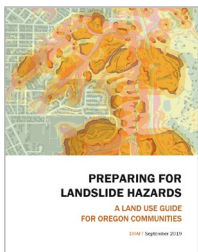


QUICK REFERENCE PREPARING FOR LANDSLIDE HAZARDS

A LAND USE GUIDE FOR OREGON COMMUNITIES



Preparing for a local or catastrophic event requires a comprehensive community effort. Oregon communities can become more resilient to landslide hazards through community land use options and strategies. The *Preparing for Landslide Hazards: A Land Use Guide for Oregon*

Communities brings together strategies and examples from a variety of sources to help each community make good decisions. This quick reference contains highlights.

Without proper site evaluation and construction techniques, development in areas susceptible to landslides will significantly increase potential for loss of life and property damage, not only on the subject property but also on neighboring properties.

Land use planning to reduce landslide hazard risk uses comprehensive plan and implementation provisions (e.g., zoning code, building code, etc.) and is based on science and policy. Much of the expressed need for the *Guide* stemmed from communities that pursued and obtained lidar-based mapping with Oregon Department of Geology and Mineral Industries (DOGAMI).

As always, when developing land use regulations or other legislation for local adoption:

- **local governments should consult with their legal counsel to ensure that proposals comply with applicable federal, state, and local requirements, and**
- **communities should consider their own strategies to reduce landslide hazard risk.**

Landslide Code Review — Summary of Results

The *Guide* includes a list of communities (counties and cities) that have complete or partial DOGAMI lidar-based landslide mapping. Many communities with DOGAMI lidar-based mapping and two jurisdictions without DOGAMI lidar-based mapping* were included in the code review. In total, codes and plans from 34 communities were reviewed. Of those:

- 20 of the 28 cities and all 6 of the county plans reviewed require a **geologic report** as part of the development permitting process for land parcels or lots.
- 22 of the 26 codes that require geologic reports include a **certification requirement** for the person completing the report. In most cases, this was listed as a geologist, registered geologist (RG), engineering geologist (CEG), or a geotechnical engineer (PE or GE).
- 18 of the 26 codes that require a geologic report also include regulations addressing **drainage and hydrology** of the site.
- 13 communities either require a **soils study** report prior to development or include that information as a required part of the geologic report.
- 24 of the 34 communities in the code review include requirements for **predevelopment grading plans**.
- 26 of the 34 codes include a requirement for an **erosion control plan**.
- 11 of 28 cities and 4 of 6 counties referenced DOGAMI publications in their codes when deciding **where geologic reports are required**.
- 14 communities implement their provisions through a **hazards overlay zone**.
- Sandy is the only community of the 34 to include the **Oregon State Board of Geologist Examiners *Guidelines for Preparing Engineering Geologic Reports in Oregon*** as an appendix to the hillside development chapter of the city code.

* Although the Cities of Newport and Salem have not received DOGAMI lidar-based landslide inventory and landslide susceptibility maps, these two cities were included because of their unique geologic hazard codes.

Zoning Codes

Features of Strong Zoning Codes

- Are supported by and incorporate the best available science-based landslide hazard maps and analysis.
- Have clear submittal requirements and approval criteria.
- Employ factors in addition to slope to determine when a geotechnical report is required.
- Define and establish the qualified geoprofessional(s) for the required report in accordance with state licensing regulations.
- Require geotechnical reports to determine whether a proposed development is within the community's risk tolerance level and to properly condition development.
- Link requirements to degree of risk and geotechnical report recommendations.
- Address soil stabilization through grading, erosion control, vegetation management, and water management.
- Require monitoring by the geotechnical report author during construction.
- Are enforced.
- Contain strong grading, erosion control, and land use planning codes. These codes provide clarity in what is applicable; protect the people, property, and environment; and are effective in limiting or preventing deleterious soil movement.
- Are based on maps and reports that provide details on the hazard areas.
- Include specific references to the materials used to establish the code provisions (such as maps and reports) and have those materials adopted and incorporated into the regulatory provisions;
- Have clearly identified application materials (with checklists and handouts to help explain the information) and processes of review.
- Have information located on the community's website so that the code is clear and accessible.
- Have replaced outdated Unified Building Code or UBC references with current International Building Code or IBC references in the code.

Outline of Model Zoning Code Provisions for Landslide Hazards in Oregon

- **Intent and Purpose** — why is this code provision here.
- **When Required (Regulated Activities) or Applicability of Landslide/Geologic Hazard Regulations** — when do these provisions apply, what kind of activity requires a permit, clearly identifies reference maps and reports here.
- **Landslide and/or Geologic Hazard Reference Maps and Reports** — uses information from DOGAMI's lidar-based landslide maps and reports such as the landslide inventory, shallow susceptibility landslides, deep susceptibility landslides, and IMS-22. IMS-22 is *GIS Overview Map of Potential Rapidly Moving Landslide Hazards in Western Oregon* (DOGAMI, 2002)].
- **Landslide and/or Geologic Hazard Permit Submittal Requirements and Procedures** — what information must be submitted for the permit, and what is the process that will be followed (this may include the geologic assessment or geotechnical report requirements or it may be a separate section).
- **Exemptions** — when do the provisions not apply, what kind of activity does not require a permit.
- **Prohibitions** — if applicable.
- **Development Standards** — how to construct, build, move earth materials and vegetation on the site, e.g., cut/fill/grading, retaining walls etc.
- **Access to Property** — minimize disturbance related to driveways by sharing driveways and limiting cut and fill, make sure emergency services can access to the site.
- **Stormwater Drainage** — how will the stormwater be managed.
- **Erosion Control Measures** — minimize disturbance and removal of soil and vegetation, avoid off-site impacts, identify the temporary and permanent groundcovers and plantings.
- **Utilities** — will there be utilities on the site, if so which ones and where will they be located, will they be above or below ground.
- **Approval Authority** — who reviews and approves the permit application.
- **Appeals** — is the permit appealable and if so, what are the procedures.
- **Liability, Waivers, Covenants** — releasing the city or county from liability, waiver of damages with indemnity and hold harmless agreement or covenant, requirements to record the waivers or covenants with a County Recorder, requirements to file with city or county.
- **Certification of Compliance** — all laws and regulations must be complied with, if there is a conflict of regulations then the more restrictive one applies, proof that the development has been constructed in compliance with the requirements must be submitted prior to issuance of final approval, inspections if applicable.



Comprehensive Plans

Features of Strong Comprehensive Plans

- Make use of technical information and assistance provided by local, regional, state, and federal agencies regarding natural hazards.
- Clearly link to the implementing provisions (zoning code, building code, etc.).
- Include specific references (e.g. title and date of information) to supporting documents and maps.
- Include or refer to documents, maps, or technical assistance needed to understand impacts of natural hazards.
- Create opportunities to guide growth and development away from natural hazard areas and/or provide for appropriate review of the growth and development when it is in or near a hazard area.
- Consider climate change and the impacts of climate change on natural hazards, and the subsequent vulnerabilities and risks to the community.

Outline of Model Comprehensive Plan Provisions for Landslide Hazards in Oregon

- Describes goals, policies, and implementing measures.
- Has information about and describes the interrelationship of land use, social, economic, environmental, resilience, and climate change impacts.
- Has a specific section about disasters and hazards, and identifies and describes the natural hazards that have occurred in the past and could in the future, impact the community.
- Specifically refers to community plans that include natural hazard information such as the Natural Hazard Mitigation Plan, the Emergency Operations Plan, the Transportation System Plan, the Capital Facilities Plan, the Open Space Plan, and the Water and Sewer Plan.
- Identifies maps and reports that support the goals, policies, and implementing measures of the community.
- Uses information from DOGAMI's lidar-based landslide maps and reports such as the landslide inventory, shallow susceptibility landslides, deep susceptibility landslides, and IMS-22. IMS-22 is GIS Overview Map of Potential Rapidly Moving Landslide Hazards in Western Oregon (DOGAMI, 2002).
- Includes recommendations about mitigating hazards such as but not limited to avoiding and minimizing construction in landslide hazard areas.
- Includes information about grading and erosion control, stormwater management, removal of vegetation, and installing vegetation.
- Describes who can request additional geologic reports (engineering geology report and geotechnical engineering report) and maps during review processes, such as the Planning Director, Public Works Director, City Engineer, and Building Official.
- Describes which geoprofessional should sign and stamp the required reports and maps.
- Has information about and links the topics of stormwater management and grading and erosion control to the natural hazards.
- Recognizes that steep slopes are not the only factor that should be used to identify landslide hazard areas. Other factors that need to be considered along with slope steepness include: the type of development, the size and scale of the development, the weight and extent of the construction, the location of the vulnerable population, the location of the critical facilities, erosion (natural and human caused), and grading.

Lidar-Based Landslide Mapping

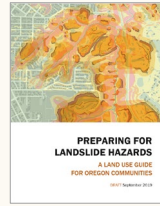
Lidar technology has revolutionized mapping. During the last decade, DOGAMI has produced lidar-based, detailed landslide inventory, shallow landslide susceptibility, and deep landslide susceptibility maps for many communities in Oregon. As a result, many communities need to revise their codes, plans, and policies to most effectively use these lidar-based maps.

- Table 1-1 in the *Guide* lists Oregon communities with DOGAMI lidar-based landslide inventory and landslide susceptibility maps.
- 46 cities and 14 counties have partial or complete DOGAMI lidar-based inventory maps.
- 35 cities and 9 counties have partial or complete DOGAMI lidar-based landslide susceptibility maps.

While the Code Review Details Table has information from 28 cities and 6 counties, it does not include every community that has DOGAMI lidar-based landslide inventory maps and/or DOGAMI lidar-based landslide susceptibility maps. A comprehensive code review was beyond the scope of this *Guide*.

Geoprofessionals

- *Registered Geologists (RG)* provide geologic maps and documents and are licensed by the Oregon State Board of Geologist Examiners (OSBGE).
- *Certified Engineering Geologists (CEG)* provide engineering geologic reports and are licensed by the Oregon State Board of Geologist Examiners (OSBGE).
- A *Geotechnical Engineer (GE)* is a *Professional Engineer (PE)* with the specific training, expertise, and experience to qualify as a *Geotechnical Engineer (GE)*. GEs provide geotechnical engineering reports and are licensed by the Oregon Board of Examiners for Engineering and Land Surveying (OSBEELS).



Preparing for Landslide Hazards: A Land Use Guide for Oregon Communities

- Explanations of the general types of landslide hazards. (Chapter 2)
- Explanation of lidar. (Chapter 2)
- Information about engineering geology reports and geotechnical engineering reports, the professionals who author them, and how to use them. (Chapter 2)
- Results of a limited review of Oregon landslide regulations primarily in Oregon communities with the new lidar-based maps. See Tables 5-1 to 5-4, Figure 4-7, and Table 8-1. (Chapters 4, 5, and 8)
- Key issues in implementing landslide hazard risk reduction identified through conversations with professionals primarily in jurisdictions with the new lidar-based maps. (Chapters 4 and 5)
- Discussions of comprehensive plan and implementation (e.g. zoning codes, building codes, and so forth) issues and approaches to reducing landslide risk through non-regulatory and regulatory steps. (Chapters 3 and 4)
- Elements of a strong comprehensive plan related to landslide hazards, examples of comprehensive plan provisions from Oregon communities, and a model framework for comprehensive plan revisions. (Chapters 3 and 5)
- Elements of a strong landslide hazard ordinance, example code provisions from Oregon communities, and a model framework for a landslide hazard ordinance. (Chapters 4 and 5)
- Key ways to reduce a community's risk from landslide hazards. (Chapter 4)
- Other resources to aid communities and individuals in reducing (mitigating) landslide hazard risks. (Chapter 5)

Available from:



Oregon Department
of Land Conservation and
Development (DLCD)
www.oregon.gov/lcd/



Oregon Department
of Geology and Mineral
Industries (DOGAMI)
www.oregon.gov/DOGAMI/