

APPENDIX E. MAP PLATES

See appendix folder for individual map PDFs.

| | | |
|----------|---|----|
| Plate 1. | Building Distribution Map of Lower Columbia–Sandy Watershed, Oregon..... | 73 |
| Plate 2. | Population Density Map of Lower Columbia–Sandy Watershed, Oregon | 74 |
| Plate 3. | Cascadia Subduction Zone (CSZ) M9.0 Peak Ground Acceleration Map of Lower Columbia–Sandy Watershed, Oregon | 75 |
| Plate 4. | Mount Hood Fault Zone (MHFZ) M6.9 Peak Ground Acceleration Map of Lower Columbia–Sandy Watershed, Oregon | 76 |
| Plate 5. | Flood Hazard Map of Lower Columbia–Sandy Watershed, Oregon..... | 77 |
| Plate 6. | Landslide Susceptibility Map of Lower Columbia–Sandy Watershed, Oregon | 78 |
| Plate 7. | Wildfire Risk Map of Lower Columbia–Sandy Watershed, Oregon..... | 79 |
| Plate 8. | Channel Migration Hazard Map of Lower Columbia–Sandy Watershed, Oregon..... | 80 |
| Plate 9. | Lahar Exposure Map of Lower Columbia–Sandy Watershed, Oregon | 81 |



Building Distribution Map of the Lower Columbia-Sandy Watershed, Oregon

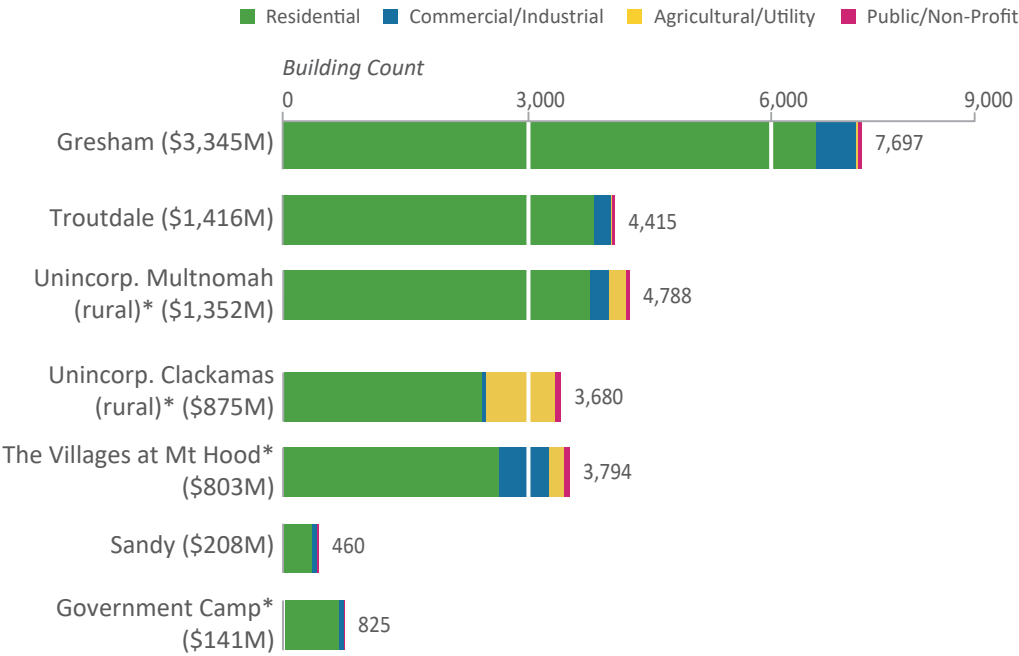
PLATE 1



Building Occupancy

- Agricultural / Utility
- Commercial / Industrial
- Public / Non-Profit
- Residential

Buildings by Occupancy Class
(Ranked by Value)



*Unincorporated

Data Sources:
Building footprints: Oregon Department of Geology and Mineral Industries (2016)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

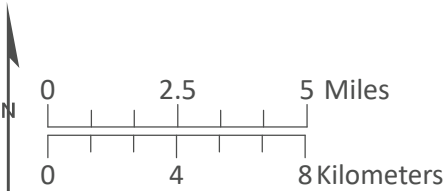
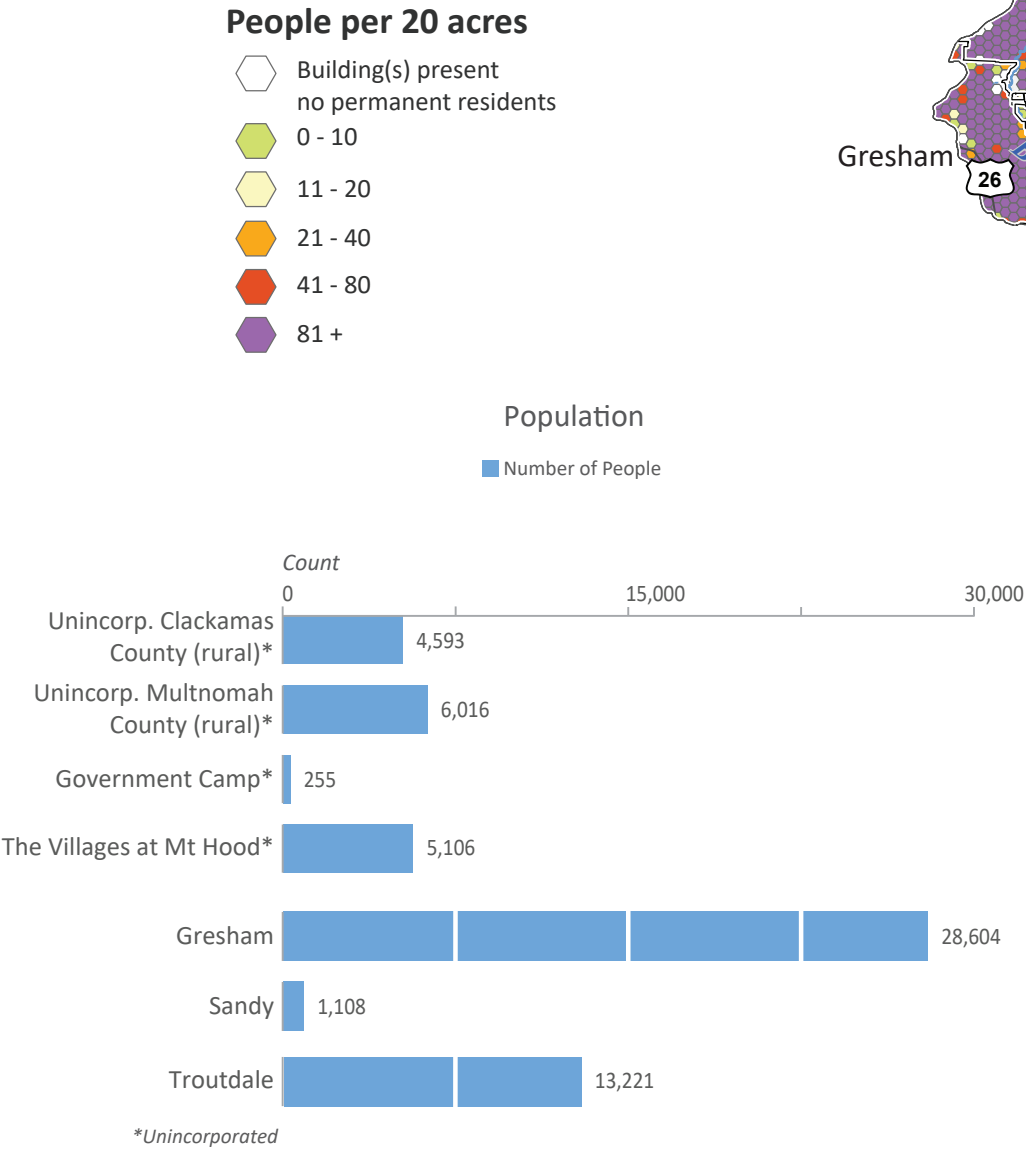
This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.



Population Density Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 2



This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.

Data Sources:
Population data: U.S. Census (2010)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

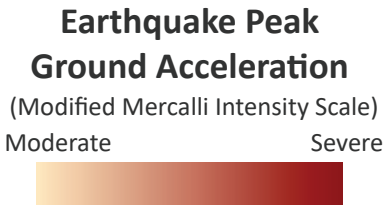


M9.0 CSZ Earthquake Shaking Map of the Lower Columbia-Sandy Watershed, Oregon

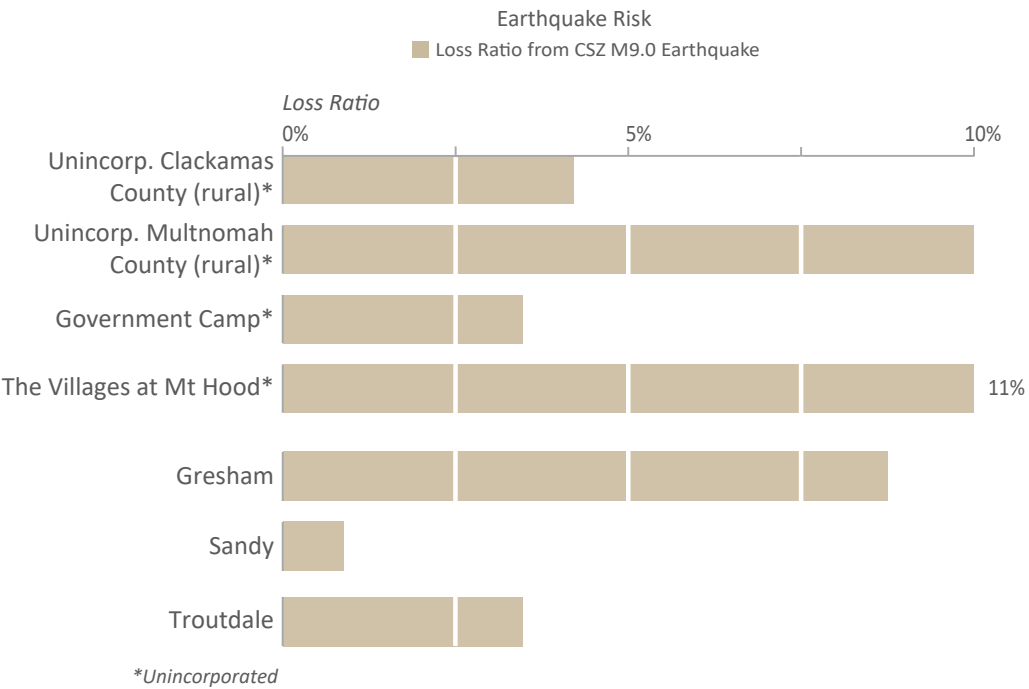
PLATE 3



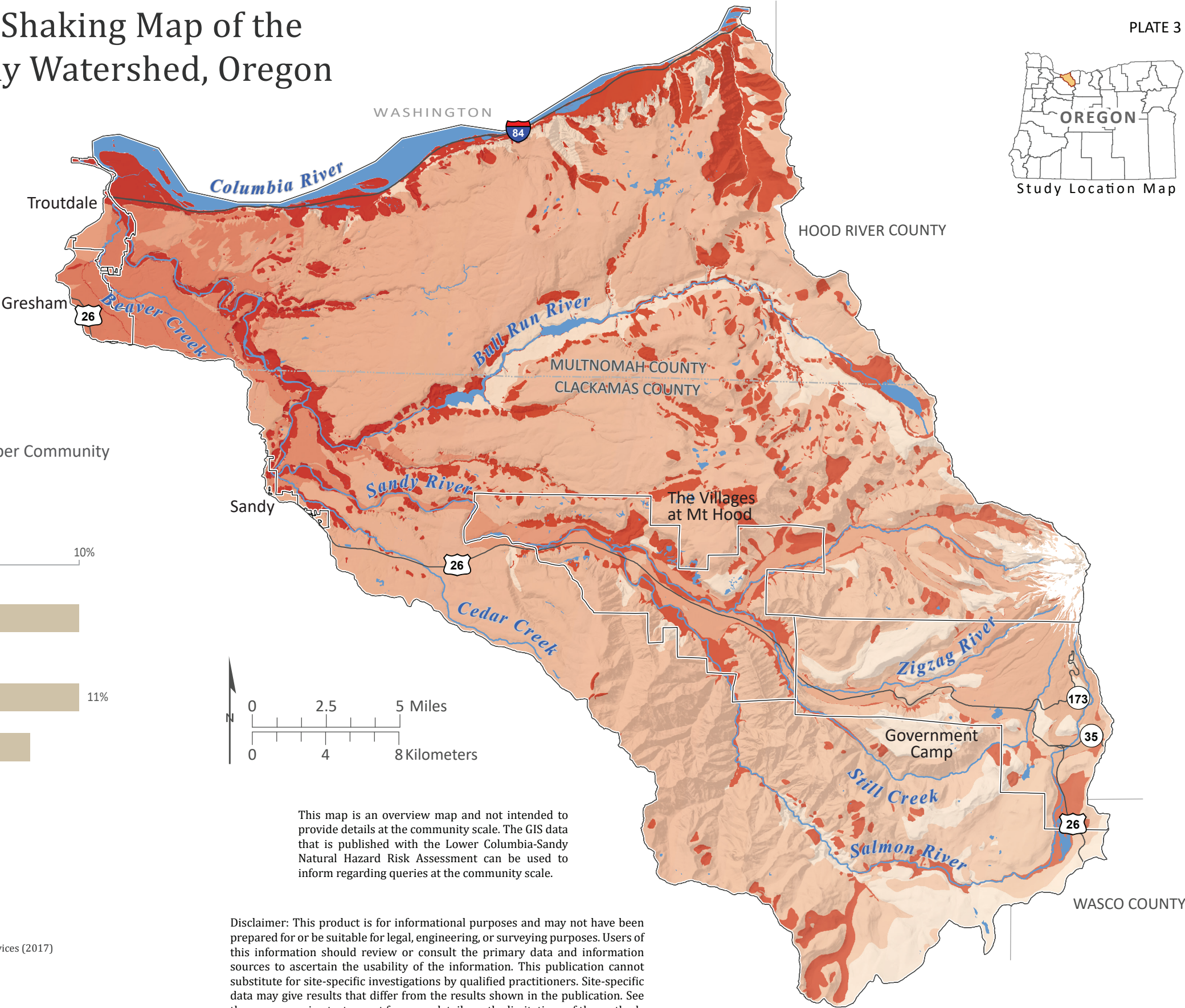
Peak Ground Acceleration (PGA) is the maximum acceleration in a given location or rather how hard the ground is shaking during an earthquake. It is one measurement of ground motion, which is closely associated with the level of damage that occurs from an earthquake.



Total Building Value Loss Ratio from M9.0 Earthquake per Community



Data Sources:
Earthquake peak ground acceleration: Madin and Burns (2013)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)
Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018



This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.



M6.9 MHFZ Earthquake Shaking Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 4

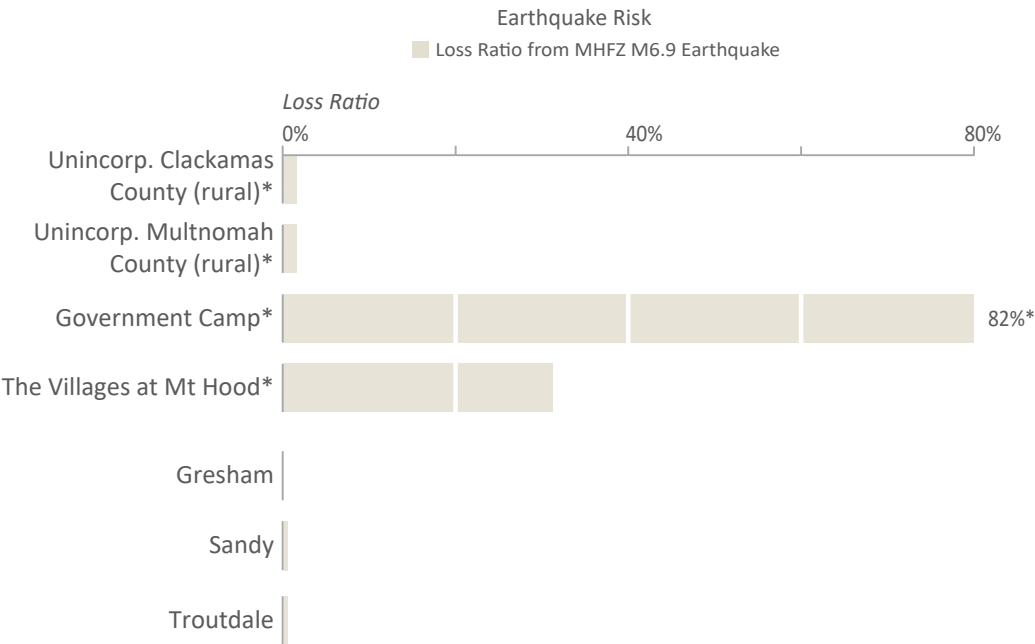


Peak Ground Acceleration (PGA) is the maximum acceleration in a given location or rather how hard the ground is shaking during an earthquake. It is one measurement of ground motion, which is closely associated with the level of damage that occurs from an earthquake.

Earthquake Peak Ground Acceleration



Total Building Value Loss Ratio from M9.0 Earthquake per Community

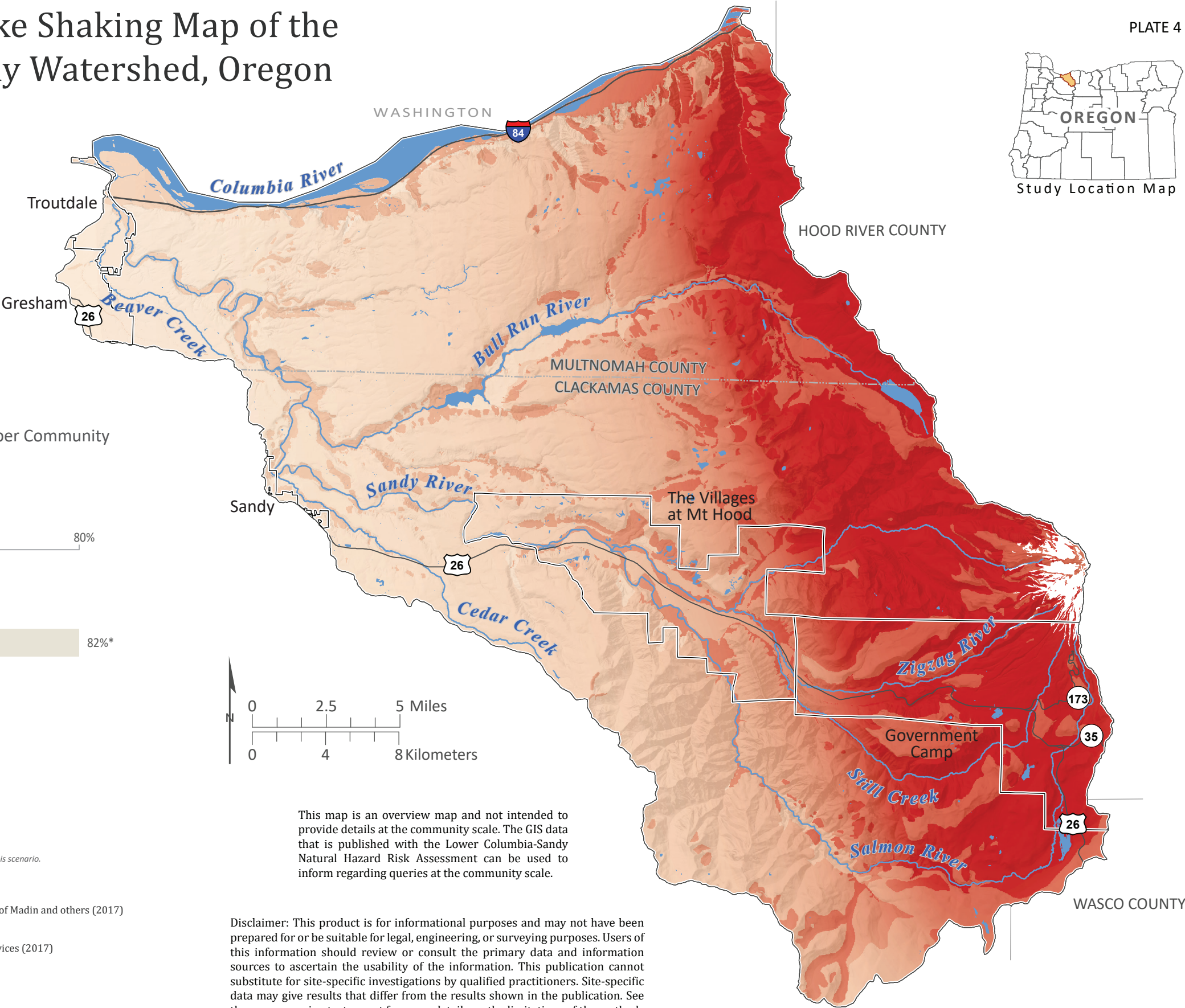


*Unincorporated
*Most of this damage is incurred from the community's most expensive buildings (e.g. Timberline Lodge) in this scenario. The percentage of red and yellow tagged buildings for Government Camp is near 40%.

Data Sources:
Earthquake peak ground acceleration: Oregon Department of Geology, HAZUS Interpretation of Madin and others (2017)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)
Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.





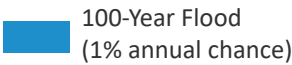
Flood Hazard Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 5

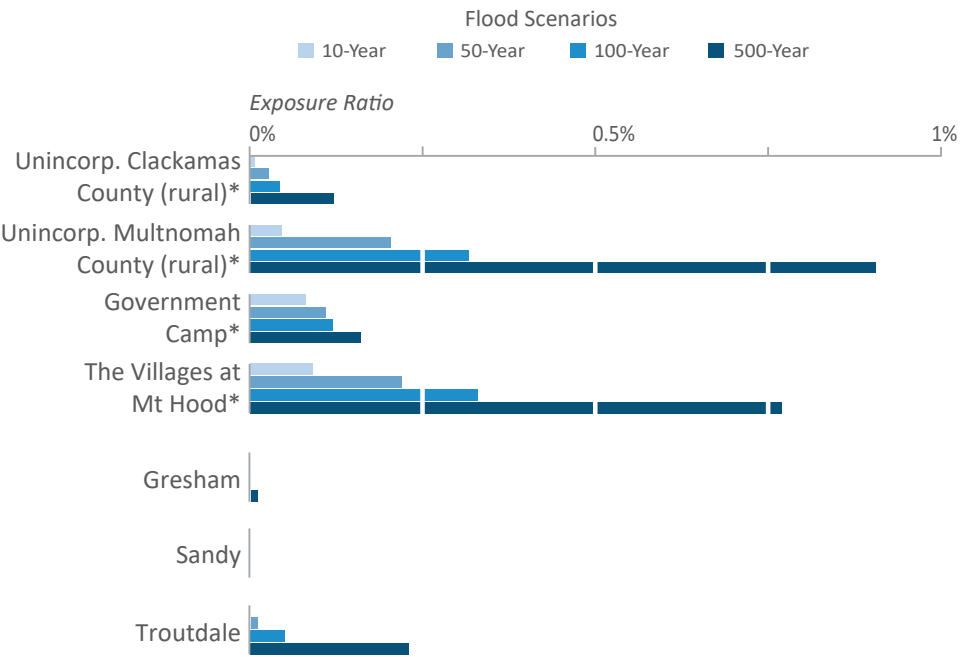


The flood hazard data show areas expected to be inundated during a 100-year flood event. Flooding sources include riverine. Areas are consistent with the regulatory flood zones depicted in Lower Columbia-Sandy Watershed's Digital Flood Insurance Rate Maps.

Flood Hazard Zone



Ratio of Estimated Loss to Flooding



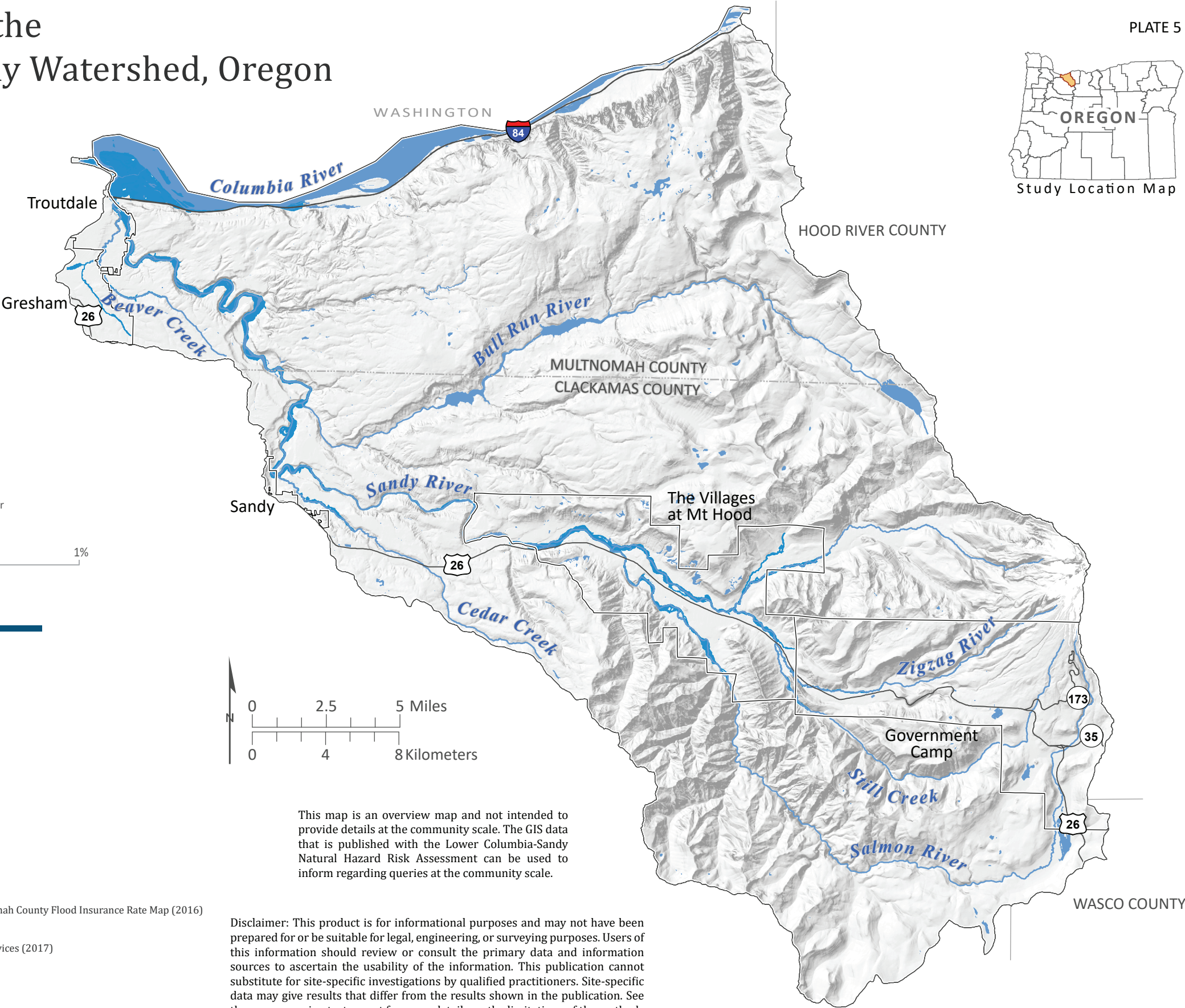
*Unincorporated

Data Sources:
Flood hazard zone (100-year): Clackamas County Flood Insurance Rate Map (2016) | Multnomah County Flood Insurance Rate Map (2016)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.





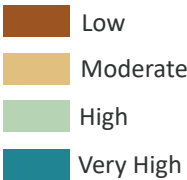
Landslide Susceptibility Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 6

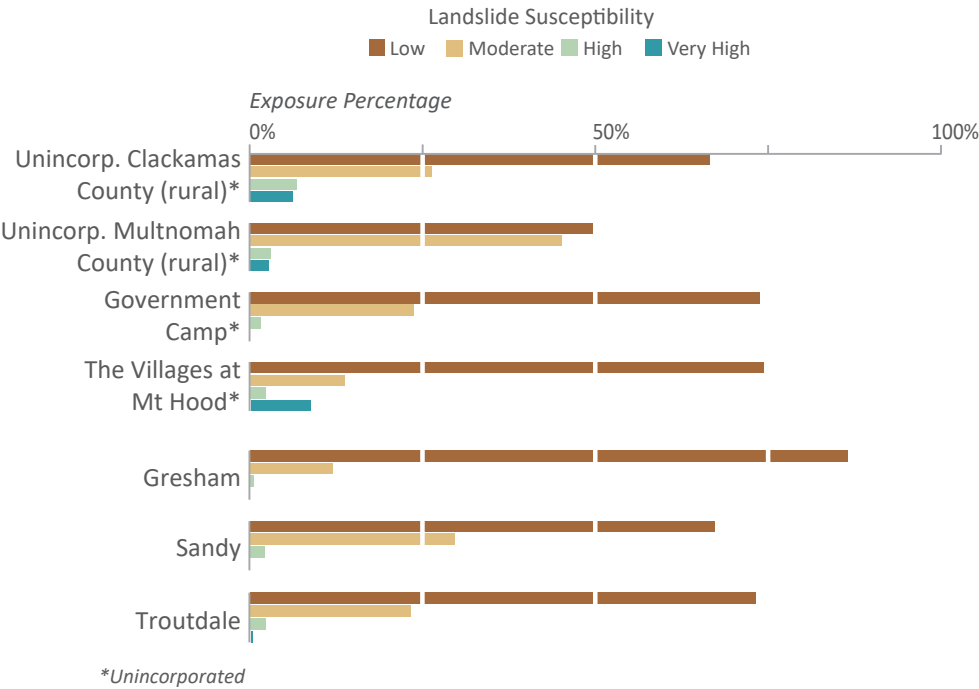


Landslide susceptibility is categorized as Low, Moderate, High, and Very High which describes the general level of susceptibility to landslide hazard. The dataset is an aggregation of three primary sources: landslide inventory (SLIDO), generalized geology, and slope.

Landslide Susceptibility



Percentage of Building Value Exposed to Landslide



*Unincorporated

Data Sources:
Landslide susceptibility: Oregon Department of Geology, Burns and others (2016)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.



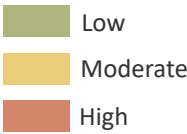
Wildfire Risk Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 7

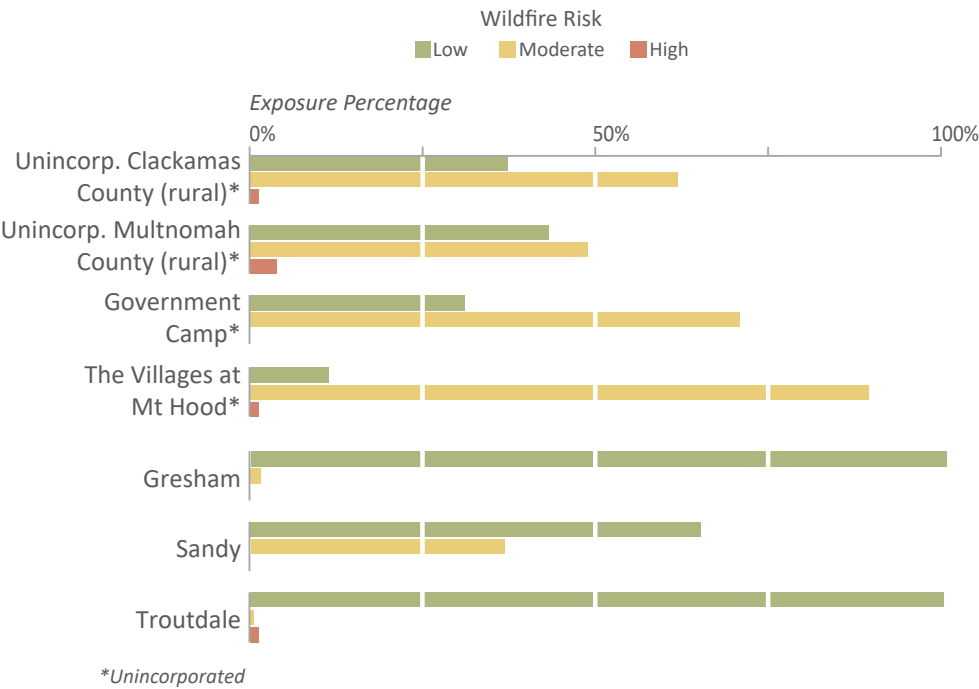


Wildfire Risk is categorized as Low, Moderate, and High and indicates the level of risk a location has to wildfire hazard. The Wildfire Risk data layer (Fire Risk Index) is derived from a combination of the Fire Threat Index (fire history and behavior) and the Fire Effects Index (infrastructure and assets).

Wildfire Risk



Percentage of Building Value Exposed to Wildfire



Data Sources:
Wildfire risk data: Oregon Department of Forestry (2013)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.



Channel Migration Hazard Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 8

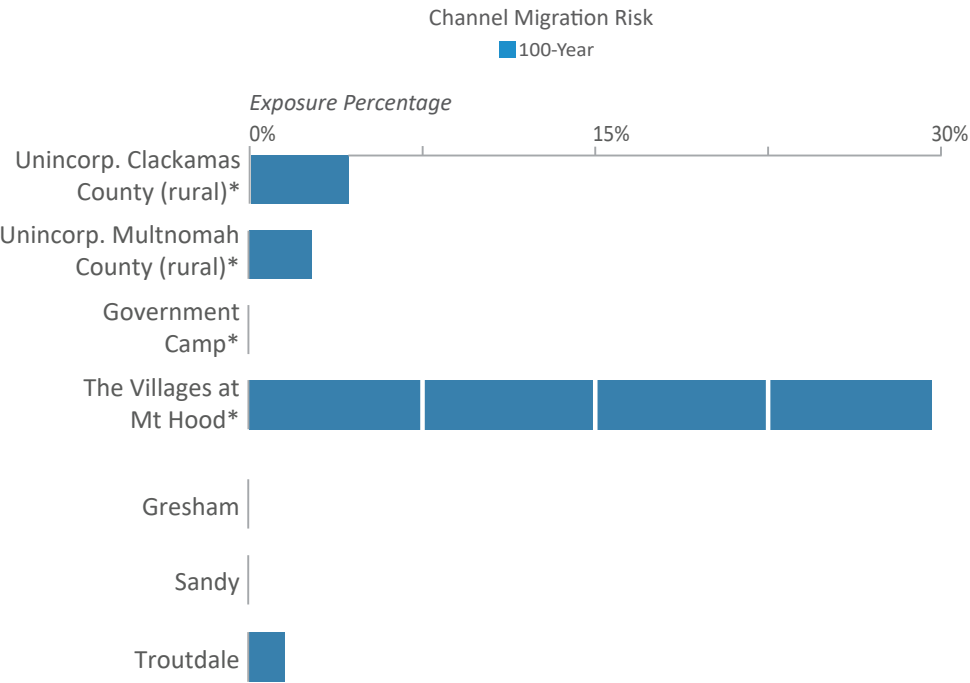


The channel migration hazard data show areas expected to be exposed in a 100-year period. In the upper portions of drainages in the study area (just below Mount Hood), channel migration hazards are severe.

Channel Migration Exposure

Channel Migration Zone

Percentage of Building Value Exposed to Channel Migration



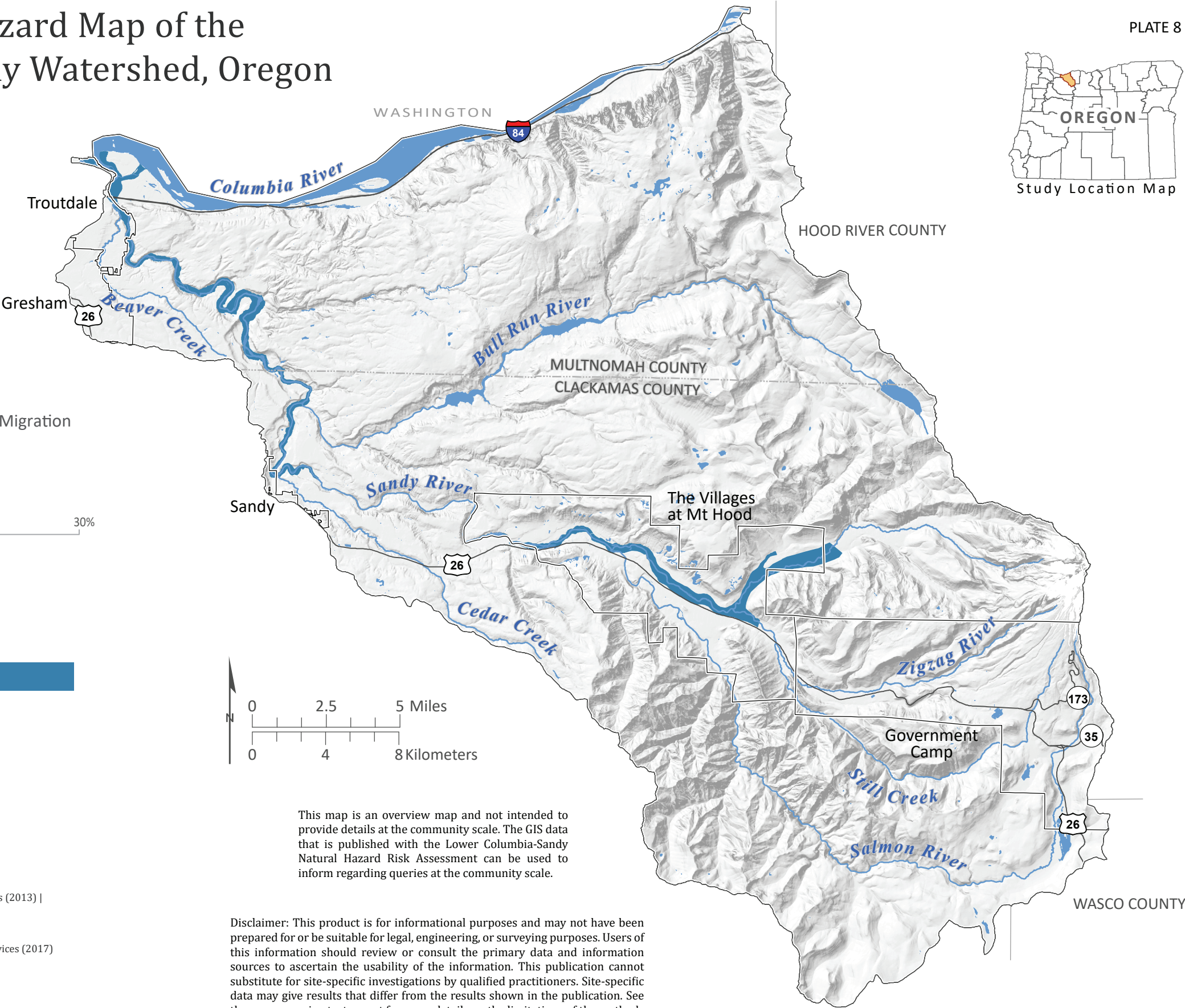
*Unincorporated

Data Sources:
Channel Migration hazard zone (100-year): Oregon Department of Geology, English and others (2013) | Natural Systems Design, Abbe and others (2015)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018

This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.





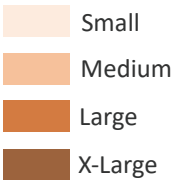
Lahar Exposure Map of the Lower Columbia-Sandy Watershed, Oregon

PLATE 9

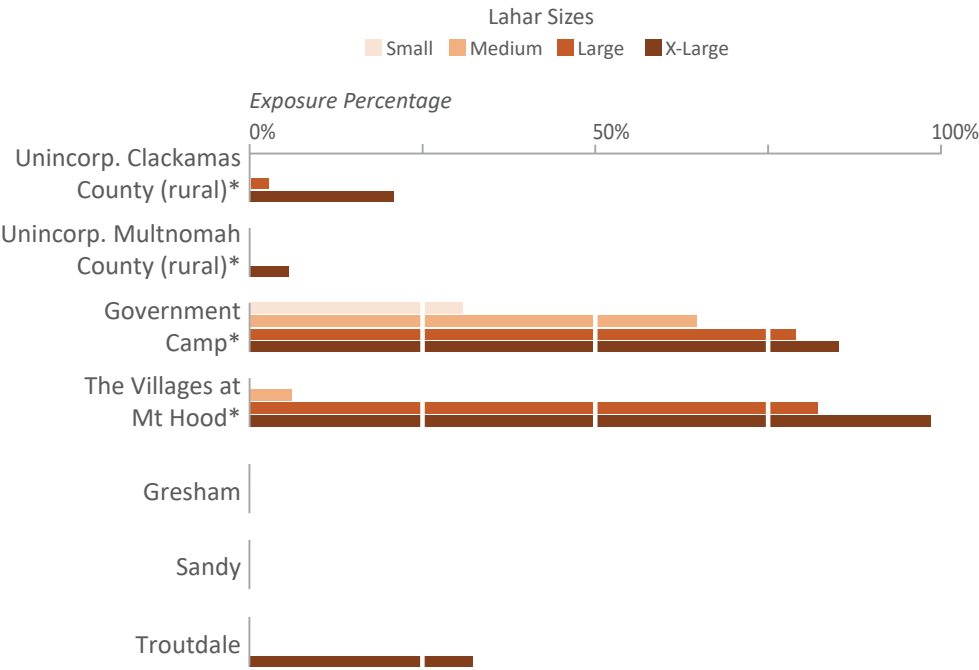


The lahar hazard data show areas of expected exposure from several local lahar scenarios produced from a volcanic event on Mt Hood. The scenarios were categorized based on “t-shirt” sizes, ranging from Small to X-Large.

Lahar Hazard Zone



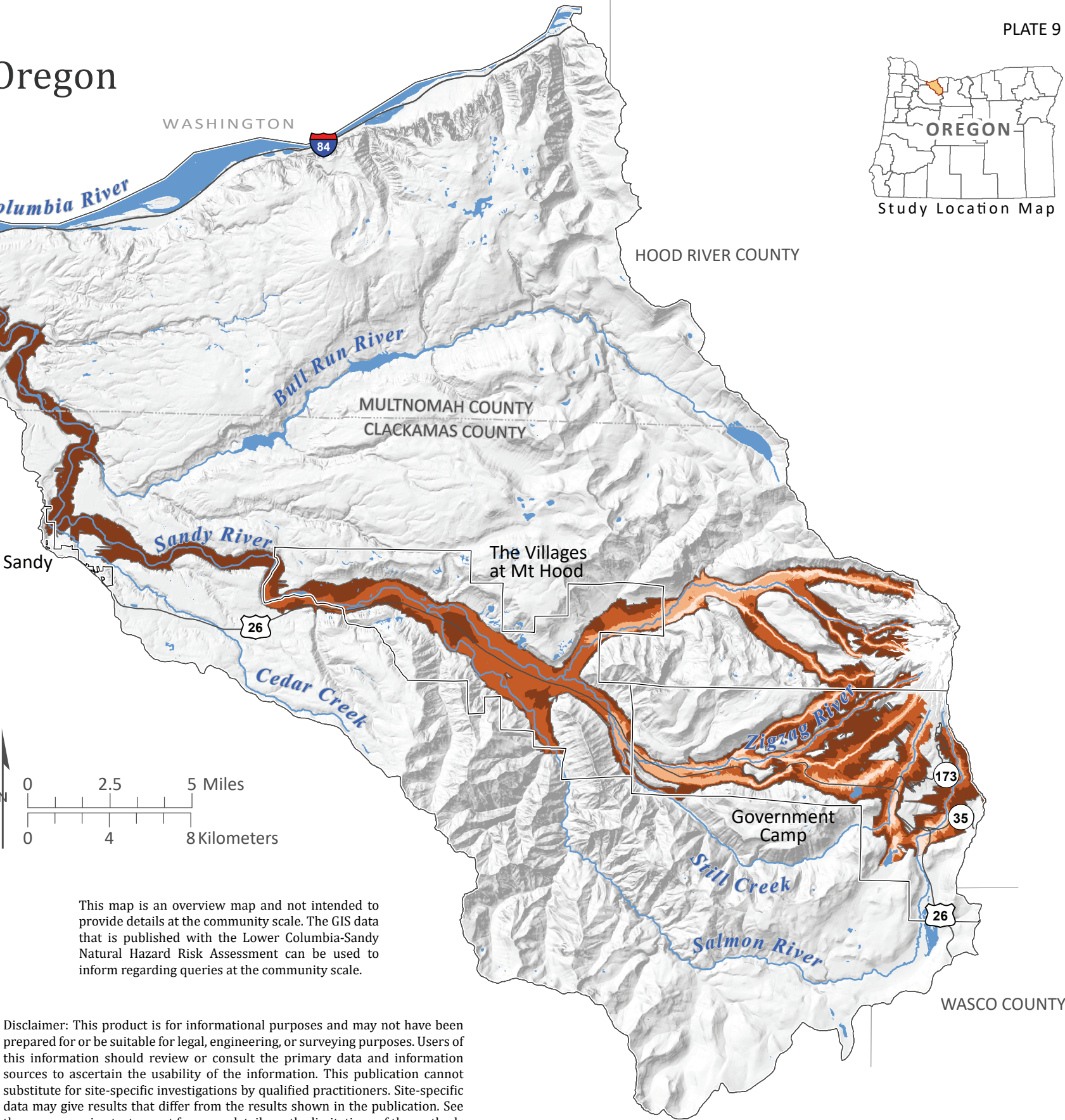
Percentage of Building Value Exposed to Lahar



*Unincorporated

Data Sources:
Lahar Hazard Zones: Oregon Department of Geology, Burns and others (2011)
Roads: Oregon Department of Transportation Signed Routes (2013)
Place names: U.S. Geological Survey Geographic Names Information System (2015)
City limits: Oregon Department of Transportation (2014) | Clackamas County Technology Services (2017)
Basemap: U.S. Geological Survey and Oregon Lidar Consortium (2012)
Hydrography: U.S. Geological Survey National Hydrography Dataset (2017)

Projection: NAD 1983 UTM Zone 10N
Software: Esri® ArcMap 10, Adobe® Illustrator CS6
Cartography by: Lowell H. Anthony, 2018



This map is an overview map and not intended to provide details at the community scale. The GIS data that is published with the Lower Columbia-Sandy Natural Hazard Risk Assessment can be used to inform regarding queries at the community scale.

Disclaimer: This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This publication cannot substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from the results shown in the publication. See the accompanying text report for more details on the limitations of the methods and data used to prepare this publication.