unit per acre provided geotechnical report recommendations are followed). No new lots may be created on such slopes. Hazardous or unstable areas of the site must be avoided.
  - The maximum cut slope height is 15 feet and the maximum fill slope height is 20 feet.
  - Trees must be protected based on an arborist report and must consider fire protection plan requirements in designated wildfire areas.

  On-site density transfer is allowed from non-buildable to buildable areas of the site (contiguous land under common ownership). The maximum allowable density on buildable areas of the site is twice the allowable density in the underlying zoning district.

- **Bend** maps and regulates development on "**sensitive lands"** which include both Goal 7 natural hazards and Goal 5 natural resources. Natural hazards included in the definition of "sensitive lands" include slopes of 10% or greater and land within the 100-year floodplain.
  - The Bend Comprehensive Plan includes policies to (a) coordinate with DOGAMI to identify fault lines in the community and (b) to review development "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." However, we could find no specific development standards to implement these policies.
  - Although the Bend Development Code defines steep slopes as 10% or greater (BDC 16.05.060), the threshold for requiring grading and erosion control permits (and possibly engineering reports) is slopes of 20% or greater. As part of grading permit review, the city "may" require an

engineering or geologist report if "the City determines that special circumstances warrant such information."
    - Minimum densities are determined after excluding "sensitive lands." (BDC 2.1.600) However, density transfer is allowed from land with slopes of 25% or greater to buildable areas on the same site if "sensitive lands" are protected by a conservation easement or dedication. There do not appear to be any restrictions on the amount of density that can be transferred.

- **Grants Pass** evaluated soil types for erosion and shrink-swell potential. The comprehensive plan 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.
    - 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's Comprehensive Plan** 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.
    - Comprehensive Plan Policy 5 states that "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."
    - **The Newberg Development Code** does not appear to have specific geological development regulations. However, sloped areas are regulated by Title 13 Public Utilities and Services, which "may require" additional erosion and sediment controls on slopes of 10 percent or more.

- **Redmond's Comprehensive Plan** includes several policies related to natural hazards:
    - 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.
    - Redmond's **Urbanization Study** indicates that "Redmond has no land that is unavailable for development due to physical constraints: steep slopes, wetlands, riparian areas, and floodplains. This is due to the city's location and the fact that the dry canyon is mostly in public ownership."
    - However, evaluation of hazards may be required during site and design review:

  The Redmond Development Code (RDC 8.3030) states that "Special Studies, Investigations and Reports. Special studies, investigations and reports may be required to ensure 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 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."

Flood Hazards

The text below considers (a) McMinnville MHMP flood hazard measures / action items and (b) flood hazard mitigation programs (comprehensive plan policies and development standards) in six comparator cities.

McMinnville NHMP – Recommended Flood Hazard Measures

The draft McMinnville NHMP (Table MA-1 McMinnville Action Items) proposes specific mitigation measures / action items for flood hazards.

Table VI.4 McMinnville NHMP – Evaluation of Recommended Flood Hazard Mitigation Measures

Policy Number	Policy Text	Evaluation
Flood #1	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	**The Comprehensive Plan already includes a policy to this effect.**
Flood #2	Work with FEMA to update FIRMs. Request DOGAMI debris flow and lidar data be included in FIRM updates. Use the updated FIRMS for land use and mitigation planning.	**Section III Flood Hazard Inventory relies on existing flood hazard information. Section VII includes a policy to update the flood hazard inventory in the future based on DOGAMI debris flow and lidar data.**
Flood #4	Develop and maintain GIS mapped critical facility inventory for all structures and residential and commercial buildings located within 100-year and 500-year floodplains.	**Section VII includes a policy recommendation to this effect.**

Best Flood Hazard Management Practices in Comparator Cities

As discussed below, the cities of Albany, Ashland, Bend, Grants Pass, Newberg and Redmond all limit development in mapped floodplain areas. **Please see Appendix 1 Best Natural Hazard Mitigation Practices in Comparator Cities** for a more detailed discussion of comprehensive plan policies and development regulations that limit development in flood hazard areas.

Table VI.5

City	Prohibit Development in Floodway	Limit Development in Flood Plain	Density Transfer Allowed?	Erosion Control Measures?	Other Standards
Albany	Yes	Yes	Yes	Yes	Yes – see below
Ashland	Yes	Yes	Yes	Yes	Yes – see below
Bend	Yes	Yes	No	Yes	Yes – see below
Grants Pass	Yes	Yes	No	No	Yes- see below
Newberg	Yes	Yes	No	No	Yes – see below
Redmond	Yes	Yes	No	No	Yes – see below
McMinnville	Yes	Yes	No	No	Yes – see Section VII of this report

Summary of Flood Hazard Management Practices by City

The Cities of Ashland, Albany, Bend, Grants Pass, Newberg and Redmond all have standard floodplain management programs consistent with FEMA standards. Development, if allowed within the 100-year floodplain, must be constructed one foot above flood level and meet other standards.

- Ashland's **Physical and Environmental Constraints Overlay Zone** regulates natural hazards as well as natural resources. Ashland integrates its floodplain management program with related natural resources (wetland and stream corridor) programs. In addition to designated floodplain areas, Ashland limits development in areas that have historically experienced flooding.
- Bend defines the 100-year floodplain as **"sensitive lands"** along with other natural hazards and natural resources (including wetlands and stream corridors).

Wildfire Hazards

Most comparator cities do not have reregulate wildfire hazards in their land use regulations. The text below considers (a) McMinnville NHMP wildfire hazard measures / action items and (b) wildfire hazard mitigation programs (comprehensive plan policies and development standards) in six comparator cities.

McMinnville NHMP – Recommended Measures

The draft McMinnville NHMP (Table MA-1 McMinnville Action Items) proposes specific mitigation measures / action items for wildfire hazards.

Table VI.5 McMinnville NHMP – Evaluation of Recommended Flood Hazard Mitigation Measures

Policy Number	Policy Text	Evaluation
Wildfire #1	Coordinate wildfire mitigation action items through the Yamhill County Community Wildfire Protection Plan.	**The CWPP was last revised in 2015. The revised version was considered in this report.**
Wildfire #3	Develop, implement, and enforce vegetation management codes/plans to reduce wildfire risk.	**Section V considers options for vegetation management measures – depending on the location of the wildfire hazard. Section VII includes recommendations for a consolidated Natural Hazards Overlay District that includes vegetation management provisions – again depending on the location of the hazard.**

Best Practices in Comparator Cities

Most comparator cities have participated in county community wildfire protection planning efforts. However, only Ashland has mapped and adopted zoning standards to protect life and property in designated wildlife hazard areas. **Please see Appendix 1 Best Natural Hazard Mitigation Practices in Comparator Cities** for a more detailed discussion of comprehensive plan policies and development regulations that limit development in wildfire hazard areas.

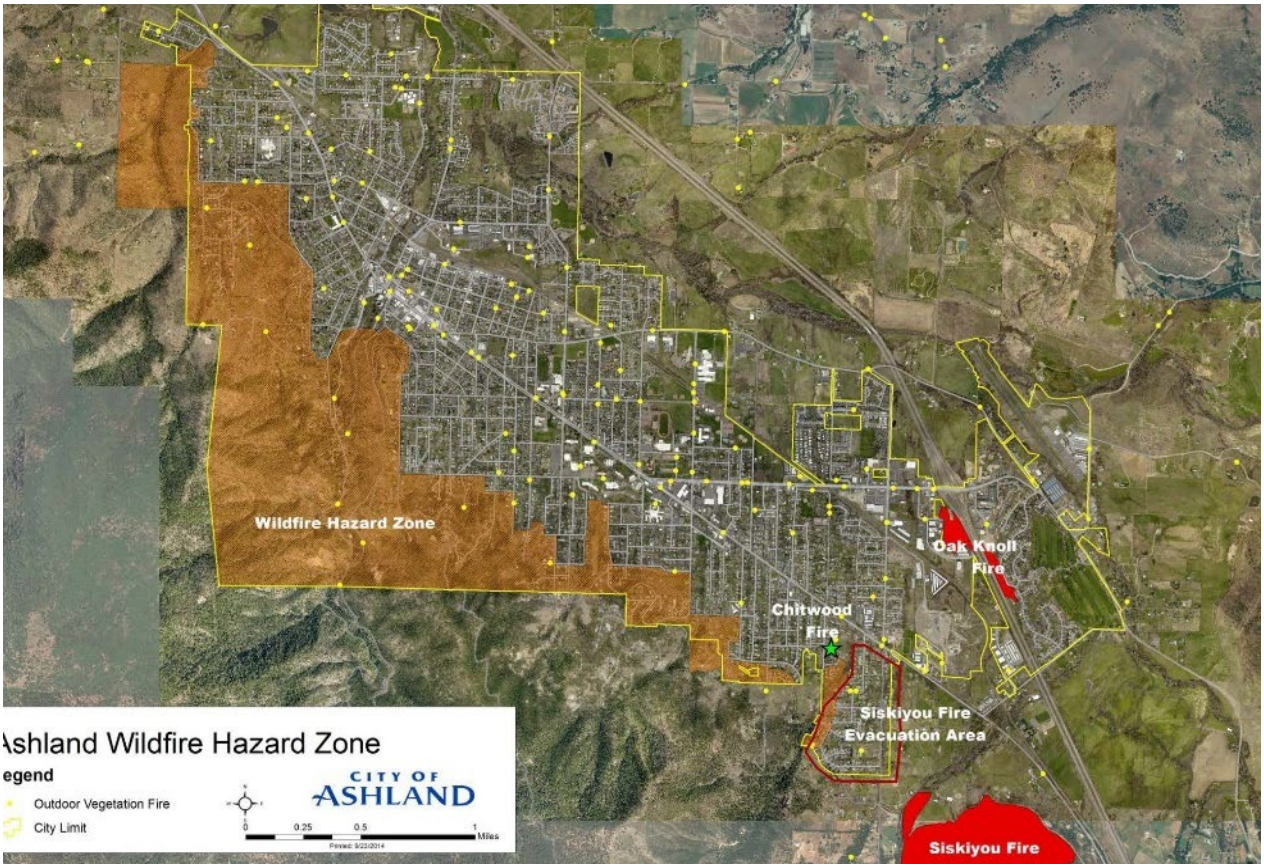
Ashland Wildfire Mitigation Program

Ashland's standards for wildfire mitigation mirror standards required by the Goal 4 administrative rule for structures in commercial forest zones. Ashland maps urban-wildland interface areas and has adopted 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 are not 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.

Figure VI-1 Ashland's Wildfire Hazard Overlay Zone



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

- 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 trimming, etc.).
- "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.

Composite Approach – Cumulative Impacts

As discussed above, most comparator cities separately regulate flooding with geological hazards (to varying degrees).

- All flood maps and regulations are based on FEMA standards and restrict development within floodplains and floodways.
- Most cities have some variation on hillside development overlay zones triggered by minimum slopes – ranging from 10% to 20%.
- Ashland is unique among comparator cities in have a single multi-hazard overlay zone – supported by a series of hazard-specific maps – that includes development standards for geological, flooding and wildfire hazards.

VII. Natural Hazard Program Recommendations

McMinnville's Existing Natural Hazard Policy Framework

McMinnville Comprehensive Plan (2017)

Winterbrook was able to find two Comprehensive Plan policies directly related to natural hazards:

> ***2.00 The City of McMinnville shall continue to enforce appropriate development controls on lands with identified building constraints, including, but not limited to, excessive slope, limiting soil characteristics, and natural hazards.***
>
> ***9.00 The City of McMinnville shall continue to designate appropriate lands within its corporate imits as "floodplain" to prevent flood induced property damages and to retain and protect natural drainage ways from encroachment by inappropriate uses.***

Policy 71.07 applies the relatively low density R-1 zoning designation to steeply sloped portions of the West Hills:

> ***71.07 The R-1 zoning designation shall be applied to limited areas within the McMinnville urban growth boundary. These include: 1. The steeply sloped portions of the West Hills.***

As noted in the Introduction to this report, McMinnville recently adopted Great Neighborhood Principles that call for consideration of natural features the long-range and land use application planning processes. This report helps to implement these policies.

In addition to these general policies described above, the McMinnville Residential Land Study (ECONorthwest, 2003) excludes slopes of 25% and greater and land within the 100-year floodplain from the buildable lands inventory. It is our understanding that the City requires sprinklers for homes constructed on slopes of 15% or greater.

Otherwise, there do not appear to be any other natural hazard policies in the McMinnville Comprehensive Plan.

McMinnville NHMP Plan Direction

From the McMinnville NHMP (p. MA-13):

> ***Incorporate mitigation planning provisions into community planning processes such as comprehensive, capital improvement, land use, transportation plans, zoning ordinances, community development practices, etc.***
>
> > *Rationale: Comprehensive plans provide the framework for the physical design of a community. They shape overall growth and development while addressing economic, environmental and social issues. Oregon's statewide goals are accomplished through local comprehensive plans. State Law requires local governments to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into action.*
> >
> > *Integration of NHMPs into comprehensive plans and other plans will help to reduce a community's vulnerability to natural hazards, support in mitigation activities, help to*

increase the speed in which action items are implemented and therefore the speed in which communities recover from natural disasters.

Integration of NHMPs into local plans gives the action items identified in the NHMP legal status for guiding local decision-making regarding land use and/ or capital expenditures.

Implementation: Integrate natural hazards information and policies into the comprehensive plan and other plans.

Engage in collaborative planning and integration.

Coordinate future NHMP and comprehensive plan reviews and updates.

Proposed Natural Hazards Comprehensive Plan Amendments

The proposed Comprehensive Plan amendment package would include:

- Natural Hazard Inventory Maps and Descriptions (Sections II-V of this report).
- Natural Hazard Management Policy Framework (a new Chapter XI: Natural Features)
- Natural Hazard Overlay shown on the Comprehensive Plan Map (shown on Figure VII-1)

Proposed McMinnville Zoning Ordinance Amendments

Proposed natural hazards policies call for the adoption of two natural hazards subdistricts (that would overlay the underlying base zones (Residential, Commercial, Industrial, Floodplain and Agricultural Holding). The proposed natural hazards subdistricts are based on a ranking system and policy framework set forth below and would include hazard-specific protection and mitigation standards. The two proposed subdistricts are shown on Map VII-1 and could be referenced in a new Chapter 17.50 Natural Hazard Subdistricts:

- The Natural Hazards Mitigation (NH-M) Subdistrict
- The Natural Hazards Protection (NH-P) Subdistrict

Natural Hazards Inventory

The Natural Hazards Inventory (including text and embedded maps) is included in Sections I-V and VII of this report. Copies of 11" X 17" GIS Inventory maps are provided separately.

Natural Hazards Composite Ranking System

The proposed Natural Hazard composite ranking system is based on two scored variables: the probability of a natural hazard event occurring at a specific location within the 2021 UGB and the vulnerability assessment of the natural hazard event happening. The probability variable is determined by combining the natural hazard inventory maps into a single overlay that describes the combined probability for individual "subareas" (GIS polygons). The vulnerability variable is informed by the 2020 *Oregon Natural Hazards Mitigation Plan* (Oregon NHMP). The terms "subarea" and "polygon" are used interchangeably to describe the composite ranking system. Appendix 2 contains a detailed methodology of the steps used to create the Natural Hazard Overlays.

Natural Hazard Probability

A combined natural hazard probability can be created by assigning a consistent number scoring system and by using a series of GIS manipulations. The number scoring system used in the rank of the probability score is displayed in Table VII.1. The scores were determined in coordination with McMinnville Associate Planner Jamie

Fleckenstein, and they are consistent with the ranking scale used in the Oregon NHMP. The scale runs from 0 to 5, with 0 being no or low probability of the natural hazard event happening at that spatial location and 5 being a high or severe probability of the natural hazard event happening.

- **Natural Hazard Type** shows the types of natural hazards that may be present in any given subarea.
- **Hazard Probability** shows the hazard levels that may be present for each hazard probability in any given subarea.
- **Hazard Probability Score** shows the hazard score for each type and level of hazard probability that may be present in any given subarea.

Table VII.1 Natural Hazard Risk Assessment (2021)

Natural Hazard Type	Hazard Risk Level	Individual Hazard Score
Landslide	Moderate	2
	High	5
Cascadia Subduction Zone Earthquake		
Liquefaction	Moderate	2
	High	5
Shaking	Very Strong	2
	Severe	5
Slope	25%	5
Flood	Floodplain	5
Wildfire	Moderate	2
	High/Severe	5

Natural Hazard Vulnerability – Oregon Natural Hazards Mitigation Plan

The Oregon NHMP was completed in the Fall of 2020. To remain consistent with the State's assessment, the plan was considered and incorporated as part of the natural hazard composite ranking system. The Oregon NHMP presents a series of natural hazard risk assessments for all Oregon counties. For simplification at the state level, these risk assessments were calculated county wide. The Oregon NHMP is broadly based on three variables:

1. The probability of the event happening.
2. The physical vulnerability of the event happening, and
3. The social vulnerability of the event happening.

These variables are summarized for Yamhill County in Table V11.2.

Table VII.2 Oregon NHMP Risk Assessment for Yamhill County

Hazards for Yamhill County	Probability	Physical Vulnerability				Social Vulnerability	Vulnerability (Social + Physical)		Risk (Prob. + Physical Social)	
		State Buildings	State Critical Facilities	Local Critical Facilities	Total Combined & Rescaled		Total Combined & Rescaled	Vulnerability	Total Combined & Rescaled	Risk
Earthquake	4	3	3	2	2.67	4	3.33	Very High	3.56	Very High
Flood	4	1	1	2	1.33	4	2.67	Moderate	3.11	High
Landslide	5	1	1	2	1.33	4	2.67	Moderate	3.44	Very High
Volcanic	1.5	1	1	1	1	4	2.5	Moderate	2.17	Low
Wildfire Hazard	2	1	1	1	1	4	2.5	Moderate	2.33	Moderate
County Total									**2.92**	**High**

Physical vulnerabilities were determined by assessing the concentration of state-owned or leased facilities and local critical facilities. Social vulnerabilities were based on Centers for Disease Control and Prevention (CDC) social vulnerability index. The Oregon NHMP uses 2016 data and aggregates at the County level, normalizing it with other Oregon Counties, grouping counties into quintiles, and then included state determined "sensitivity" and "adaptive capacity" rankings.

Because the state assessment is county wide, the probability of the natural hazard event occurring is based on the county-wide probability, regardless of spatial sensitivity to the event within the county. For example, wildfire hazards that are more probable in the west hills would be assigned the same probability in that location as if they were to occur in the City center or suburban areas. Since more detailed spatial probability of a natural hazard event occur is available – as detailed in the inventory maps of this report – the composite mapping relies only on the combined physical and social vulnerabilities determined by the Oregon NHMP. The probabilities of the natural hazard event occurring are replaced with the more spatially sensitive information contained in the inventories. The vulnerability index was only applied to a subarea when there was a moderate or high/severe probability of that natural hazard event occurring.

Combined (Cumulative) Ranking Applied Individually to Hazard Subareas

Using GIS, Winterbrook assigned a combined natural hazard risk score based on both the probability of the event happening and the state determined vulnerability of the event happening. This score was calculated for each spatial subarea (polygon) within the 2021 McMinnville UGB. Total probabilities and vulnerabilities were summed and averaged to produce a total risk score on a scale from 0 to 5, where 0 is low to no risk of the natural hazard event and 5 is high/severe risks of multiple hazard events. Each polygon now has 10 contributing variables. The combined natural hazard risk is detailed in Table V11.3.

Table VII.3 Combined Natural Hazard Risk by Natural Hazard Type in McMinnville

Natural Hazard Type	Probability of the Hazard in McMinnville		Social + Physical Vulnerability
Landslide	Moderate	2	2.67
	High	5	2.67
Cascadia Subduction Zone Earthquake			(Earthquake) 3.33
Liquefaction	Moderate	2	
	High	5	
Shaking	Very Strong	2	
	Severe	5	
Slope	➢25%	5	-
Wildfire	Moderate	2	2.50
	High/Severe	5	
Flood	Floodplain	5	2.67
	Floodway	5	

For discussion purposes, the McMinnville study area can be divided into two generalized areas in relation to hazard characteristics: low-lying (Valley) areas and higher-elevation areas (West Hills). Characteristics of Valley and West Hills areas in relation to combined hazard scores are summarized below. Note that the entire McMinnville 2021 UGB has a "very strong" probability of shaking. This hazard is included in the combined natural hazard risk calculations for consistency but does not affect subdistrict determination. Because of this, policies are recommended to address "very strong" shaking risks.

Valley Area Hazard Characteristics

The Cascadia Subduction Earthquake and flooding pose the greatest long-term threats to life and property in low-lying areas. Moderate earthquake liquefaction risk and "very strong" shaking hazards are present on most land within the UGB. These areas overlap with the 100-year flood plain and would trigger river and stream bank failures in the event of a major earthquake.

Valley area hazard scores have several inter-related characteristics:

- Due to the presence of moderate earthquake liquefaction and shaking hazards in most UGB subareas, the highest combined hazard risk score *outside* the 100-year floodplain is 2.75.
- Because floodplain polygons (score of 5) also have moderate earthquake liquefaction and very strong shaking hazards, the combined hazard score for most floodplain subareas is 3.571. Floodplain polygons are also likely to have also has moderate to severe wildfire risk (due to riparian vegetation) and moderate to high landslide risks (bank failure).
- Steep slopes in the valley are also more likely to correlate with floodplain and floodway areas. When outside of the floodplain and floodways, steep slopes occur with moderate to high landslide risks in most areas.

West Hills Area Hazard Characteristics

In the West Hills, landslide, steep slope, and wildfire hazards are common and often overlap. Earthquake liquefaction and shaking risk areas may also be located within the floodplains of Cozine and Baker Creeks.

- Subareas with moderate to severe wildfire risks have a combined score between 0.983 and 2.55. These wildfire risk areas often have moderate to high landslide risks.
- Subareas with steeps slopes always overlap with moderate to high landslide risk areas.
- Some moderate liquefaction areas are present along the tributaries of Cozine and Baker Creeks.

Natural Hazards – Combined Risk Categories and Related NH Subdistricts Map

There are three broad categories of natural hazards in the McMinnville 2021 UGB. These categories relate to proposed Natural Hazards Subdistricts (NH-M and NH-P) and are based on the subarea combined hazard risk score (probabilities and vulnerabilities). Table VII.4 summarizes how Winterbrook applied the cumulative hazard score for each of the 87 subareas in the Natural Hazards Study Area to determine the level of natural hazard protection.

Table VII.4 Designation of NH Subdistricts Based on Ranking of Natural Hazards Subareas

Combined Subarea Hazard Risk	Natural Hazard Overlay Subdistrict
0 to 0.99	No NH-Subdistrict
1 to 1.499	Natural Hazard Mitigation Subdistrict (NH-M)
1.5 to 3.517	Natural Hazard Protection Subdistrict (NH-P)

- **Subareas that have one or more high risk hazards areas with a combined hazard risk of 1.5 or more would be subject to the proposed Natural Hazard Protection (NH-P) Subdistrict** The NH-P prohibits most types of development; however, uses such as public utilities and resource enhancement are subject to hazard-specific development standards as well as building and fire codes. This category includes land within (a) floodplains and adjacent landslide and wildfire risk areas, and (b) some West Hills subareas with a combination of steep slopes, high landslide risk and moderate to high wildfire risk.
- **Subareas that have one or more moderate-to-high hazard risks with a combined hazard risk between 1 and 1.499 would be subject to the proposed Natural Hazards Mitigation (NH-M) Subdistrict**. Uses allowed by the underlying zoning district are allowed in the NH-M Subdistrict and are subject to hazard-specific development standards as well as building and fire codes. Much of the land within the West Hills falls within this category. Additional areas along creek tributaries, but outside of the floodplain, are included in this subdistrict. A larger mitigation area in the northeast is associated with dense tree groves and therefore severe wildfire hazards.
- **Subareas that are subject to moderate liquefaction or moderate wildfires only have a combined hazard risk of less than 1 and would not be subject to zoning regulation – but are subject to seismic building codes, fire codes and construction standards**. Most of the land within the UGB falls into this category.

Figure VII-1 shows the proposed Natural Hazards Overlay with Natural Hazards Mitigation (NH-M) and Protection (NH-P) Subdistricts that are derived from GIS data and based on Tables VII.1 and VII.2.

- The Natural Hazards Overlay would be shown on the comprehensive plan map.
- The subdistricts would be included in the McMinnville Zoning Ordinance and shown on the McMinnville Zoning Map.

As discussed in the Chapter XI Natural Features policy framework below, the McMinnville Urban Growth Management Agreement with Yamhill County could also be amended to apply Chapter XI policies and natural hazards overlay maps and regulations within the Natural Hazards Study Areas.

Figure VII-1 Proposed McMinnville Natural Hazards Overlay – Study Area

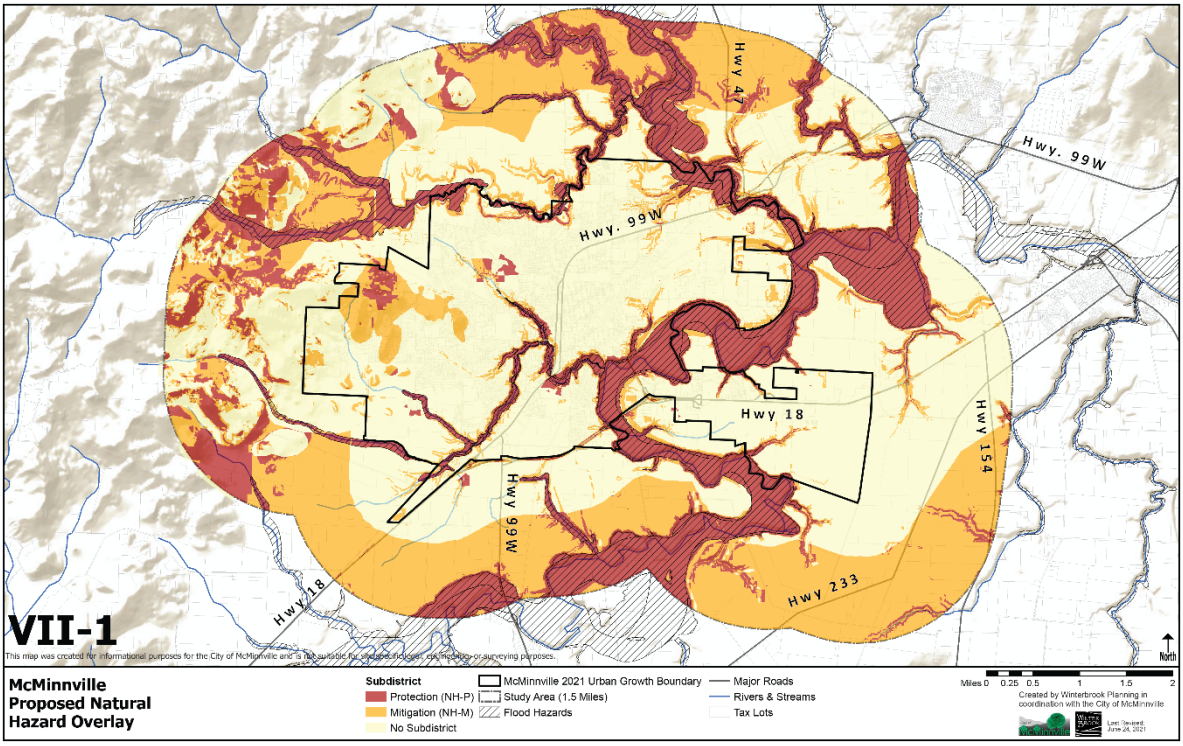
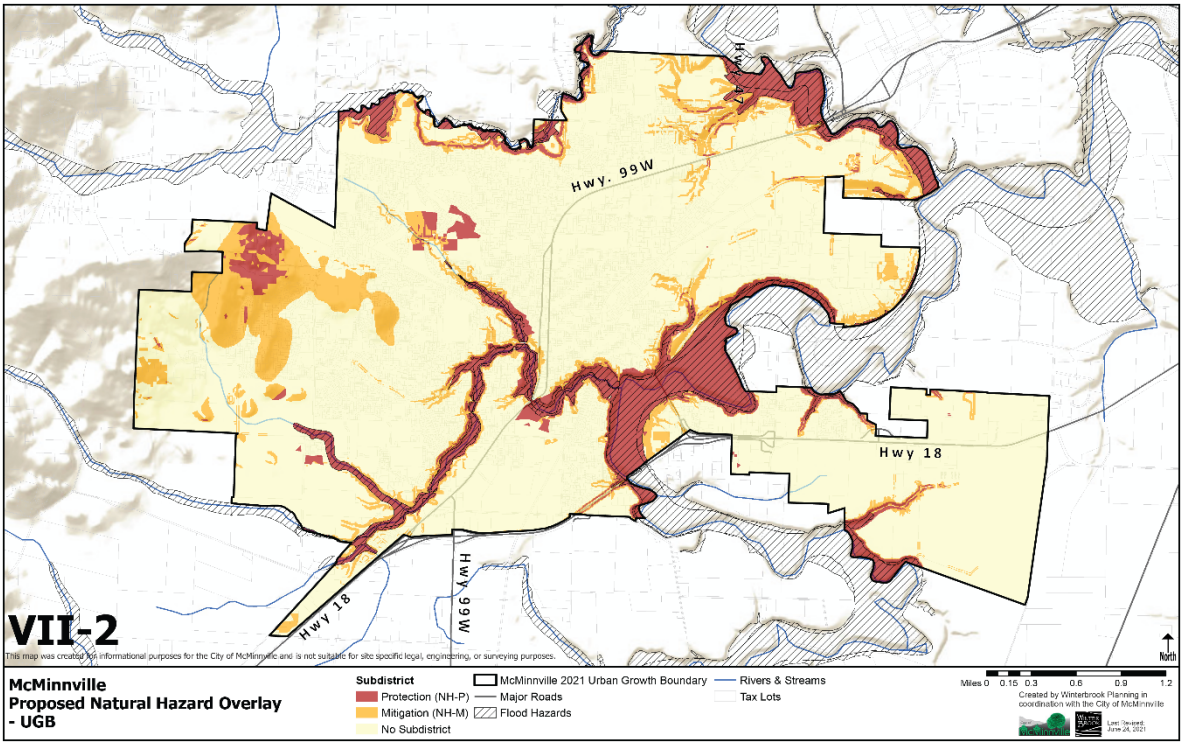


Figure VII-2 Proposed McMinnville Natural Hazards Overlay – 2021 Urban Growth Boundary



Recommended Natural Hazards Policy Framework

Winterbrook recommends that the following policy framework be added to the McMinnville Comprehensive Plan as a new Chapter XI: Natural Features.

Multi-Hazard Policies

Policy 197.00 The City of McMinnville shall adopt and maintain a Natural Hazards Inventory as part of the McMinnville Comprehensive Plan (Volume I). The inventory shall include maps and text that identify the location, type and risk level for three types of natural hazards: geological hazards (including steep slopes, earthquakes and landslides), flood hazards (land within the 100-year floodplain) and wildfire hazards within the study area (the UGB and the unincorporated outside the UGB).

Policy 197.00.010 The City of McMinnville shall apply public works construction standards, seismic building codes and fire and life safety codes wherever natural hazards are identified in the Natural Hazards Inventor – including limited, moderate and high combined risk subareas described in Table VII.1 of the Natural Hazards Inventory.

Policy 197.00.020 The City of McMinnville shall establish a **Natural Hazards (NH)** overlay zone to manage the cumulative effects of inventoried natural hazards in "moderate and high combined risk subareas" as described in Tables VII.1 and VII.2 of the Natural Hazards Inventory.

Policy 197.00.030 As shown on Figure VI-2, the NH overlay zone shall include two subdistricts based on cumulative ranking criteria found in Tables VII.1 and VII.2 of the Natural Hazards Inventory:

1. **The Natural Hazards Mitigation Subdistrict (NH-M)**. The NH-M is intended to mitigate hazard impacts based on objective development standards for each applicable hazard type and the recommendations of required site-specific hazard studies.
2. **The Natural Hazards Protection Subdistrict (NH-P).** The NH-P Subdistrict is intended to prohibit most types of development and may allow for residential density transfer. Where development is allowed it shall be subject to objective development standards for each applicable hazard type and the recommendations of required site-specific hazard studies.

Policy 197.00.040 The NH-M and NH-P Subdistricts shall include objective development standards for each type of natural hazard identified the Natural Hazards Inventory, including landslide, earthquake (liquefaction and shaking), floodplains and wildfire hazards. Floodplains shall be protected by the underlying F-P Flood Hazard zone and the NH-P Subdistrict.

1. Specific information regarding the location and severity for each type of hazard in each subdistrict are available in 11" X 17" format and in the City's GIS data base.
2. In cases where hazard-specific development standards overlap, the more restrictive standard shall apply.

Policy 197.00.060 Based on objective development standards and required hazard studies, the City of McMinnville may impose conditions of land use approval to protect life and property and mitigate natural hazard impacts in natural hazard subareas. Such conditions may include, but are not limited to, conservation easements or dedication of hazard areas to the City.

Policy 197.00.060 Land division applications shall not result in a lot that lacks sufficient buildable area to meet the minimum lot size and development standards applicable in the underlying zoning district.

Policy 197.00.070 New residential, commercial and industrial construction shall be prohibited within the NH-P Subdistrict with the following exceptions:

1. Public facilities and environmental restoration projects may be permitted under objective development standards.

2. Agricultural and forest uses are permitted within the NH-P Subdistrict in areas zoned for exclusive farm and commercial forest use.

3. Residential density transfer from land within the NH-P Subdistrict to contiguous property under the same ownership that is outside both the NH-M and NH-P Subdistricts may be allowed. The maximum density allowed in the transfer area shall be the maximum density allowed in the next higher residential zoning district. For example, density transfer from the NH-P land with an underlying R1 zone to land outside the Natural Hazards Overlay (NH-P and NH-M) shall be capped at the density allowed in the R2 zone.

4. In situations where density transfer is not feasible, one dwelling unit may be allowed on a vacant residential tract under common ownership that is outside the 100-year floodplain *if* consistent with the recommendations of a geotechnical engineering study and any conditions required by the review authority.

Policy 197.00.080 In cases where application of NH-P provisions would prohibit all reasonable economic use of an existing tract of land under common ownership, the City may grant an exception to allow a use permitted in

the underlying zoning district that is not permitted in the NH-P Subdistrict. In making this decision, the applicant and City must:

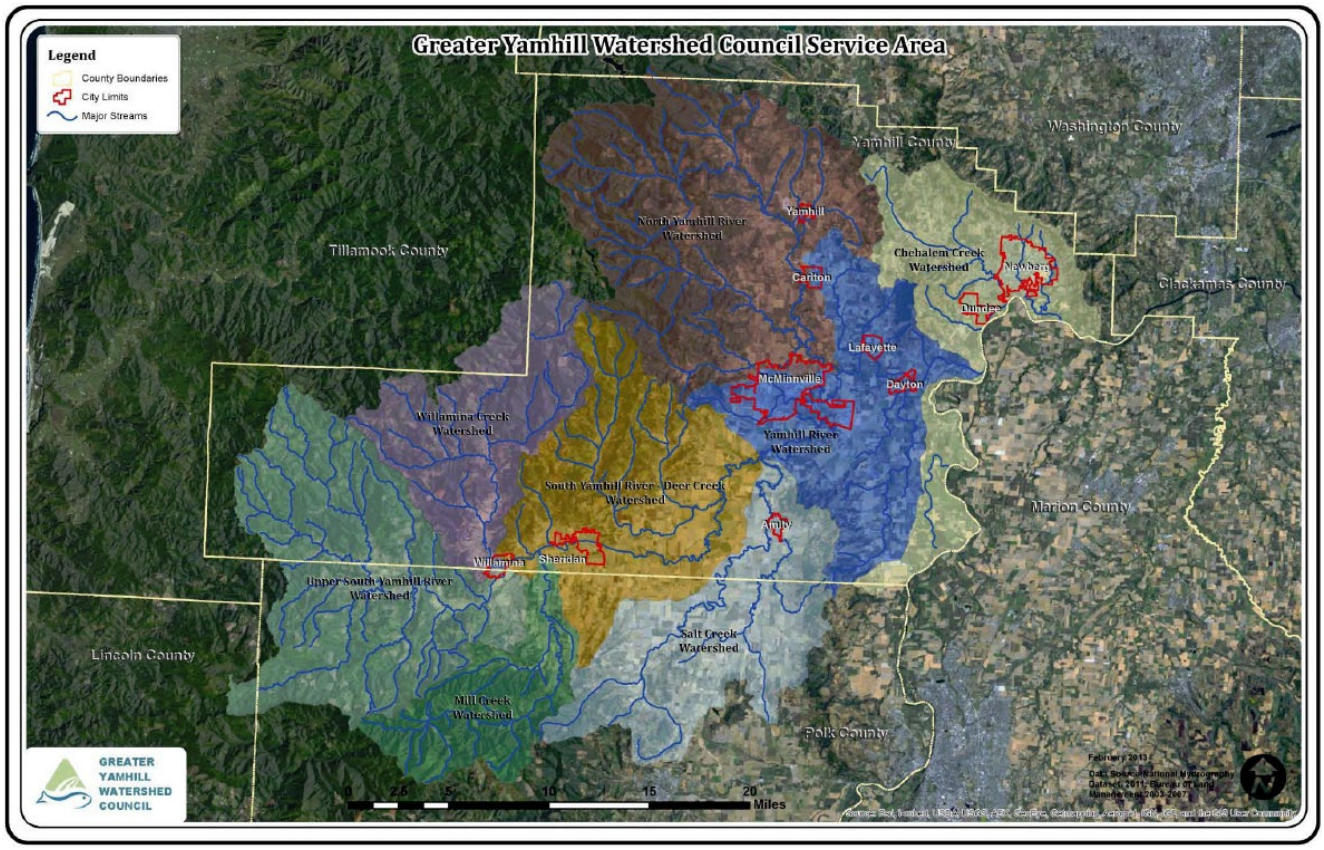
1. Consider first whether the exception provisions of Policy 197.00.070 would relieve the hardship;
2. Consider potential uses that are allowed in the NH-P Subdistrict that could provide reasonable economic value;
3. Consider alternative development layouts and land use intensity that minimize impacts from natural hazards on people and property and other values associated with natural hazard areas;
4. Limit the intensity of the allowed land use to the minimum necessary to retain reasonable economic value of the subject tract; and
5. Meet all applicable development standards that apply to natural hazards in the NH-P zone.

Policy 197.00.090 The City of McMinnville shall coordinate with Yamhill County to apply McMinnville Comprehensive Plan Chapter XI Natural Features Policies to unincorporated land within the Natural Hazards Study Area, including the application of the NH overlay zone (the NH-M and NH-S subdistricts) and related development standards. In cases of conflict with state law governing farm and forest land, state law will prevail over the NH overlay zone standards. For example, agricultural and forest uses allowed in Agricultural and Forest zones shall continue to be allowed; and the more restrictive fire mitigation standards in the County's forest zones will prevail over the less restrictive City fire mitigation standards.

Policy 197.00.100 The City of McMinnville shall coordinate with the Oregon Department of Geology and Mineral Industries (DOGAMI), the Department of Land Conservation and Development (DLCD), the McMinnville Fire Department, and Yamhill County in updates of the Yamhill County Multi-Jurisdictional Natural Hazards Mitigation Plan, the McMinnville Addendum to County NHMP, and the Yamhill County Community Wildfire Protection Plan. Updates to these plans will be considered in future updates to Chapter XI of the McMinnville Comprehensive Plan.

Policy 197.00.110 The City of McMinnville shall coordinate with the Greater Yamhill Watershed Council to facilitate watershed restoration and improvement projects in natural hazard areas such as floodplains and slide hazard areas. Shared natural hazard mitigation goals include: (1) removal of invasive vegetation species (that that increase fuel for wildfires and clog waterways) and replacement with native species that reduce erosion, are more fire resistant and are less likely to clog waterways; and (2) restoration and enhancement of wetlands that provide flood control.

Figure VII-3 Greater Yamhill Watershed Council Service Area



Policy 197.00.120 New development applications shall include a Tree Removal and Mitigation Plan within the NH-M and NH-P Subdistricts. To minimize erosion and landslide potential and to maintain water quality, removal of more than three trees over 6 inches dbh[10] in a calendar year shall require a Tree Removal and Mitigation Plan prepared by a certified arborist. The plan shall ensure replacement of lost trees with fire resistant native trees and vegetation. The following exceptions to this policy shall apply where:

1 Tree removal is permitted in the underlying Yamhill County farm or forest zone.
2 The proposal is part of a watershed restoration or enhancement project sponsored by a relevant Watershed Council that meets applicable City development standards.
3 The proposal is part of a fire protection program approved by the City of McMinnville Fire Department or RFPD. (See Wildfire Hazard Policies below.)
4 The proposal is necessary to meet fuel reduction standards in wildfire hazard areas pursuant to Wildfire Policies 200.050.00 and 200.060.00.

[10] Diameter at breast height – or 4'6" above ground.

Geological Hazard Policies

Policy 198.00 Geological hazards appear on the McMinnville Natural Hazards Inventory and include: (1) Slopes of 25% or more; (2) Moderate, high and severe risk earthquake (liquefaction and shaking) risk areas; and (3) Moderate and high-risk landslide hazard areas.

Policy 198.10 The NH-P and NH-M Subdistricts shall apply to subareas with geological hazards as shown on Map VII-2 of the Natural Hazards Inventory. Specific geological hazards found in each subdistrict are available in 11" X 17" format and in the City's GIS data base.

Policy 198.20 Residential and commercial construction in areas with moderate or high geological risk hazards – as indicated on the Natural Hazards Inventory – shall meet the seismic and slope stability provisions of the Oregon State Building Codes. The Building Official may require a geotechnical engineering study prior to approval of construction.

Policy 198.30 The City of McMinnville shall require erosion control measures prior to grading or construction in subareas with:

1. Slopes of 15% or greater, and
2. Landslide hazards in the NH-M and NH-P Subdistricts.

Policy 198.040.00 The City of McMinnville shall require geological reconnaissance studies with the submission of land development applications where geological hazards are present within the NH-M and NH-P Subdistricts. The recommendations of the geological reconnaissance study shall become conditions of land use approval unless specifically exempted or modified by the review authority.

Policy 198.50 Where recommended in a required geological reconnaissance study – or where determined necessary by the City Engineer or Building Official in moderate risk landslide hazard areas that are not included in the NH-M Subdistrict – a geotechnical engineering study may be required prior to grading, land development or construction.

Policy 198.60 The City of McMinnville shall retain the services of a qualified geologist or geological engineer to review geological studies prepared for land use applicants.

1. The City Engineer shall determine whether a second professional opinion is required.
2. The costs of peer review shall be borne by the applicant.

Policy 198.70 The City shall consider adopting standards for public street and utility construction to moderate or higher geological hazard areas.

Policy 198.80 Because trees contribute to slope stability and reduce erosion, tree removal shall be limited in the NH-M and NH-P Subdistricts pursuant to Policy 197.120.00.

Flood Hazard Policies

Policy 199.00 Flood hazards areas are located within the designated 100-year floodplain. The City of McMinnville will continue to prohibit most types of development within the 100-year floodplain consistent with the City's F-P Flood Hazard Zone.

Policy 199.10 Natural geological and wildfire hazards associated with the 100-year floodplain, including but not limited to overlapping landslide areas, will be addressed in NH-P Subdistrict development standards. Overlapping wildfire and geological hazards found in NH-P Subdistrict that overlay the F-P Flood Hazard Zone are available in 11" X 17" format and in the City's GIS data base.

Policy 199.20 The City of McMinnville is committed to continued participation in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management regulations.

Policy 199.30 The City of McMinnville will work with the Federal Emergency Management Agency (FEMA) to update Flood Insurance Rate Maps (FIRM). The City will request Oregon Department of Geology and Mineral Industries (DOGAMI) debris flow and lidar data be included in FIRM updates.

Policy 199.40 The City of McMinnville will develop and maintain GIS maps of critical facilities identified in the McMinnville NHMP for all structures and residential development and commercial buildings within the 100-year and 500-year floodplains.

Policy 199.50 Because wetlands serve an important flood control function, wetland fill and removal shall not be permitted within the 100-year floodplain unless there is no reasonable alternative for a planned public works project.

Policy 199.60 The City of McMinnville will coordinate with the Greater Yamhill Watershed Council (or its affiliates) regarding stream and river restoration and enhancements projects to restore native vegetation, improve bank stability and improve water quality.

Policy 199.70 Because trees and vegetation reduce streambank failure and improve water quality, tree removal shall be limited in the NH-M and NH-P Subdistricts pursuant to Policy 197.120.00.

Wildfire Hazard Policies

Policy 200.00 Moderate, high, and severe wildfire hazard areas appear on the Natural Hazards Inventory and are generally associated with the West Hills and vegetated floodplains.

1. Where wildfire hazards subareas overlap with geological or floodplain hazards, they may be subject to NH-P or NH-M Subdistrict requirements, consistent with the ranking criteria found in the Natural Hazards Inventory and as shown on Natural Hazards Inventory Map VII-1.
2. Existing fire standards in Yamhill County forest zones shall continue to apply.

Policy 200.10 City staff shall coordinate with the McMinnville Fire Department and RFPD to encourage fire safety planning and education – especially in Wildfire Urban Interface zones and designated Fire Reduction Areas in the West Hills. The City of McMinnville shall continue to coordinate wildfire mitigation action items through the Yamhill County Community Wildfire Protection Plan.

Policy 200.20 Residential, commercial and industrial development shall not be permitted in wildfire risk subareas in the NH-P Subdistrict; However, exceptions may be permitted pursuant to Natural Hazard Policies 197.070.00 and 197.080.00.

Policy 200.30 Development density in wildfire risk areas in the NH-M Subdistrict may be limited where necessary to provide adequate space for fuel breaks in areas that are threatened by two or more natural hazards.

Policy 200.40 In the NH-P and NH-M Subdistricts with identified wildfire hazards, applicants for land divisions and new development (excluding home remodels or additions) shall prepare a Fire Prevention and Control Plan in coordination with the McMinnville Fire Department or RFPD. The plan shall be prepared by a certified arborist and shall consider necessary tree and vegetation removal, erosion control and replacement of lost trees and vegetation with native, fire-resistant trees and vegetation.

Policy 200.50 Based on the Fire Prevention and Control Plan, the following wildfire mitigation standards shall be met:

1. Installation and maintenance of at least a 40-foot fuel break around each new dwelling or structure.
2. 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.
3. Provision of one or more than one ingress/egress route or road widths wide enough to accommodate incoming fire apparatus and evacuating residents simultaneously in an emergency situation.
4. Roofs and siding with fire-resistant materials. Wood shake or shingle roofs are not allowed.
5. Design road placement to function as fire breaks in urban wildland interface developments.
6. Chimneys of wood-burning devices to be equipped with spark arrester caps and/or screens.
7. Underground electrical distribution circuits if technically feasible.
8. Sprinkler systems in all dwelling units and occupied buildings.

ATTACHMENT 5

Appendix 1

Best Natural Hazards Management Practices in Comparator Cities

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.[1] 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.

[1] "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.[2]

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.

[2] 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, [3] and building envelope and design standards.[4]

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:

[3] E.g., per Section 18.3.10.090.D.5 "Development shall be designed to preserve the maximum number of trees on a site."

[4] 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 Gradings, 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.[5] 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.

[5] 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[6] 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.

[6] 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[7] 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.

[7] 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).[8]

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.

[8] 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."[9]

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

[9] 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.l. 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.

ATTACHMENT 6

Appendix 2: Natural Hazard Overlay Methodology

Prepared by:

Contents

Data and Sources

- DOGAMI: Landslide Susceptibility
- DOGAMI: Landslide Inventory - Statewide Landslide Information Database for Oregon (SLIDO)
- DOGAMI: LiDAR and Digital Elevation Model (10 Meters)
- DOGAMI: Earthquake Shaking and Liquefaction Risks
- DLCD and DOGAMI: Oregon Statewide Flood Hazard Database - FEMA Flood Insurance Studies – 2015
- Yamhill County Community Wildfire Protection Plan (CWPP, Revised 2015): Rural Fire Protection Districts
- USFS Pacific Northwest Region Wildfire Risk Assessment (PNRA) – 2018
- Date: April, 2018Geospatial Enterprise Office: Oregon Rivers
- Geographic Information Services Unit, ODOT: Oregon Transportation Network – 2017
- DLCD: McMinnville Urban Growth Boundary – 2018
- Yamhill County Tax Assessor: Yamhill County Tax Lots
- DLCD: Oregon Zoning
- DLCD: Oregon City Limits
- DLCD: Oregon Natural Hazards Mitigation Plan (Oregon NHMP) – 2020

I. Methods by Mapping Product

Inventory I-1: McMinnville Natural Hazards Study Area

1. Isolate McMinnville Urban Growth Boundary (UGB) from statewide 2018 Urban Growth Boundary file.

2. Modify UGB to reflect adopted 2020 amendments

Inventory I-2: McMinnville Study Area Slopes

1. Slice Digital Elevation Model (DEM) 10 Meters to SA
2. Use "Slope" tool to generate Slope raster by percent rise
3. Use "Reclassify" to reclassify raster by 0% to 14.9%, 15% to 24.9%, 25% to 39.9%, and 40% or greater
4. Use "Raster to Polygon" to convert Slope to polygons
5. Use "Contour" to convert DEM in SA to 10 Meter Contours. Contour interval: 10 meters. Contour type: contour.

Inventory I-3: McMinnville Rural Areas Zoning

1. Clip Oregon Zoning (OZ) to SA
2. Clip Tax Lots (TL) to SA
3. Display OZ based on field "orZDesc"

Inventory II-1: McMinnville Geologic Hazards: Landslides

1. Slice Landslide Susceptibility raster (LS) to SA
2. Use "Raster to Polygon" to convert LS to polygons
3. Dissolve LS on field "Description"
4. Display LS based on field "Description" for moderate and high risk areas

Inventory II-2: McMinnville Geologic Hazards: Cascadia Subduction Earthquake Shaking

1. Import TIF of Earthquake Shaking areas into ARC
2. Resize and align to SA
3. Create new polygon shapefile
4. Trace "Severe Shaking" areas
5. Union new Shaking polygon to SA
6. Define areas outside of "Severe Shaking" as "Very Strong Shaking" areas
7. Display Shaking polygon by "Severe Shaking" and "Very Strong Shaking"

Inventory II-3: McMinnville Geologic Hazards: Earthquake Liquefaction Susceptibility

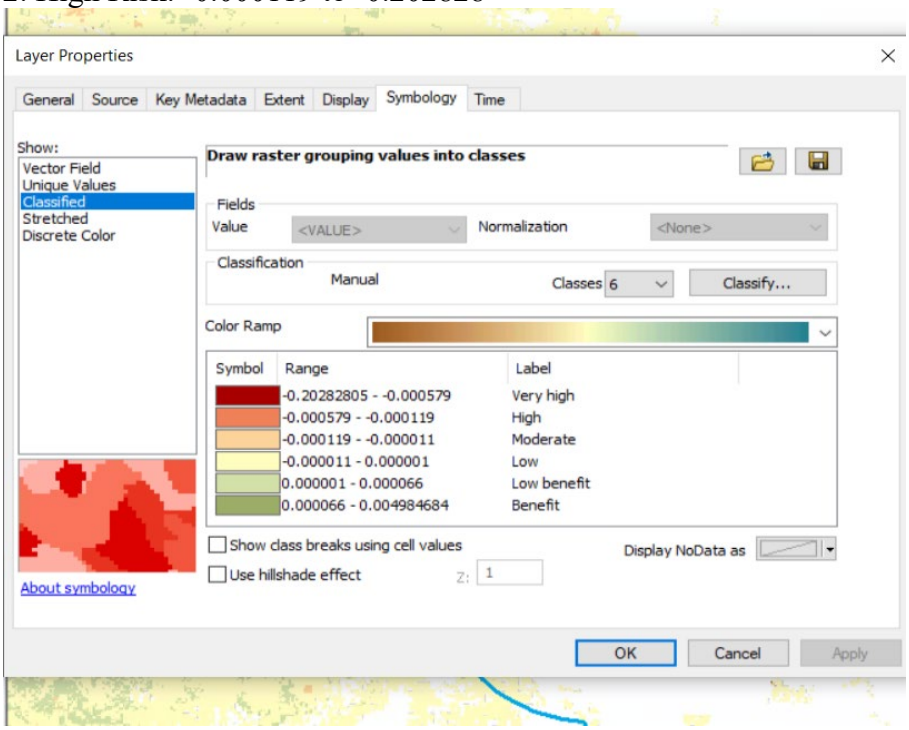
1. Dissolve by "Liquefaction Susceptibility Score"
2. Clip to SA
3. Classify and display by "Liquefaction Susceptibility Score"
    a. Low Risk: Susceptibility Sore 2
    b. Moderate Risk: Susceptibility Score 3
    c. High Risk: Susceptibility Score 4

Inventory III-1: McMinnville Flood Hazards

1. Clip Flood (FL) layer to SA
2. Dissolve by field "FLD_ZONE"
3. Classify and display by field "FLD_ZONE"

Inventory IV-2: McMinnville Potential Wildfire Impact to People and Property

1. Display "Potential Impact to People and Property" layer in wildfire geodatabase
2. Check projection to read: NAD_1983_Oregon_Statewide_Lambert_Feet_Intl
3. Use "Reclassify" to reclassify raster:

a. Delete: Fire Benefits: 0.004984684 to 0
b. 0: Low Risk: 0 to -0.000011
c. 1: Moderate Risk: -0.000011 to -0.000119
d. 2: High Risk: -0.000119 to -0.202828
e. 

4. Use “Raster to Polygon” to convert tif file to polygons
5. Dissolve by reclassified grid code
6. Clip to SA
7. Classify and display by grid code

Composite Hazards VII-1: McMinnville Proposed Natural Hazard Overlay

1. For each final shapefile clipped and displayed in the inventory maps, add a field “Prob_S” and assign the following individual hazard score to the hazard risk levels defined by natural hazard type (see table below).

Natural Hazard Type	Hazard Risk Level	Individual Hazard Score
Landslide	Moderate	2
	High	5
Cascadia Subduction Zone Earthquake		
Liquefaction	Moderate	2
	High	5
Shaking	Very Strong	2
	Severe	5
Slope	➢ 25%	5
Wildfire	Moderate	2
	Severe/High	5
Flood	Floodplain	5
	Floodway	5

2. Delete hazard risk levels that are not described in the table above from all of the natural hazard final shapefiles (i.e., "very low", "low", no flood risks, etc.).
3. Use "Union" to combine all modified hazard final shapefiles into a single shapefile: Natural Hazard Overlay (NHO)
4. Clip NHO to McMinnville UGB
5. Assign "0" to probabilities (Prob_S) with "null"
6. Add a field "Total_Prob" that sums all hazard probabilities (Prob_S)
7. Reference the Oregon Natural Hazards Mitigation Plan (ORNHMP) to determine vulnerability assessments for Yamhill County. Vulnerability assessments are displayed I the table below and are derived from the following tables within the ORNHMP report:
    a. Table 2-8. Earthquake Hazard, 2020 Risk Assessment
    b. Table 2-9. Flood Hazard, 2020 Risk Assessment
    c. Table 2-10. Landslide Hazard, 2020 Risk Assessment
    d. Table 2-12. Volcanic Hazard, 2020 Risk Assessment
    e. Table 2-13. Wildfire Hazard, 2020 Risk Assessment
    f. Table 2-14. Seven Hazards Combined, 2020 Risk Assessment

Hazards for Yamhill County	Probability	Physical Vulnerability				Social Vulnerability	Vulnerability (Social + Physical)		Risk (Prob. + Physical Social)	
		State Buildings	State Critical Facilities	Local Critical Facilities	Total Combined & Rescaled		Total Combined & Rescaled	Vulnerability	Total Combined & Rescaled	Risk
Earthquake	4.00	3.00	3.00	2.00	2.67	4.00	3.33	VH	3.56	VH
Flood	4.00	1.00	1.00	2.00	1.33	4.00	2.67	M	3.11	H
Landslide	5.00	1.00	1.00	2.00	1.33	4.00	2.67	M	3.44	VH
Volcanic	1.50	1.00	1.00	1.00	1.00	4.00	2.50	M	2.17	L
Wildfire Hazard	2.00	1.00	1.00	1.00	1.00	4.00	2.50	M	2.33	M
County Total									2.92	H

8. Add the following fields to represent hazard vulnerabilities: "Vul_Earth", "Vul_Flood", "Vul_Lands", and "Vul_WF"
9. Assign the following vulnerability score to each corresponding field <u>when that hazard is present</u> (see table below)

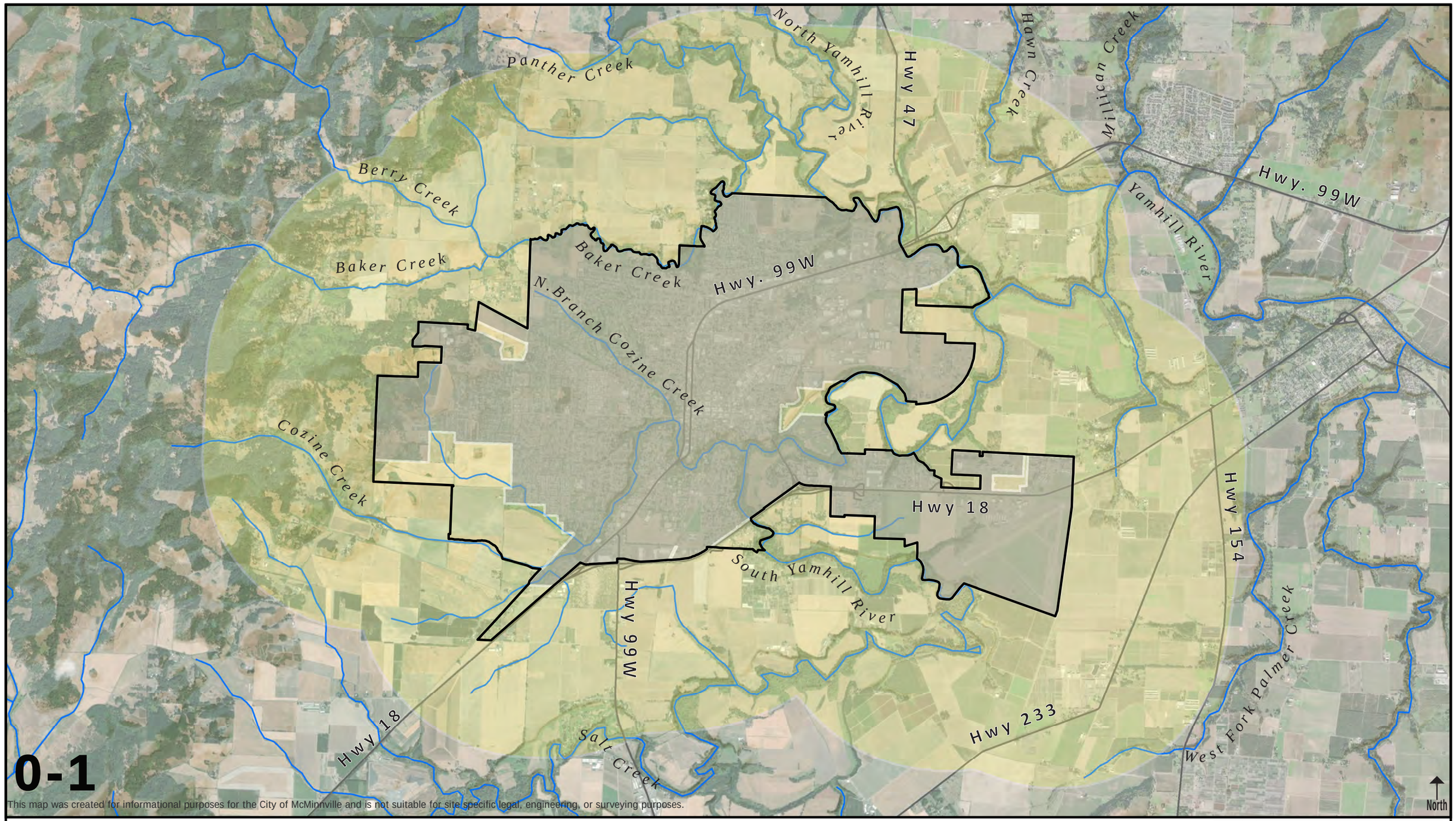
Natural Hazard Type	Probability of the Hazard in McMinnville		Social + Physical Vulnerability
Landslide	Moderate	2	2.67
	High	5	2.67
Cascadia Subduction Zone Earthquake			
Liquefaction	Moderate	2	(Earthquake) 3.33
	High	5	
Shaking	Very Strong	2	
	Severe	5	
Slope	➢ 25%	5	-
Wildfire	Moderate	2	2.50
	Severe/High	5	
Flood	Floodplain	5	2.67
	Floodway	5	

10. Add a field "New_Tot" and calculate based on the sum and average of the total probability and the vulnerability fields
11. Classify and display by "New_Tot" in the following breaks:
    a. No Subdistrict: 0.533 – 0.99
    b. Mitigation: 1 – 1.499
    c. Protection: 1.5 – 3.517
12. Refine Overly
    a. Identify polygons under 1,000 sq. ft. that are noncontiguous to other mitigation/protection areas
    b. Polygons under 1,000 sq. ft. and within riparian corridor categorized as either mitigation or no overlay and were touching a protection layer were reclassed as protected
    c. Mitigation polygons under 1,000 sq. ft. touching a protection layer and isolated from other mitigation areas were reclassed as protected
    d. Polygons with no overlay that are under 1,000 sq. ft. that are touching and surrounded by protection areas were reclassed as protected
    e. Polygons with no overlay that are under 1,000 sq. ft. that are touching and surrounded by both protection and mitigation layer were reclassed as mitigation
    f. Mitigation polygons under 1,000 sq. ft. that are surrounded by areas with no overlay – protection or mitigation – were reclassed without an overlay
    g. Repeat process for polygons between 1,000 and 2,000 sq. ft., where deemed appropriate.

ATTACHMENT 7

Appendix 3: Natural Hazard Inventory and Natural Hazard Overlay Maps

Prepared by:



McMinnville Natural Hazards Study Area

- McMinnville 2021 Urban Growth Boundary
- McMinnville 2019 Urban Growth Boundary
- Study Area (1.5 Miles from 2019 UGB)
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 22, 2021

Hwy 47

Hwy. 99W

Hwy. 99W

Hwy 18

Hwy 99W

Hwy 154

Hwy 18

Hwy 233

I-1

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

North

McMinnville Slopes

Slope Percent

- 15% to 24.9%
- 25% to 39.9%
- > 40%

- Contours (10 Meters)
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 22, 2021

Hwy 47

Hwy. 99W

Hwy. 99W

Hwy 18

Hwy 99W

Hwy 154

Hwy 18

Hwy 233

1-2

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North

McMinnville Rural Area Zoning

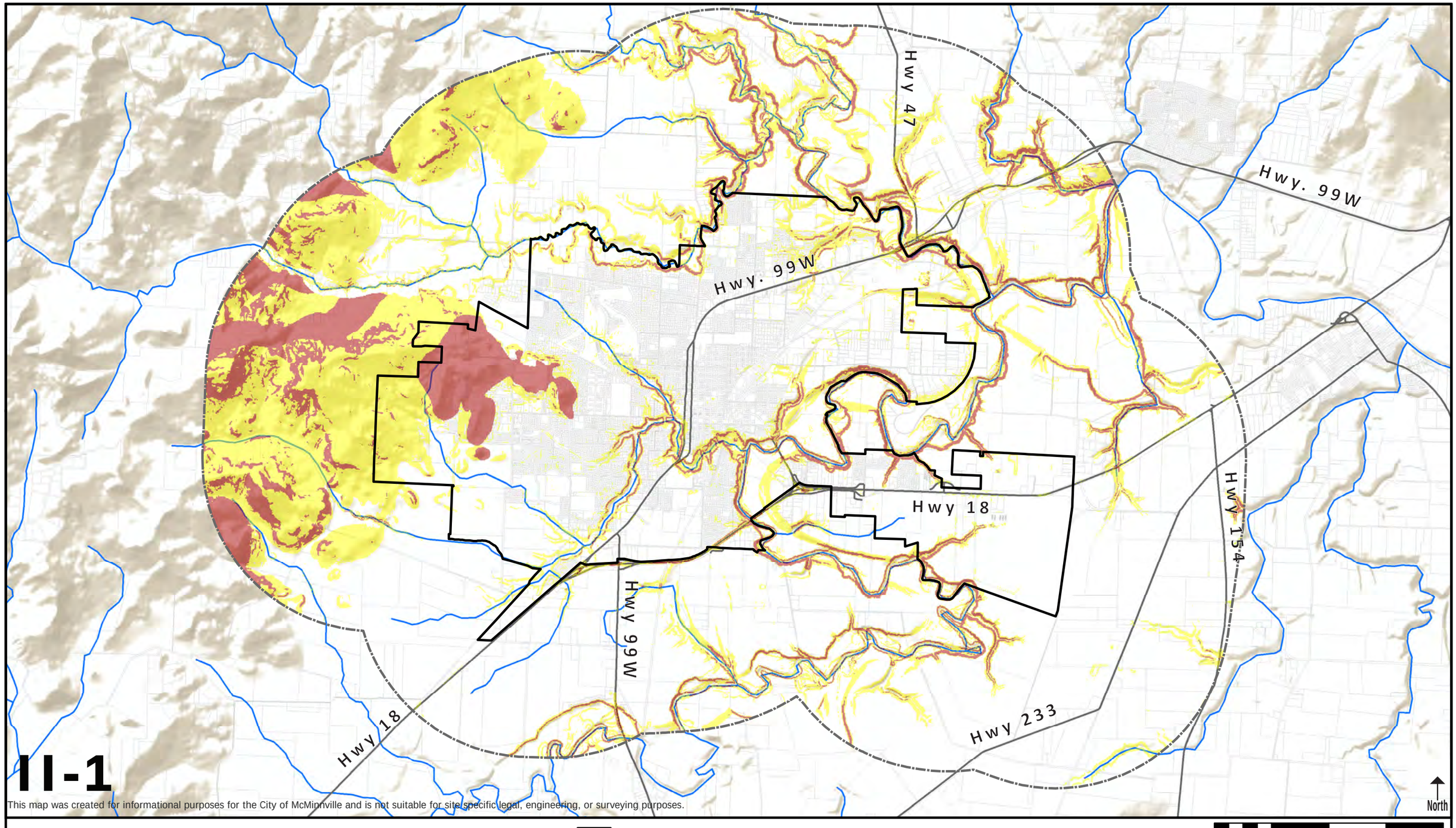
Yamhill County Zoning

- Exclusive Farm Use 20+
- Exclusive Farm Use 40+
- Exclusive Farm Use 80
- Mixed Farm-Forest 40
- Open Space/Conservation
- Other
- Prime Forest 80
- Rural Commercial
- Rural Industrial
- Rural Residential 1 acre
- Rural Residential 10 acres
- Rural Residential 2-4 acres
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- City Limits
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 21, 2021



II-1

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville Geologic Hazards: Landslides

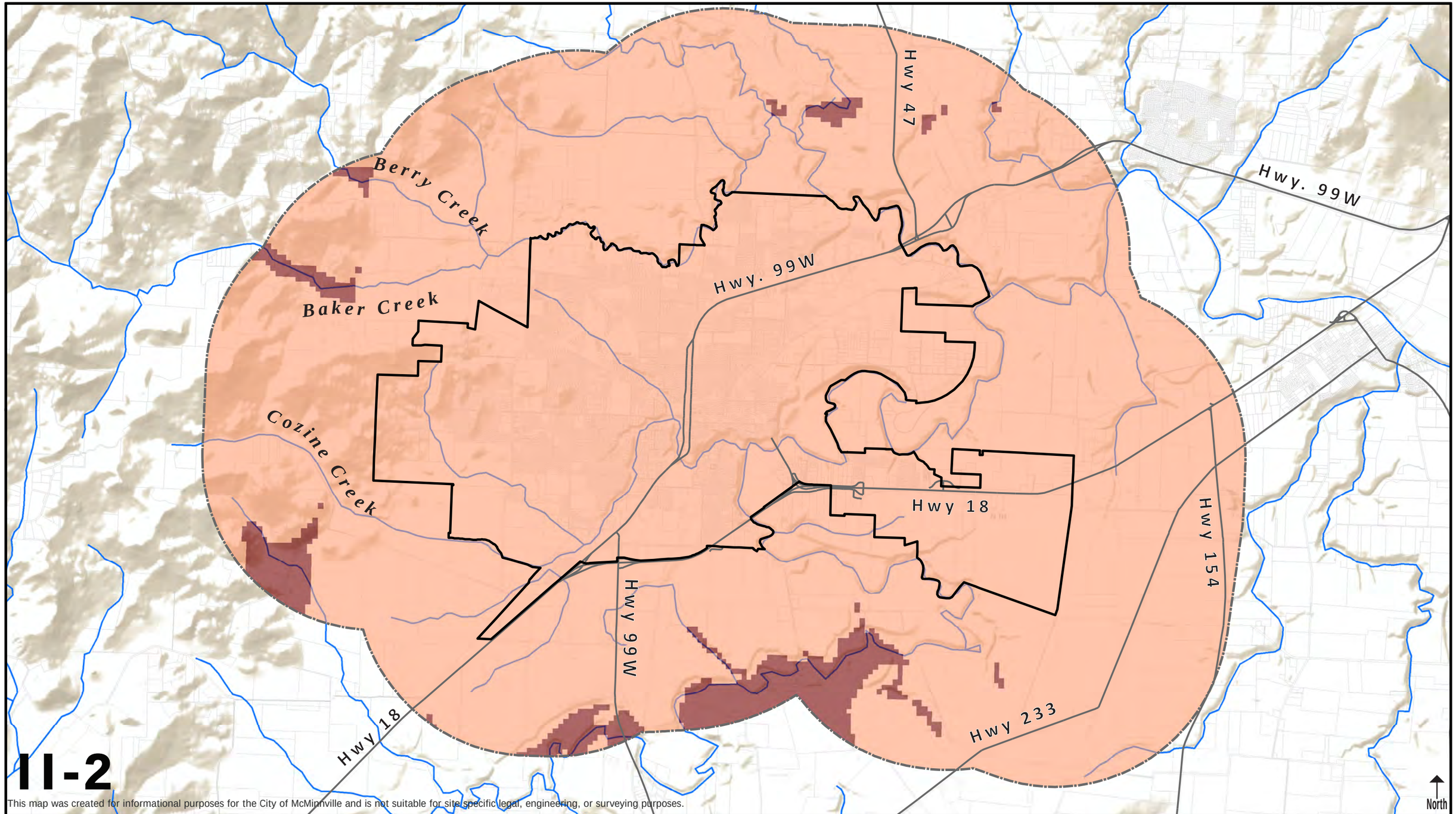
Landslide Risk
- Moderate Risk
- High Risk

- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 21, 2021



II-2

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville
Geologic Hazards:
Cascadia Subduction
Earthquake Shaking

Expected Shaking
- Very Strong Shaking
- Severe Shaking

- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

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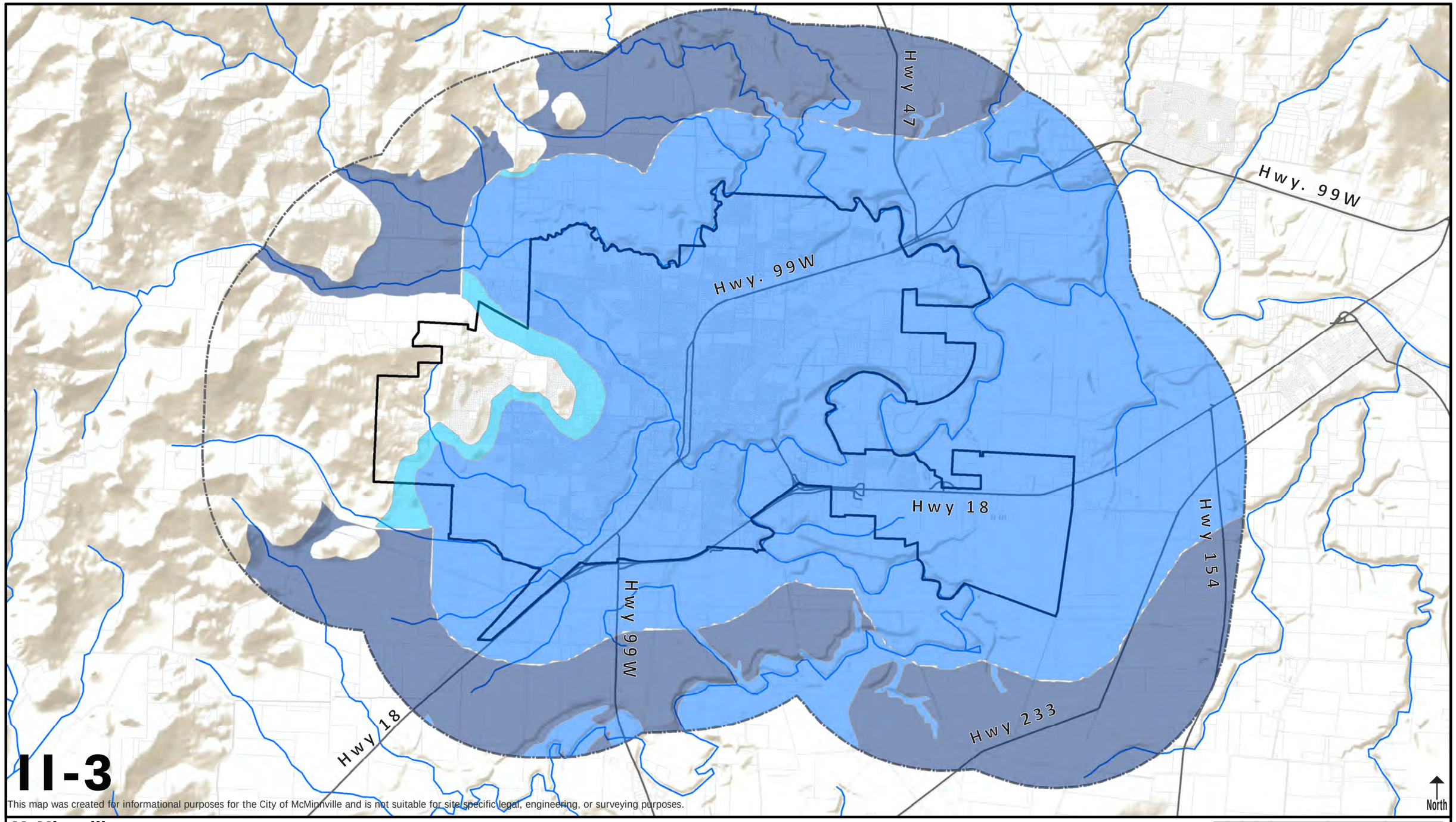
Last Revised: June 21, 2021



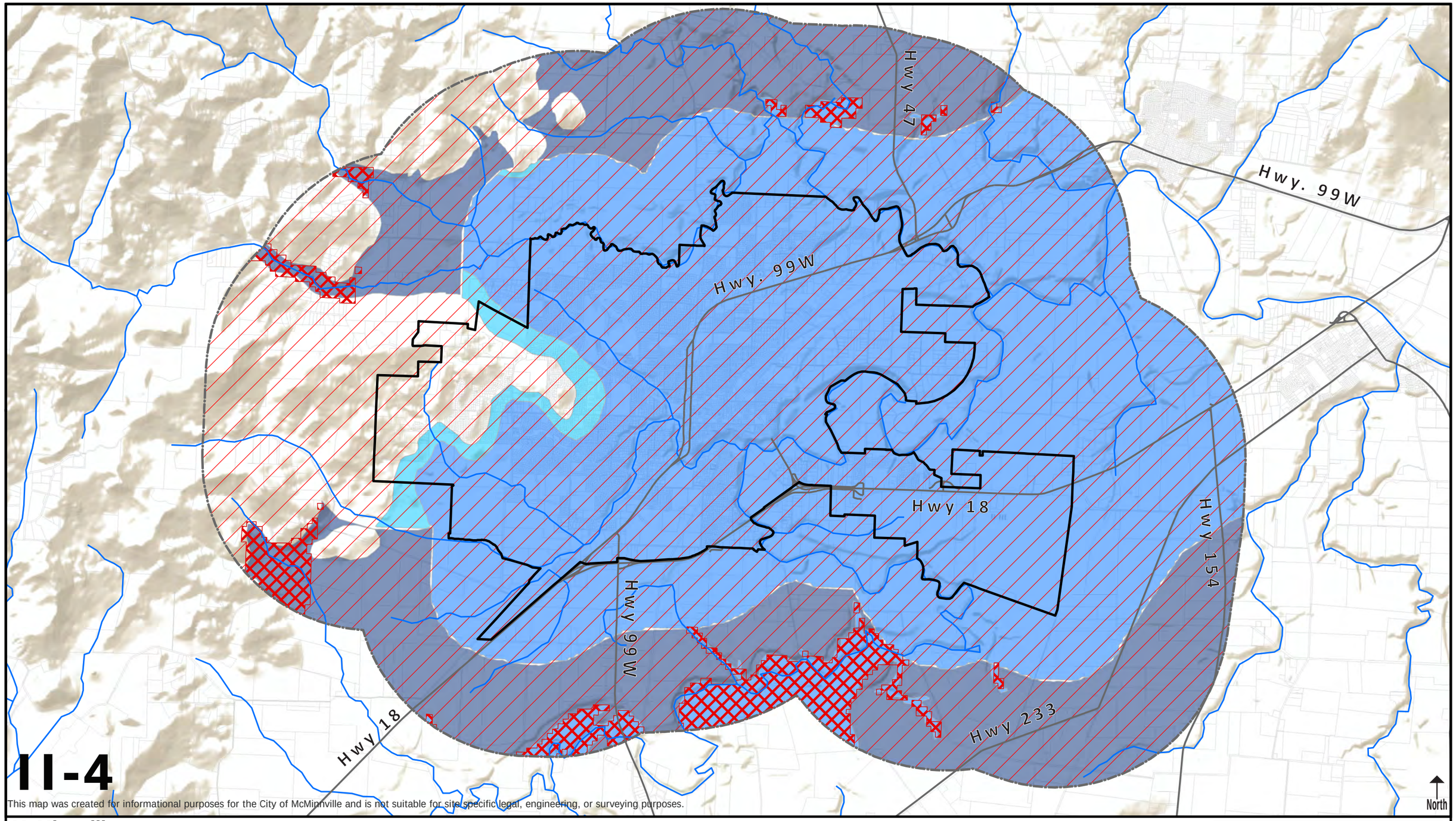
McMinnville Geologic Hazards: Earthquake Liquefaction Susceptibility

Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 22, 2021



McMinnville Geologic Hazards: Subduction Shaking & Liquefaction Risks

Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk
- Very Strong Shaking
- Severe Shaking
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 22, 2021

Hwy 47
Hwy. 99W
Hwy. 99W
Hwy 18
Hwy 99W
Hwy 154
Hwy 18
Hwy 233

II-5

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

North

McMinnville
Geologic Hazards: Landslide, Liquefaction, Subduction Shaking & Steep Slopes

Landslide Risk
- Moderate Risk
- High Risk

Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk

- Severe Shaking
- Steep Slopes (>15%)
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)

- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

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Last Revised: June 23, 2021

Hwy 18

Hwy 99W

North

II-6

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McMinnville WEST HILLS
Geologic Hazards:
Landslide, Liquefaction, Subduction Shaking & Steep Slopes

Landslide Risk
- Moderate Risk
- High Risk

Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk

- Severe Shaking
- Steep Slopes (>25%)
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0.125 0.25 0.5 0.75 1

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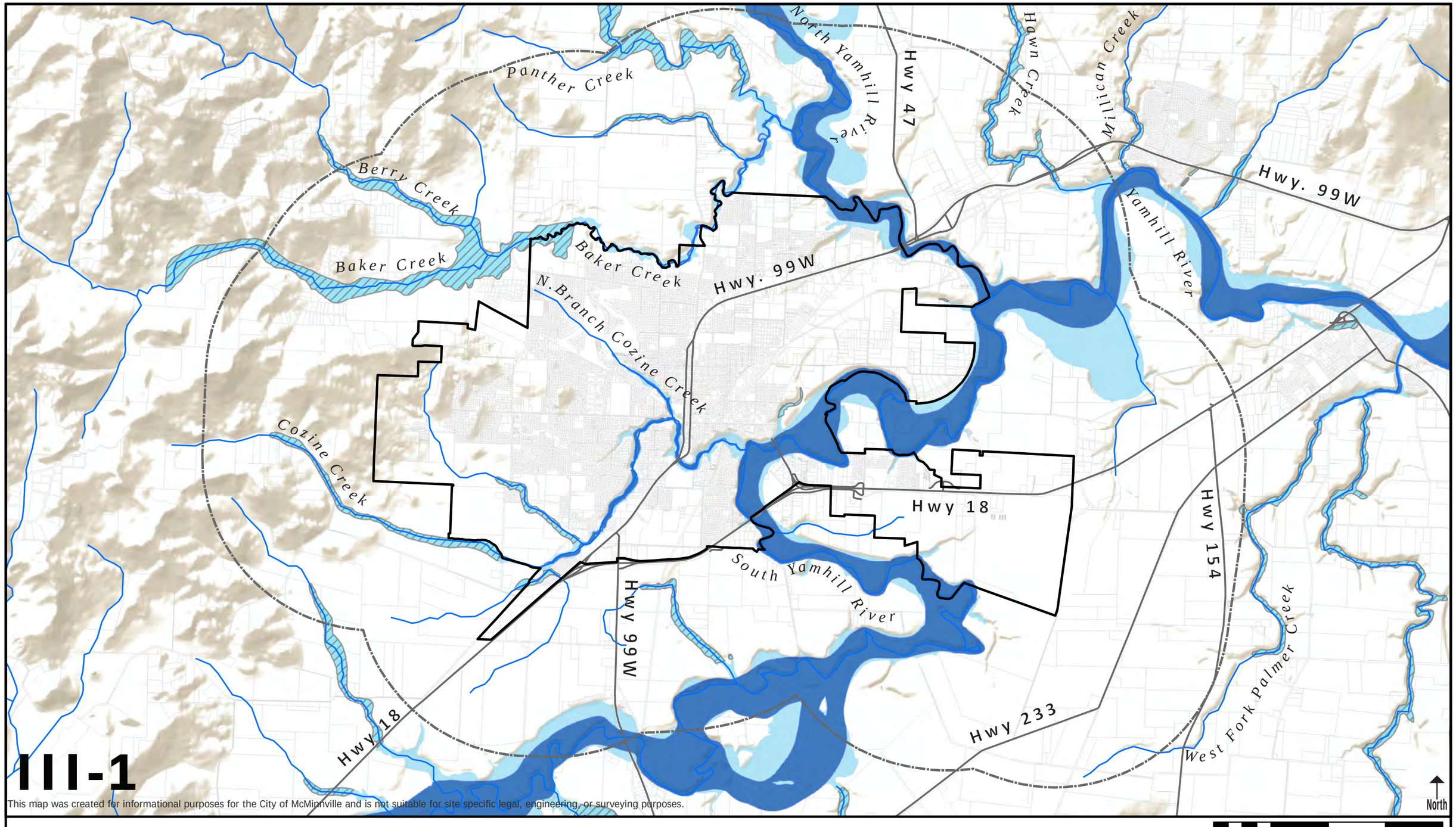
Last Revised: June 23, 2021



McMinnville Flood Hzards

- Floodway
- Flood Zone A
- Flood Zone AE
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

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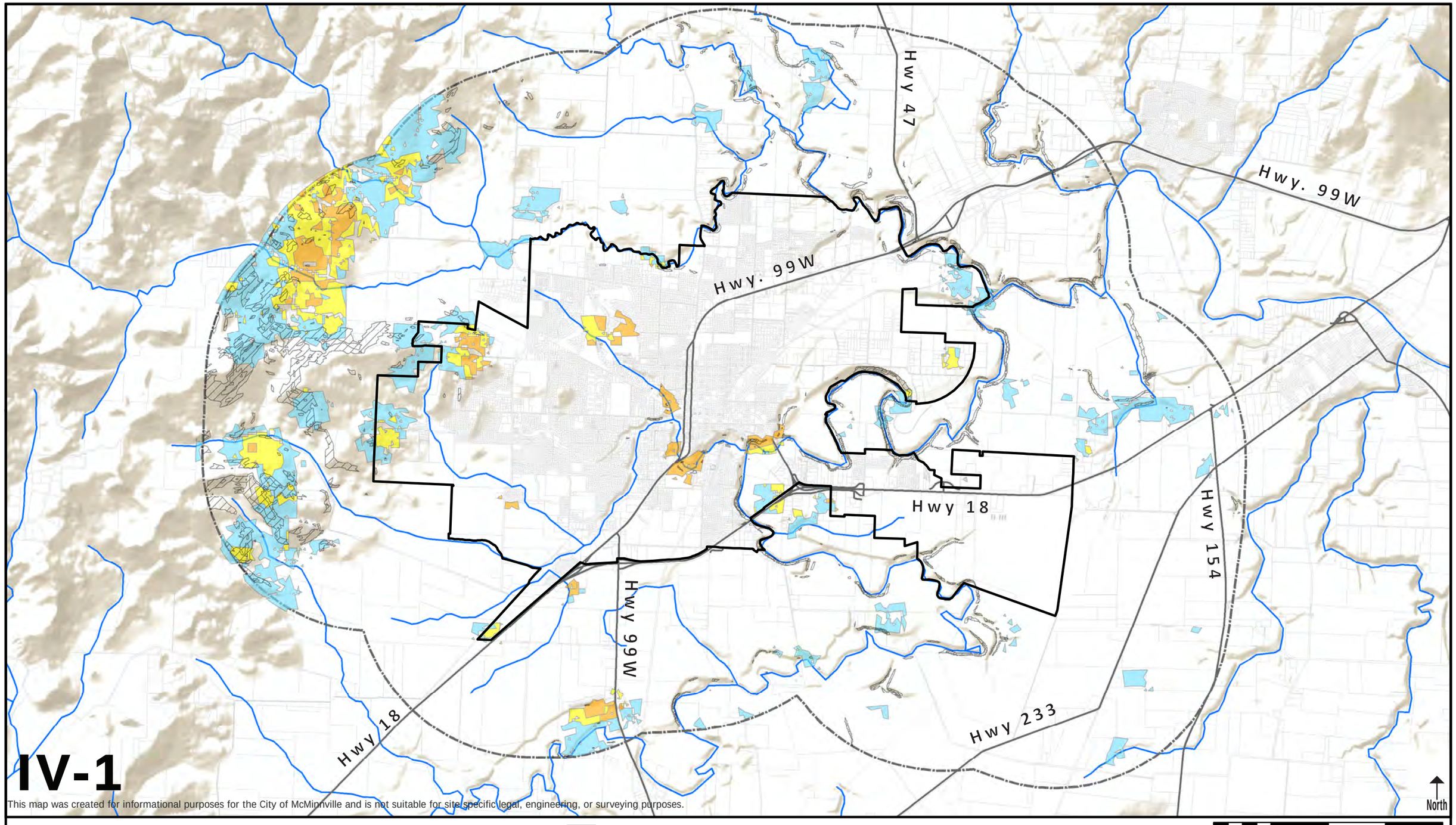
Last Revised: June 23, 2021



IV-1

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville Potential Wildfire Impact to People and Property

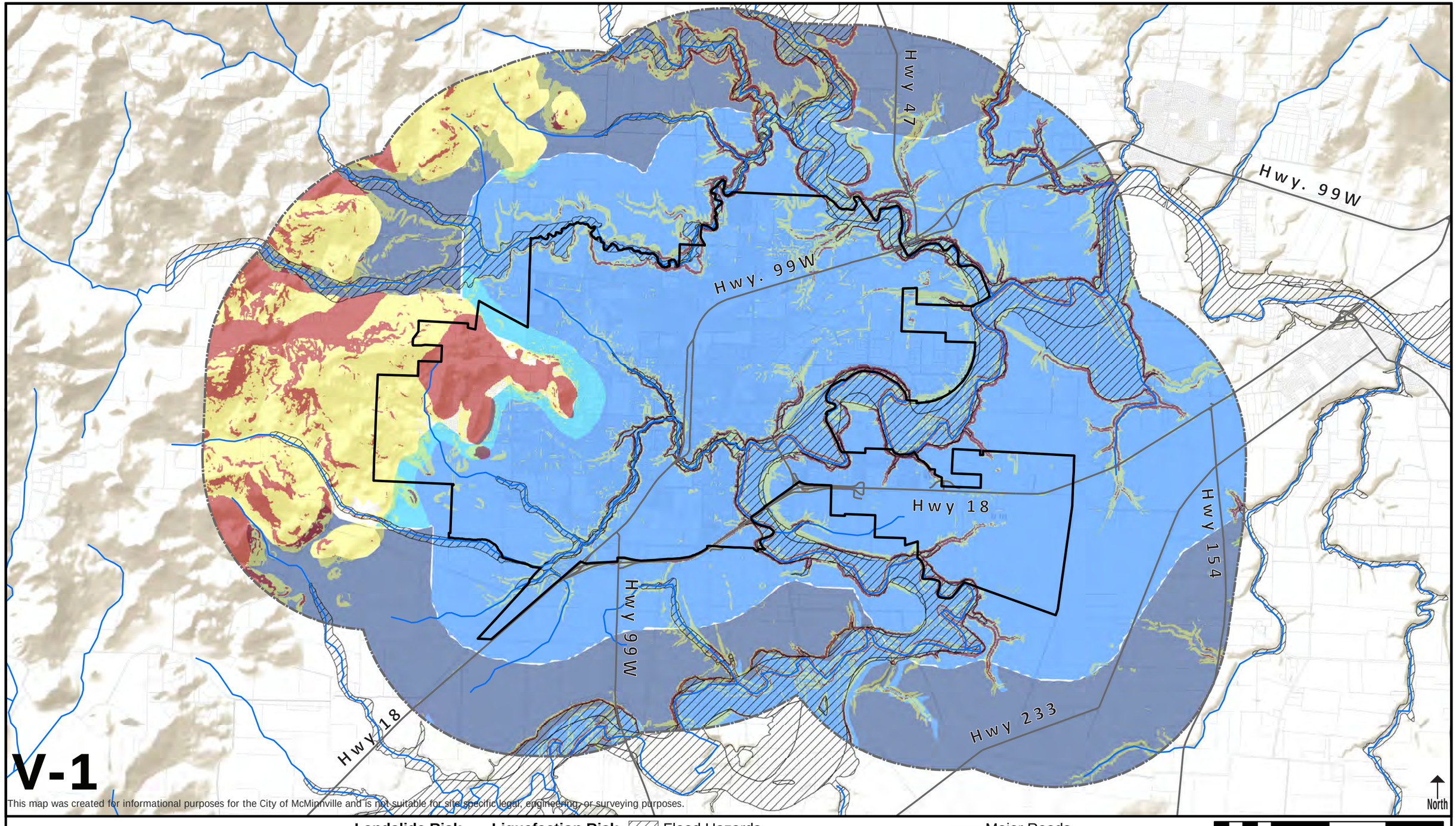
Wildfire Risk
- Low
- Moderate
- High/Severe

- Steep Slopes (>25%)
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 23, 2021



V-1

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville Landslide, Liquefaction, & Flood Hazards

Landslide Risk
- Moderate Risk
- High Risk

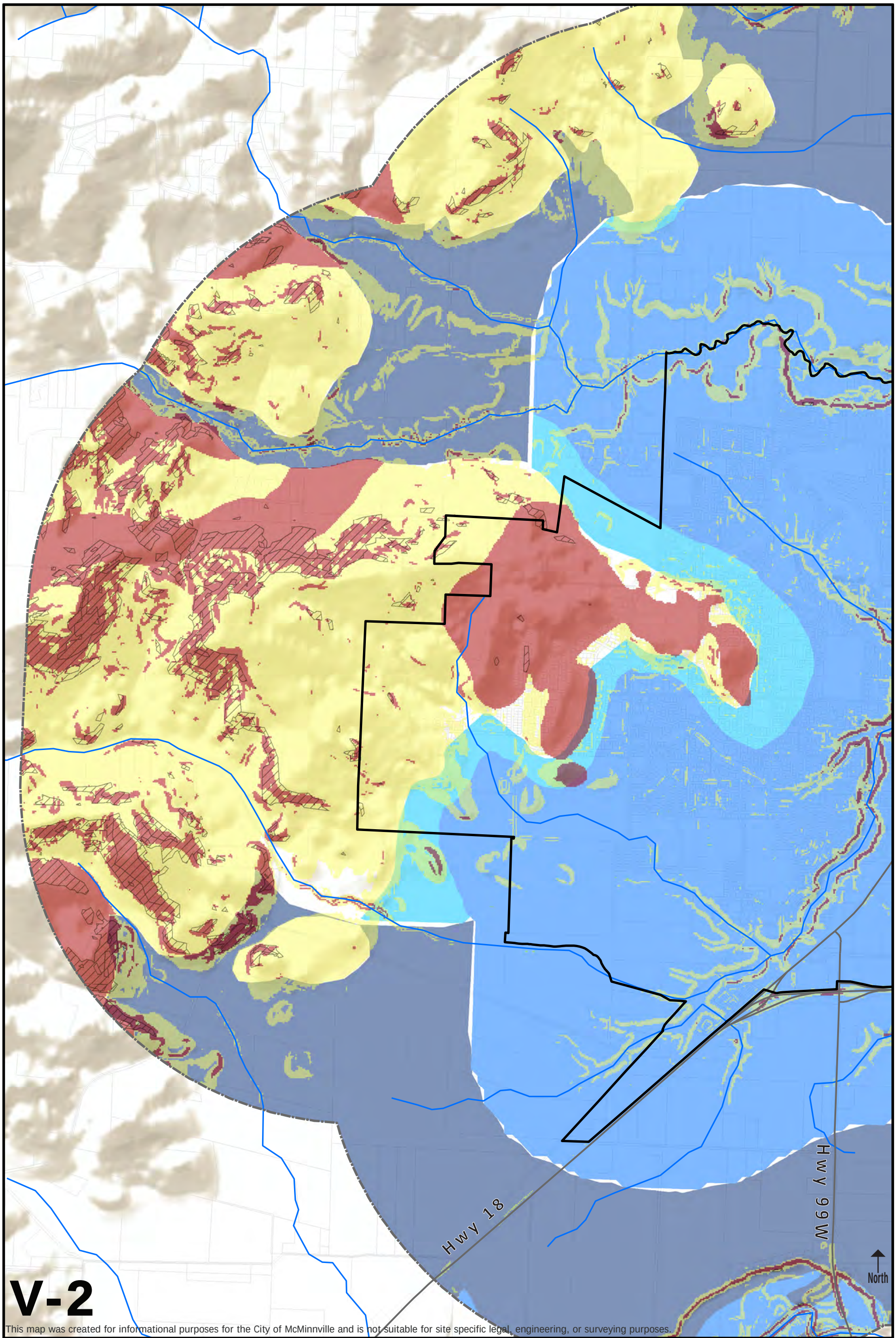
Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk

- Flood Hazards
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 23, 2021



V-2

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville WEST HILLS
Geologic Hazards:
Steep Slopes, Landslide & Liquefaction

Landslide Risk
- Moderate Risk
- High Risk

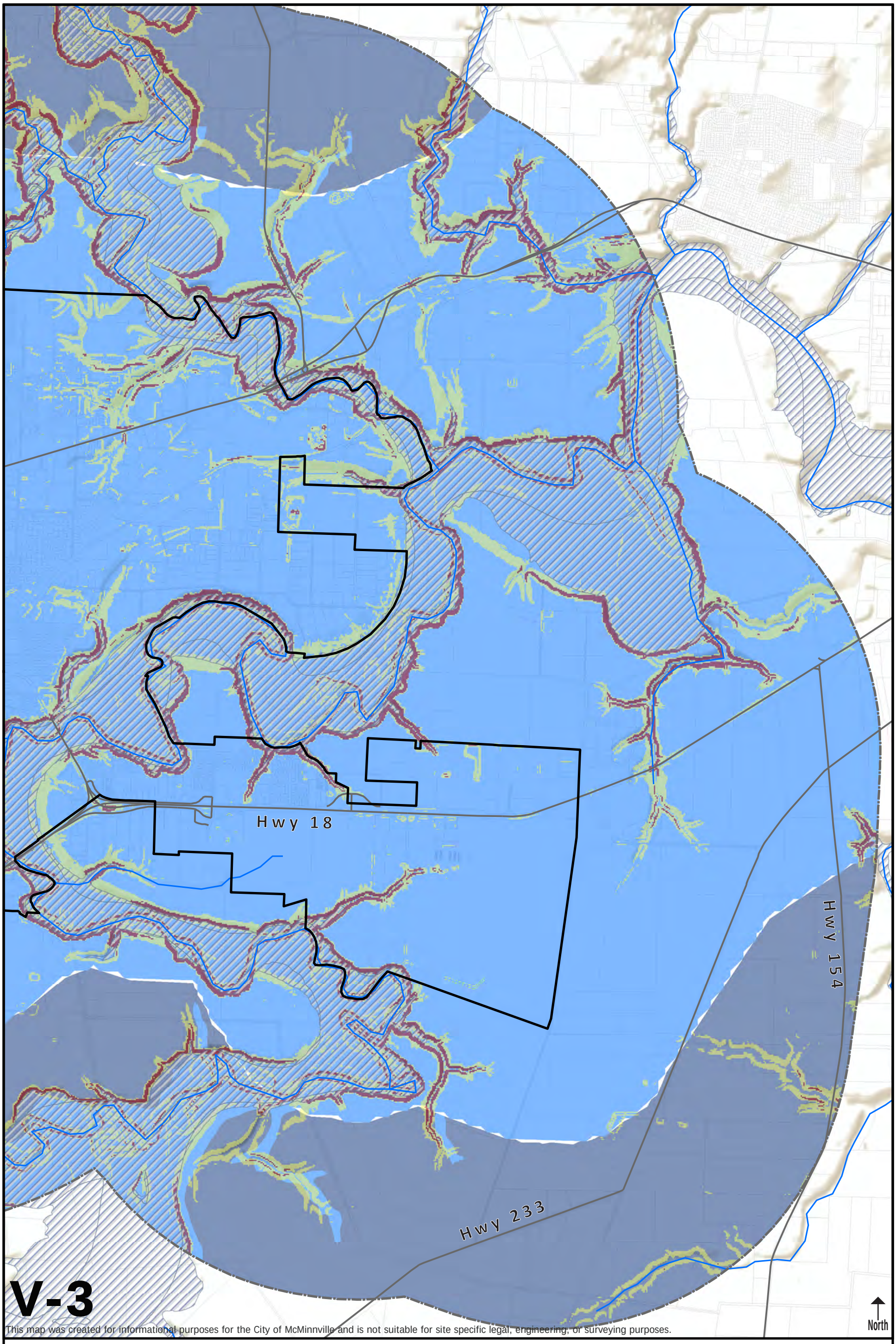
Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk

- Steep Slopes (>25%)
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0.125 0.25 0.5 0.75 1

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 23, 2021



V-3

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville
EAST VALLEY
Landslide, Liquefaction, & Flood Hazards

Landslide Risk
- Moderate Risk
- High Risk

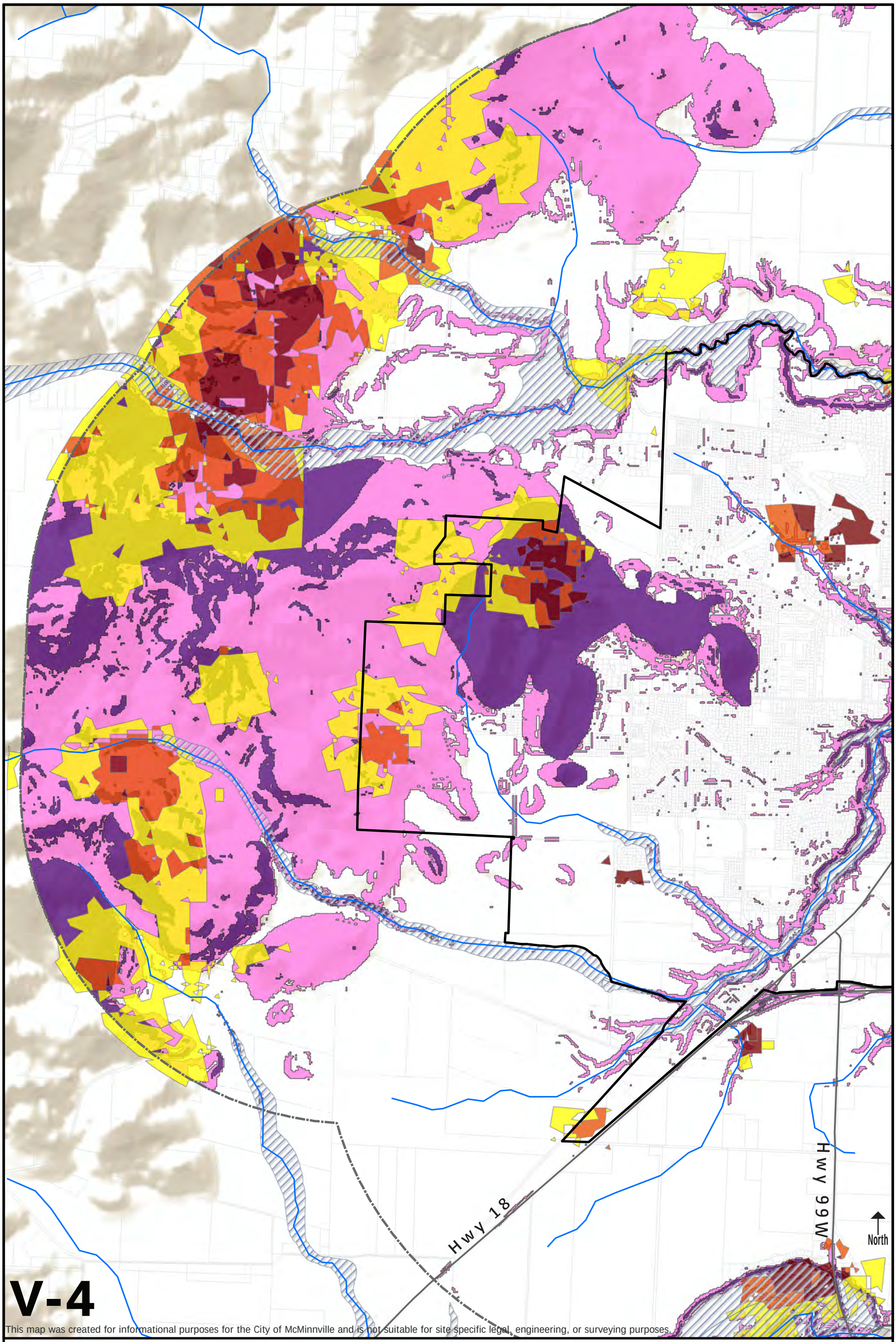
Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk

- Flood Hazard
- McMinnville 2021Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0.125 0.25 0.5 0.75 1

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 23, 2021



V-4

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

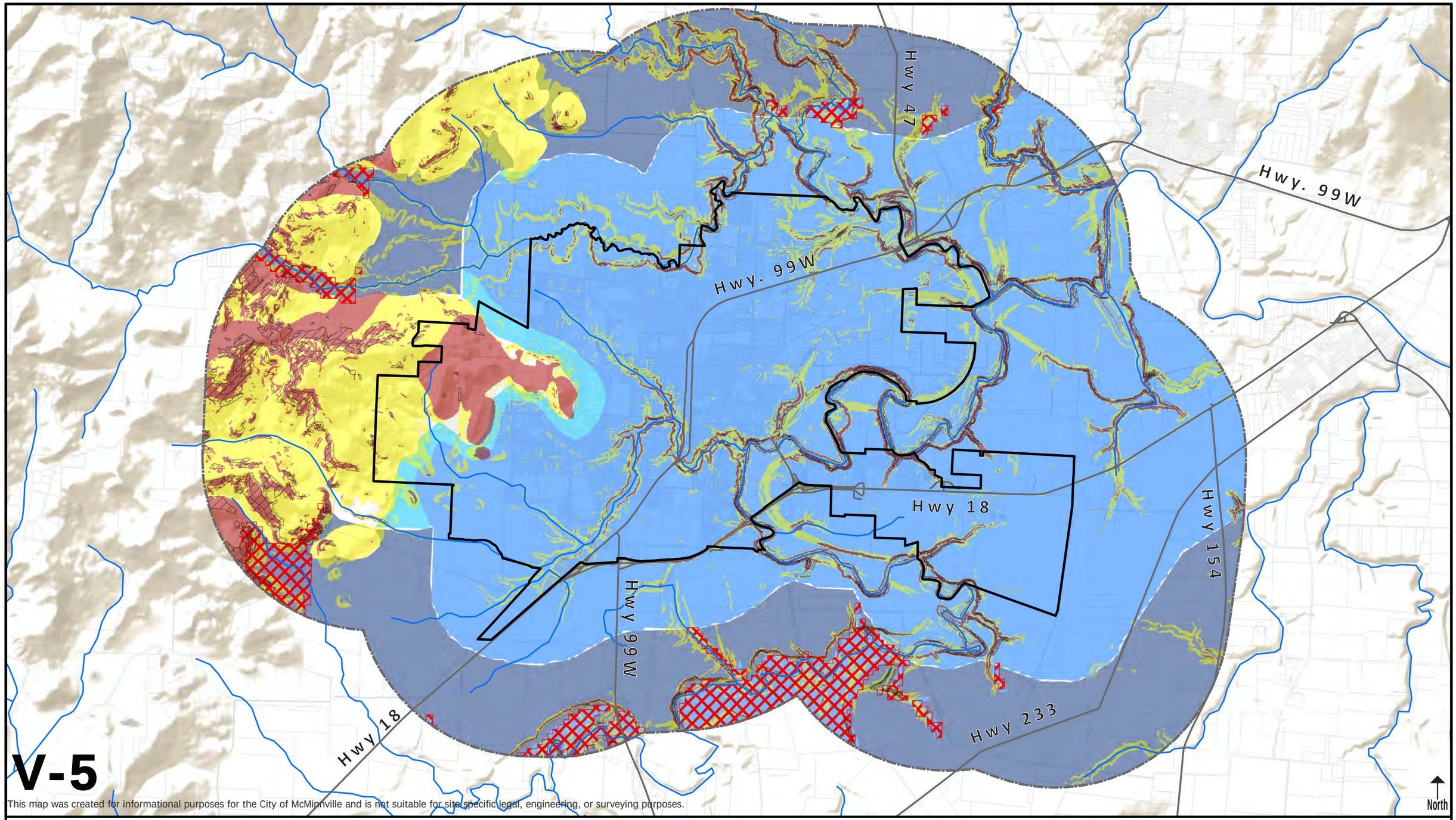
McMinnville WEST HILLS
Wildfire Impacts to People & Property, Landslide Risk, & Flood Hazards

Wildfire Risk Landslide Risk
- Low
- Moderate
- High
- Moderate Risk
- High Risk
- Flood Hazard
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0.125 0.25 0.5 0.75 1

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 23, 2021



V-5

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville Composite Map: Landslide, Liquefaction, Subduction Shaking & Steep Slopes

Landslide Risk
- Moderate Risk
- High Risk

Liquefaction Risk
- Low Risk
- Moderate Risk
- High Risk

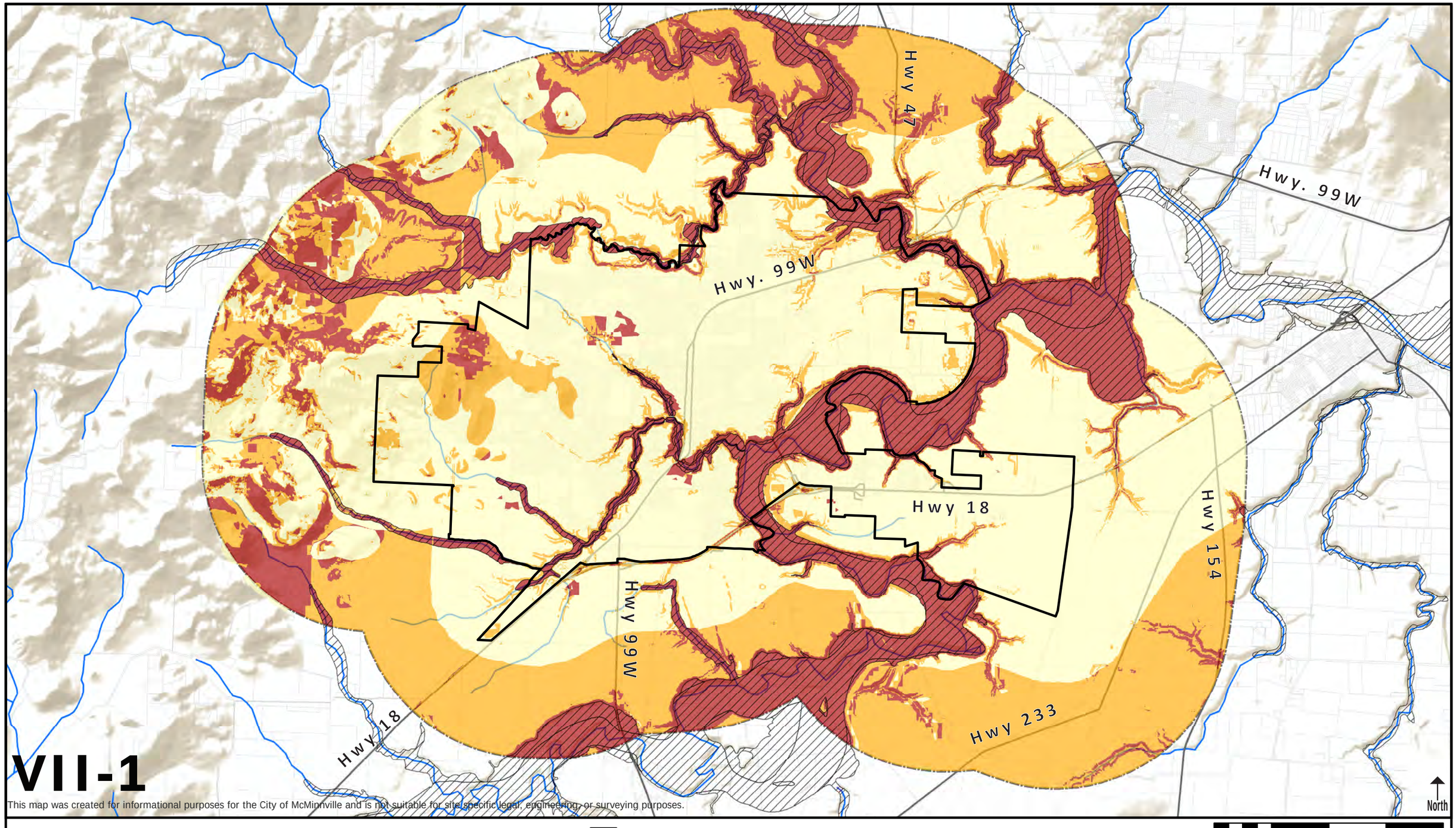
- Severe Shaking
- Steep Slopes (>25%)
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)

- Tax Lots
- Major Roads
- Rivers & Streams

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 23, 2021



VII-1

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville Proposed Natural Hazard Overlay

Subdistrict
- Protection (NH-P)
- Mitigation (NH-M)
- No Subdistrict

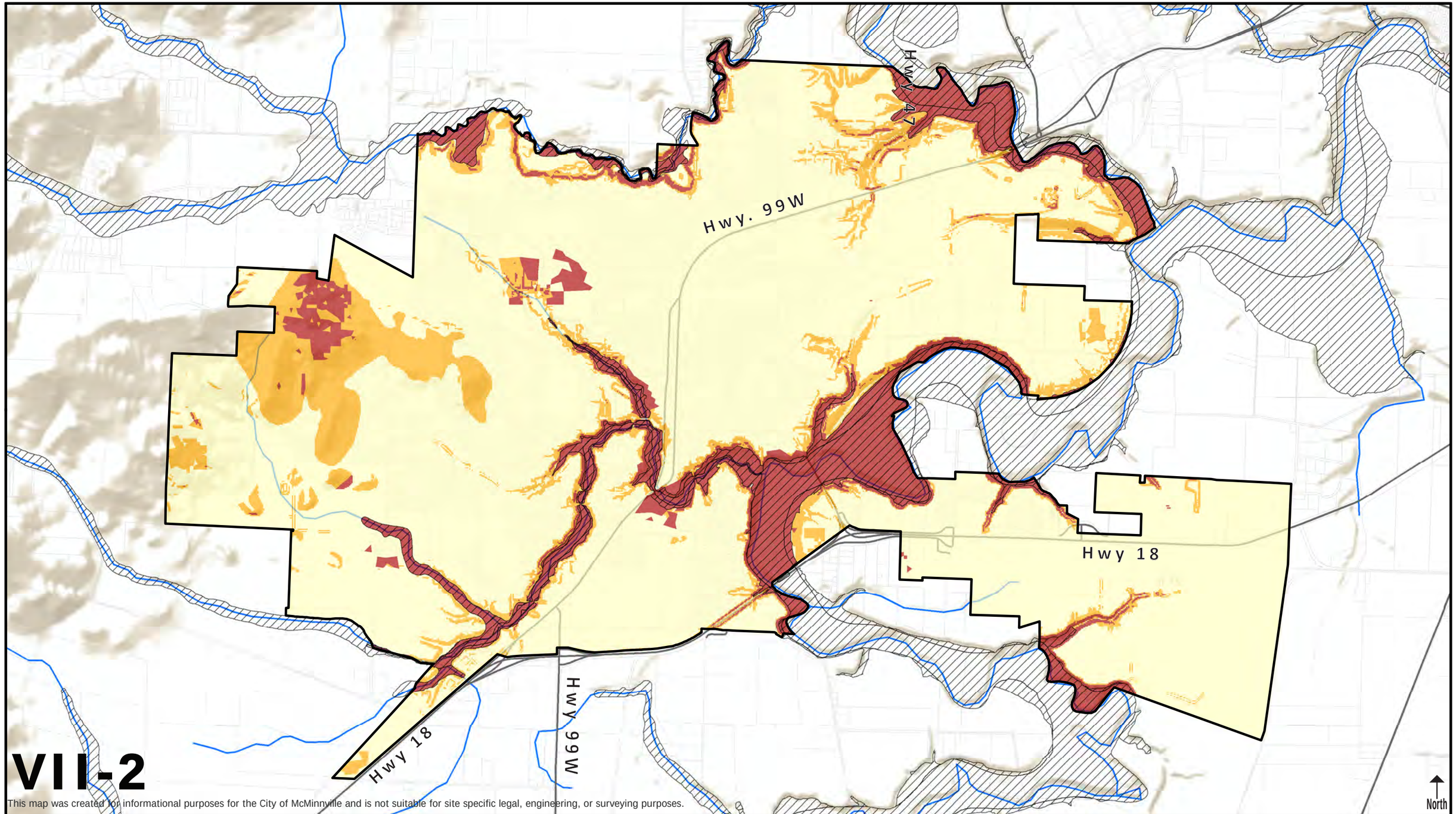
- McMinnville 2021 Urban Growth Boundary
- Study Area (1.5 Miles)
- Flood Hazards

- Major Roads
- Rivers & Streams
- Tax Lots

Miles 0 0.25 0.5 1 1.5 2

Created by Winterbrook Planning in coordination with the City of McMinnville

Last Revised: June 24, 2021



VII-2

This map was created for informational purposes for the City of McMinnville and is not suitable for site specific legal, engineering, or surveying purposes.

McMinnville
Proposed Natural Hazard Overlay
- UGB

Subdistrict
- Protection (NH-P)
- Mitigation (NH-M)
- No Subdistrict

- McMinnville 2021 Urban Growth Boundary
- Major Roads
- Flood Hazards
- Rivers & Streams
- Tax Lots

Miles 0 0.15 0.3 0.6 0.9 1.2

Created by Winterbrook Planning in coordination with the City of McMinnville

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ATTACHMENT 8

Adopted September 28, 2001
Effective June 1, 2002

Oregon's Statewide Planning Goals and Guidelines
GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS

To protect people and property from natural hazards.

A. NATURAL HAZARD PLANNING

1. Local governments shall adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards.

2. Natural hazards for purposes of this goal are: floods (coastal and riverine), landslides,[1] earthquakes and related hazards, tsunamis, coastal erosion, and wildfires. Local governments may identify and plan for other natural hazards.

B. RESPONSE TO NEW HAZARD INFORMATION

1. New hazard inventory information provided by federal and state agencies shall be reviewed by the Department in consultation with affected state and local government representatives.
2. After such consultation, the Department shall notify local governments if the new hazard information requires a local response.
3. Local governments shall respond to new inventory information on natural hazards within 36 months after being notified by the Department of Land Conservation and Development, unless extended by the Department.

C. IMPLEMENTATION

Upon receiving notice from the Department, a local government shall:

1. Evaluate the risk to people and property based on the new inventory information and an assessment of:
   a. the frequency, severity and location of the hazard;
   b. the effects of the hazard on existing and future development;
   c. the potential for development in the hazard area to increase the frequency and severity of the hazard; and
   d. the types and intensities of land uses to be allowed in the hazard area.
2. Allow an opportunity for citizen review and comment on the new inventory information and the results of the evaluation and incorporate such information into the comprehensive plan, as necessary.
3. Adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures consistent with the following principles:
   a. avoiding development in hazard areas where the risk to people and property cannot be mitigated; and
   b. prohibiting the siting of essential facilities, major structures, hazardous facilities and special occupancy structures, as defined in the state building code (ORS 455.447(1)(a)(b)(c) and (e)), in identified hazard areas, where the risk to public safety cannot be mitigated, unless an essential facility is needed within a hazard area in order to provide essential emergency response services in a timely manner.[2]
4. Local governments will be deemed to comply with Goal 7 for coastal and riverine flood hazards by adopting and

[1] For "rapidly moving landslides," the requirements of ORS 195.250-195.275 (1999 edition) apply.

[2] For purposes of constructing essential facilities, and special occupancy structures in tsunami inundation zones, the requirements of the state building code - ORS 455.446 and 455.447 (1999 edition) and OAR chapter 632, division 5 apply.

implementing local floodplain regulations that meet the minimum National Flood Insurance Program (NFIP) requirements.

D. COORDINATION

1. In accordance with ORS 197.180 and Goal 2, state agencies shall coordinate their natural hazard plans and programs with local governments and provide local governments with hazard inventory information and technical assistance including development of model ordinances and risk evaluation methodologies.

2. Local governments and state agencies shall follow such procedures, standards and definitions as may be contained in statewide planning goals and commission rules in developing programs to achieve this goal.

GUIDELINES

A. PLANNING

1. In adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider:

a. the benefits of maintaining natural hazard areas as open space, recreation and other low density uses;

b. the beneficial effects that natural hazards can have on natural resources and the environment; and

c. the effects of development and mitigation measures in identified hazard areas on the management of natural resources.

2. Local governments should coordinate their land use plans and decisions with emergency preparedness, response, recovery and mitigation programs.

B. IMPLEMENTATION

1. Local governments should give special attention to emergency access when considering development in identified hazard areas.

2. Local governments should consider programs to manage stormwater runoff as a means to help address flood and landslide hazards.

3. Local governments should consider nonregulatory approaches to help implement this goal, including but not limited to:

a. providing financial incentives and disincentives;

b. providing public information and education materials;

c. establishing or making use of existing programs to retrofit, relocate, or acquire existing dwellings and structures at risk from natural disasters.

4. When reviewing development requests in high hazard areas, local governments should require site-specific reports, appropriate for the level and type of hazard (e.g., hydrologic reports, geotechnical reports or other scientific or engineering reports) prepared by a licensed professional. Such reports should evaluate the risk to the site as well as the risk the proposed development may pose to other properties.

5. Local governments should consider measures that exceed the National Flood Insurance Program (NFIP) such as:

a. limiting placement of fill in floodplains;

b. prohibiting the storage of hazardous materials in floodplains or providing for safe storage of such materials; and

c. elevating structures to a level higher than that required by the NFIP and the state building code.

Flood insurance policy holders may be eligible for reduced insurance rates through the NFIP's Community Rating System Program when local governments adopt these and other flood protection measures.