REVISED

Natural Hazards Inventory &
Management Program Options and
Recommendations

Appendix 2: Natural Hazard Overlay Methodology

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COMMUNITY RESOURCE PLANNING

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

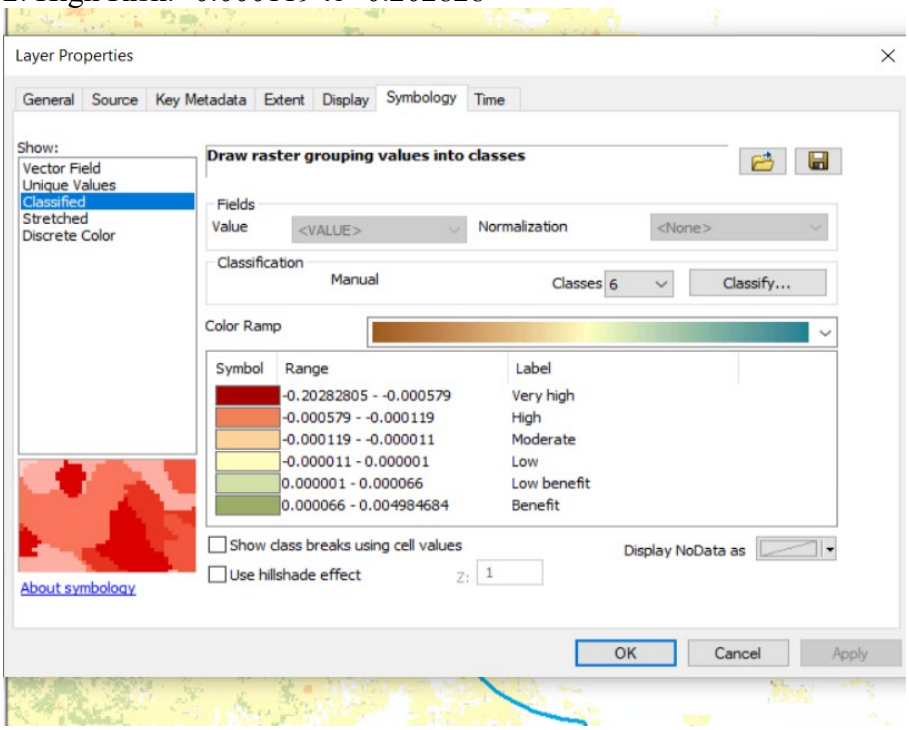
1. Dissolve by "Liquefaction Susceptibility Score"
2. Clip to SA
3. Classify and display by "Liquefaction Susceptibility Score"
    a. Low Risk: Susceptibility Sore 2
    b. Moderate Risk: Susceptibility Score 3
    c. High Risk: Susceptibility Score 4

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.