OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
INTERPRETIVE MAP SERIES 24

GEOLOGIC HAZARDS, EARTHQUAKE AND LANDSLIDE HAZARD MAPS, AND FUTURE EARTHQUAKE DAMAGE ESTIMATES FOR SIX COUNTIES IN THE MID/SOUTHERN WILLAMETTE VALLEY INCLUDING YAMHILL, MARION, POLK, BENTON, LINN, AND LANE COUNTIES AND THE CITY OF ALBANY, OREGON

APPENDIX J:
PRE-DISASTER MITIGATION PLAN ACTION ITEMS

Table J1 lists pre-disaster mitigation (PDM) plan action items, sorted by hazard type.

Table J1. Pre-Disaster Mitigation Plan Action Items.

Hazard	Action Item	Rational for Item	Ideas for Implementation
Multi-hazard	Identify and pursue funding opportunities to implement mitigation actions.	The switch from planning to implementation is the step that begins the reduction of risk.	Form partnerships with city, other county, and state agencies. Use these partnerships to apply for federal and local (local bonds, measures) mitigation grants.
Multi-hazard	Integrate the hazard data into planning ordinances and regulatory documents and programs.	Without ordinances and regulations, the hazard data are used by only a few, instead of by all.	Work with local and regional governments.
Multi-hazard	Develop education programs aimed at mitigating the risk posed by hazards.	Education of the potential hazard and risk are sometimes the best way to reduce the risk.	Work with local and regional governments. Use internet websites, local fairs, news articles, brochures, etc. to get the data to the public.
Earthquake	Improve earthquake hazard zone maps through elimination of errors and omissions: groundshaking amplification, liquefaction, earthquake-induced landslides, and tsunami inundation.	The current earthquake hazard maps are frequently a compilation of the existing maps, and were not necessarily the result of a systematic approach. These maps were compiled at widely varying scales and therefore have similarly varying levels of detail. The coarse-scale maps may mislead people to believe that certain areas have no hazard, whereas those areas have simply not been evaluated in detail. Systematic upgrading of these maps will lead to greater understanding of hazard locales. This will improve land use planning and provide for more efficient and cost effective development.	Systematically utilize the new Oregon Geologic Digital Data Compilation project output. Use new digital elevation models including those derived from LIDAR surveys to significantly enhance the accuracy of hazard classification. Collect and compile engineering properties of the geologic units. Incorporate improved spatial (vertical and horizontal) engineering properties data of the geologic rock units (shear wave velocities, strength, grain size, density, etc). Include hydrologic database characteristics such as groundwater depth.
Earthquake	Improve understanding of vulnerability and risk to life, property, and critical infrastructure (lifelines) from earthquake hazards.	If we can understand the risk from earthquakes closer to reality, we can plan and use resources more appropriately to prepare against this hazard. Better data provides for better decisions to minimize loss. In the case of lifelines, minimizing direct losses also minimizes the "snowball effect" or indirect losses also.	Complete an inventory of critical public facilities, including schools, emergency facilities, first-responder buildings, other key public use structures, and infrastructure lifelines. This is particularly important for critical structures (schools and emergency facilities) and lifelines. After the improvement of the hazard layers and the vulnerability inventory, the risk analysis should be reevaluated.
Earthquake	Educate identified vulnerable residential and commercial building owners and occupants, decision makers, lifeline owners, and others.	Those at risk need to be made aware to effect change.	Provide education media to identified vulnerable residential and commercial building owners and occupants. Explain structural and non-structural rehabilitation techniques and encourage rehabilitation.

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Table J-1, continued.

Hazard	Action Item	Rational for Item	Ideas for Implementation
Earthquake	Rehabilitate identified vulnerable schools, emergency facilities, and public buildings/lifelines.	Performing the rehabilitation of vulnerable buildings is one of the final steps that actually reduces the risk.	Provide scientific basis in effort to obtain local state, federal, and private funding.
Earthquake	Improve knowledge of earthquake sources.	The source and location of an earthquake is a critical component of the expected damage to a particular site.	Improve the existing crustal fault database by expanding LIDAR survey coverage and interpreting the results. After the potentially active faults are identified, trenching should be conducted to associated data such as recurrence intervals and maximum magnitude. Expand the seismic instrument network.
Landslide	Improve landslide hazard area maps for a variety of types of landslides.	The current landslide hazard maps are a compilation of the existing maps. These maps are a "work in progress" and have been compiled at widely varying scales and sometimes only depict risk for certain types of landslides. These various scales and levels of detail may lead to people to believe that some areas have no slope hazard, when the case is that those areas just have not been evaluated yet. Systematic upgrading of these maps will lead to greater understanding of hazard locales. This will improve land use planning and provide for more efficient and cost effective development.	Incorporate new Oregon Geologic Digital Data Model. Sponsor and collect LIDAR surveys to inexpensively vastly improve the landslide hazard model. Continue field-based science research by detailed mapping of existing landslide-prone areas. Once sufficient data is collected, perform modeling to predict areas of future higher to lower instability potential.
Landslide	Improve understanding of risk to life and property in landslide hazard areas.	Better data provide for better decisions to minimize loss. Incorporating indirect economic loss better depicts the cost from natural hazard events.	Complete inventory of critical facilities including: schools and emergency facilities, vulnerable public and commercial buildings, vulnerable residential buildings, and lifelines (including roads). Evaluate risk to life and property, including indirect economic loss. After the improvement of the hazard layers and the vulnerability inventory, the risk analysis should be reevaluated.
Landslide	Educate identified vulnerable residential and commercial building owners, occupants, and developers.	With continued urban and near-urban development, areas with significant hazard risk will face development pressures. Land use development should provide for mitigating potential losses from landslide hazards.	Provide educational media to identified vulnerable residential and commercial building owners, occupants, and developers, which explain structural and non-structural reduction techniques such as local drainage improvements.
Landslide	Improve knowledge of debris flow (rapid moving) landslide hazard areas.	Debris flow landslides are rapidly moving and have caused the loss of life in Oregon. The current debris flow hazard maps are based mostly on computer modeling and could be improved through the incorporation of better topographic survey, geologic field data, and human impact data.	Incorporation and interpretation of new base geologic maps including the Oregon Geologic Data Compilation. Use new slope maps including LIDAR-derived DEM and improvement through future mapping. Collect data related to human impact. Improve rainfall thresholds.

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Table J-1, continued.

Hazard	Action Item	Rational for Item	Ideas for Implementation
Landslide	Evaluate and improve current debris flow landslide warning systems to ensure coverage and effectiveness.	The coordination of a warning alert to the local level is as important as the alert itself.	Improvements to the instrumentation network (real time rainfall monitoring, active debris flow trip instruments, etc) should be installed and implemented. Follow-through improvements to the warning alert can be done through improvements in the chain of warning system down to the local level.
Dam failure	Acquire or prepare detailed dam failure inundation maps.	Identifying the hazard is necessary prior to identifying public notification areas and evacuation routes.	Prepare maps with FEMA 100 and 500-year flood inundation maps along with the dam failure inundation zone. Complete inventory of critical facilities including: schools and emergency facilities, vulnerable public and commercial buildings, vulnerable residential buildings, and lifelines within the dam inundation zone.
Dam failure	Improve understanding of vulnerability and risk to life and property from natural hazard induced dam failure.	If we can understand the risk from dam failure closer to reality, we can plan and use resources more appropriately to prepare against this hazard.	After the improvement of the hazard layers and the vulnerability inventory, the risk analysis should be reevaluated. Provide educational media to identified vulnerable communities.
Dam failure	Rehabilitate identified vulnerable dams.	Reduce or eliminate the risk to life, property and infrastructure.	Provide support to assist in obtaining funding to perform rehabilitation.
Dam failure	Evaluate emergency response plan and identify areas of public notification and evacuation routes.	Ensure the plan is adequate to cope with a hazard event.	Evaluate existing plan and revise notification and evacuation routes based on vulnerability inventory.
Volcanic	Acquire or prepare detailed volcanic hazard maps.	Review volcanic hazard reports including Crater Lake, Mt. Hood, Mt. Jefferson, Newberry Volcano, and the Sisters Region. The many smaller volcanoes along the Cascade Mountains have not been evaluated for hazards. These smaller volcanoes may not pose far-reaching hazards, but are a hazard to local communities and travelers.	Prepare maps of hazards related to these smaller, yet important, volcanoes.
Volcanic	Improve understanding of vulnerability and risk to life and property from natural hazard induced dam failure.	If we can understand the risk from volcanic hazards closer to reality, we can plan and use resources more appropriately to prepare against this hazard.	This is particularly important for critical structures (schools and emergency facilities) and lifelines. After the improvement of the hazard layers and the vulnerability, the understanding of vulnerability and risk should be reevaluated.
Volcanic	Evaluate emergency response plan and identify areas of public notification and evacuation routes.	The coordination of a warning alert to the local level is as important is the alert itself.	Evaluate existing plan and revise notification and evacuation routes based on vulnerability inventory.