

Appendix B

2010 Action Item Proposal Forms

Proposed Action Item Identification:	
ST: 1.1.1 Would be a Short Term Action proposed under Goal 1 Objective 1.1	
Proposed Action Title/Description:	
Develop formal agreements (such as Memorandums of Understanding, MOUs) with internal (departments) and external partners (e.g. non-profit organizations, cities, and state agencies) to work together on risk reduction efforts in the County.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Developing formal agreements with internal and external partners could assist the partners in collaborating and sharing the responsibility of natural hazard mitigation. Such actions to form collaborative partnerships and commitments to mitigation can assist the County in reducing its risk to the natural hazards addressed by the NHMP. • FEMA How-to-Guide #4 – <i>Bringing the Plan to Life</i> encourages communities to confirm and clarify responsibilities through formal agreements in order to implement the plan. • Mutual Aid Agreements are commonly used in the emergency management field to pre-arrange assistance with other agencies or jurisdictions in case of an event. This concept, under the term “Memorandum of Understanding” could be applied to pre-disaster mitigation to confirm collaboration on natural hazard mitigation activities. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Create a signature page for the Natural Hazard Mitigation Plan that must be signed by all County department heads indicating that they have received the plan and intent to assist in its implementation • Identify and pursue MOUs with potential external partners such as non-profit organizations or state and federal agencies that may be able to assist in implementing pre-disaster mitigation activities. • Renew MOUs for each calendar year so that they can be updated to reflect the changing needs and conditions of the community and internal and external partners; have both internal and external partners resign the updated MOUs each calendar year. 	
Coordinating Organization:	Linn County Board of Commissioners
Internal Partners:	External Partners:
Steering Committee Members	COG; Cities; State Agencies Non-profit Organizations OSU Extension Service
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
6 Months – 1 Year	
Status:	Several MOU’s and agreements have been developed. Since there are still are internal and external partners to develop agreements with the Steering Committee decided to defer this action item and include it in the 2010 Action Items.

Proposed Action Item Identification:	
LT: 1.1.2 Would be a Short Term Action proposed under Goal 1 Objective 1.1	
Proposed Action Title/Description:	
Explore funding opportunities with partners (both internal & external) to implement the actions identified in the plan.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Linn County currently has limited local funding opportunities available to fund and implement natural hazard mitigation projects. • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Exploring funding opportunities could provide the County with resources to implement actions for hazard mitigation. Implementing such actions could assist the County in reducing its overall risk to hazards. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Exploring funding opportunities could provide the County with resources to implement actions for hazard mitigation. Implementing such actions could assist the County in reducing its overall risk to hazards. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Convene a meeting of the Steering Committee annually to discuss potential funding sources. • Maintain communication with external partners in an effort to identify upcoming fundings sources. Report findings at Steering Committee meetings. • Collaborate with other communities to find funding sources on collaborative projects • Identify existing funding sources for hazard mitigation projects 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
Steering Committee Members	OEM DOGAMI FEMA ONHW
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	
<u>Long Term</u> (2-4 or more years)	
	Ongoing
Status:	The Steering Committee evaluated this action item and determined that exploring funding opportunities with all partners will still serve a vital role in implementation of the action items. This action item has been deferred and included in the 2010 Action Items.

Proposed Action Item Identification:	
LT: 1.1.3 Would be a Long Term Action proposed under Goal 1 Objective 1.1	
Proposed Action Title/Description:	
Establish mitigation benchmarks to assist in evaluating and updating the plan	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Establishing mitigation benchmarks can assist the County in more effectively and efficiently updating and evaluating its plan, helping the County reduce its risk to the hazards addressed by the NHMP. • The ways in which natural hazards affect communities cannot be completely predicted and are subject to change. As risk assessment information changes or is updated, the predictions for how natural hazards will affect a community also change. Establishing benchmarks will provide an opportunity to incorporate new and updated risk assessment data into Linn County's NHMP, assisting the County in mitigating the affects of natural hazards addressed by the Plan. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Establishing mitigation benchmarks can assist the County in more effectively and efficiently updating and evaluating its plan, helping the County reduce its risk to the hazards addressed by the NHMP. • The Disaster Mitigation Act of 2000 requires that communities describe how they will monitor, evaluate and update their plans within a five-year cycle [201.6(c)(4)(i)]. Establishing benchmarks will assist the County in evaluating and updating its plan, and allow the County to easily identify what has been accomplished and what remains to be completed. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Research existing federal requirements for five-year cycle of plan monitoring, evaluation, and updating. Incorporate any appropriate requirements into Linn County's mitigation benchmarks. • Identify and document potential mitigation benchmarks • The Steering Committee will convene annually to evaluate existing benchamarks and identify any modifications or adjustments that need to be made to existing benchmarks. • Partner with appropriate state agencies for assistance in developing appropriate benchmarks. • Incorporate identified benchmarks into all Plan review and evaluation meetings. 	
Coordinating Organization:	Steering Committee
Internal Partners:	External Partners:
Planning and Building Departments Emergency Management	State Agencies OEM FEMA
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	Ongoing
Status:	Deferred - Linn County has made progress on many of the Action Items in the plan. The Steering Committee determined to defer this item since it is still relevant to the 2010 update.

Proposed Action Item Identification:	
ST: 1.2.1 Would be a Short Term Action proposed under Goal 1 Objective 1.2	
Proposed Action Title/Description:	
Encourage and support the development of local community plan supplements to the County Natural Hazard Mitigation Plan	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Supporting the development of local community plans allows for better risk assessment data collection at the local level. Better local risk assessment data improves the county's risk assessment data. Improved county risk assessment data assists the county in better identifying at-risk areas and methods for mitigating those risks, helping the county reduce its overall risk to hazards. • The Linn County plan only covers unincorporated Linn County and not incorporated communities. The City of Albany is currently developing a stand-alone mitigation plan. Supporting the development of such local city plans that will supplement the County plan and improve the data and coverage of the County NHMP. Such actions can assist the County in reducing its overall risk to hazards addressed by the NHMP. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, hazards in general is high. Supporting the development of local community plans allows for better risk assessment data collection at the local level. Better local risk assessment data improves the county's risk assessment data. Improved county risk assessment data assists the county in better identifying at-risk areas and methods for mitigating those risks, helping the county reduce its overall risk to hazards. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Hold a forum to inform incorporated communities about the FEMA planning requirements. • Assist communities with the mitigation planning process. Possible methods include: <ul style="list-style-type: none"> ○ Develop or acquire existing materials with information about the natural hazard mitigation planning process that could be distributed to project directors and emergency managers of city plans. <ul style="list-style-type: none"> ▪ Provide links on the County's website for plan documents, and include an e-mail address and/or phone number that communities can contact for questions or assistance. ○ A County-hosted workshop to provide information and assistance to project managers and emergency managers involved in city plans. 	
Coordinating Organization:	Linn County Board of County Commissioners
Internal Partners:	External Partners:
Steering Committee Members Planning and Building Departments	Local Cities FEMA ONHW OEM
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-2 Years	
Status:	Several Cities within Linn County are in the process of developing addendums or updating current addendums. Since there are still cities that could develop addendums the Steering Committee deferred this action.

Proposed Action Item Identification:	
ST: 1.2.2 Would be a Short Term Action proposed under Goal 1 Objective 1.2	
Proposed Action Title/Description:	
Develop County protocols and communication strategies for the dissemination of media messages that focus on individual responsibility for disaster safety and risk reduction (e.g. IBHS homeowner guides, press releases for awareness campaigns, etc.)	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • The Steering Committee identified a lack of awareness of hazard risk among County residents. Developing communication strategies to inform the public about hazard mitigation would be a way to increase public awareness about hazards and encourage public participation in the County's efforts to mitigate its risks to the hazards addressed by the NHMP. • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Informing the public of their role in the County's risk mitigation efforts, not only increases the public's awareness of the county's hazard risks, but also helps the County reduce its risk to the hazards addressed by the NHMP. • Mitigation is a shared responsibility between local, state, and federal government; citizens; businesses; non-profit organizations; and others. Informing the public of their role in the County's risk mitigation efforts, not only increases the public's awareness of the county's hazard risks, but also helps the County reduce its risk to the hazards addressed by the NHMP. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Informing the public of their role in the County's risk mitigation efforts, not only increases the public's awareness of the county's hazard risks, but also helps the County reduce its risk to the hazards addressed by the NHMP. • The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Conducting outreach to educate the public on the shared responsibility of hazard mitigation would be a way to involve the public in the County's continued mitigation efforts. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Implement ONHW's homeowner survey of County residents to gain an understanding of current risk perception levels as well as preferred methods of receiving risk reduction information. • Utilize the preferred methods of communication indicated by the household survey to develop communication strategies. • Determine if materials or communication strategies already exist; utilize any existing materials and communication strategies. • Develop targeted outreach campaigns for specific hazards. Develop plans to run the campaigns during the times of the year when the county has a greater risk to specific hazards (an example would be running a wildfire campaign from mid-spring through the summer). 	
Coordinating Organization:	Linn County Public Information Officer
Internal Partners:	External Partners:
Planning and Building Departments Emergency Management	State Agencies FEMA IBHS
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
6 Months – 1 Year	
Status:	Deferred - No progress has been made due to lack of resources.

Proposed Action Item Identification:	
ST: 1.2.3 Would be a Short Term Action proposed under Goal 1 Objective 1.2	
Proposed Action Title/Description:	
Distribute information regarding the Natural Hazard Mitigation Plan to public officials and community leaders, and provide updates on hazard vulnerability and County hazard mitigation activities.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Informing elected officials of their role in the County’s risk mitigation efforts, not only increases officials’ awareness of the county’s hazard risks, but assists elected officials in making more informed decisions regarding hazards. More informed decisions regarding natural hazards assist the County in reducing its overall risk to the hazards addressed in the NHMP. • Mitigation is a shared responsibility between local, state, and federal government; citizens; businesses; non-profit organizations; and others. Informing elected officials of their role in the County’s risk mitigation efforts, not only increases the public’s awareness of the county’s hazard risks, but also helps the County reduce its risk to the hazards addressed by the NHMP. • The <i>State of Oregon’s Natural Hazard Mitigation Plan</i> indicates Linn County’s probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Informing elected officials of their role in the County’s risk mitigation efforts, not only increases officials’ awareness of the county’s hazard risks, but assists elected officials in making better informed decisions regarding hazards. More informed decisions regarding natural hazards assist the County in reducing its overall risk to the hazards addressed in the NHMP. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Providing information to public officials about Linn County’s risk to the hazards addressed in the NHMP would assist the elected officials in making more informed decisions regarding natural hazards. More informed decisions regarding natural hazards assist the County in reducing its overall risk to the hazards addressed in the NHMP. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Identify pertinent information to provide to and share with elected officials regarding the hazards addressed in the NHMP. • Develop strategies for delivering the information to elected officials. Such methods could include: <ul style="list-style-type: none"> ○ Quick reference brochures and factsheets. ○ Mailing such materials out to elected officials. ○ Informing elected officials of the existence of hazard related materials. ○ A County-sponsored seminar for elected officials regarding hazards. 	
Coordinating Organization:	Linn County Steering Committee
Internal Partners:	External Partners:
Planning and Building Departments County Departments; Linn County Emergency Management	State Agencies
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
6 Months – 1 Year	
Status:	The Steering Committee changed the language of this action item so that it would be more feasible to accomplish.

Proposed Action Item Identification:			
LT: 1.2.4 Would be a Long Term Action proposed under Goal 1 Objective 1.2			
Proposed Action Title/Description:			
Develop and maintain a database of current action items			
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of hazards addressed by the NHMP. Developing and maintaining a database or action items can allow the County to more quickly identify projects to submit for funding opportunities, making the County more competitive for potential funding opportunities. Being a more competitive candidate for funding opportunities can assist the county in reducing its overall risk to the natural hazards addressed in the NHMP. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Developing and maintaining a database or action items can allow the County to more quickly identify projects to submit for funding opportunities, making the County more competitive for potential funding opportunities. Being a more competitive candidate for funding opportunities can assist the county in reducing its overall risk to the natural hazards addressed in the NHMP. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Developing and maintaining a database or action items can allow the County to more quickly identify projects to submit for funding opportunities, making the County more competitive for potential funding opportunities. Being a more competitive candidate for funding opportunities can assist the county in reducing its overall risk to the natural hazards addressed in the NHMP. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Develop a database for storing action items and relevant information regarding action items. • Upon the Steering Committee's final approval, add all approved plan action items into the database. • Develop methods for maintaining the database and keeping it up-to-date. • Identify methods in which actions can be incorporated into other existing plans, programs, and policies. 			
Coordinating Organization:	Linn County Emergency Management		
Internal Partners:	External Partners:		
Planning and Building Departments			
Timeline:	If available, estimated cost:		
<table border="1"> <tr> <td>Short Term (0-2 years)</td> <td>Long Term (2-4 or more years) Ongoing</td> </tr> </table>	Short Term (0-2 years)	Long Term (2-4 or more years) Ongoing	
Short Term (0-2 years)	Long Term (2-4 or more years) Ongoing		
Status:	Deferred - No progress has been made due to lack of resources.		

Proposed Action Item Identification:	
ST: 2.1.1 Would be a Short Term Action proposed under Goal 2 Objective 2.1	
Proposed Action Title/Description:	
Provide mitigation training to county planning and public works staff, including GIS technicians.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of natural hazards addressed by the NHMP. Providing mitigation training for county planning, public works, and GIS staff increases their awareness and understanding of natural hazard mitigation planning. More informed staff can incorporate natural hazard mitigation into their daily work activities, make better decisions regarding natural hazard planning, and can assist the Steering Committee in implementing the Plan's identified action items. This can help the county reduce its overall risk to the natural hazards addressed by the NHMP. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Providing mitigation training for county planning, public works, and GIS staff increases their awareness and understanding of natural hazard mitigation planning. More informed staff can incorporate natural hazard mitigation into their daily work activities, make better decisions regarding natural hazard planning, and can assist the Steering Committee in implementing the Plan's identified action items. This can help the county reduce its overall risk to the natural hazards addressed by the NHMP. • Have County staff members who understand the principles of mitigation will create the understanding needed to better incorporate mitigation into existing programs, which is a key requirement of the Disaster Mitigation Act of 2000. 	
Ideas for Implementation: (Optional)	
<ul style="list-style-type: none"> • Identify desired areas of natural hazard mitigation training for county planning, public works, and GIS staff. • Research existing regional, state, and federal natural hazard mitigation training programs, and contact agencies for information on possible training opportunities. • Allow staff members to attend natural hazard mitigation trainings, or provide incentives for their attendance. Ensure that this is a continued, County-supported effort. 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
Linn County Roads	FEMA Fire Marshall OEM Insurance Companies DOGAMI ONHW
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
<u>ongoing</u>	
Status:	Deferred - The County has identified specific training opportunities available through the FEMA Independent Study program and announcements will prepare to the Roadmaster and Director of Planning and Building for dissemination to their staff members.

Proposed Action Item Identification:	
ST: 2.1.2 Would be a Short Term Action proposed under Goal 2 Objective 2.1	
Proposed Action Title/Description:	
Develop a continuity of government plan that details how core governmental operations will be maintained in the event of an emergency.	
Rationale for Proposed Action Item: (<i>What critical issues will the action address?</i>)	
<ul style="list-style-type: none"> • Commonwealth of Pennsylvania Human Resources and Management – Continuity of government refers to the need to continue core governmental operations in the event of an emergency situation, including natural disasters. These plans detail how essential business functions will be maintained in the event of an emergency that disrupts normal operations. • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of natural hazards addressed by the NHMP. The County currently does not have a continuity of government plan. Developing a continuity plan will assist the County in planning how it will respond in the event of a natural disaster, helping the County mitigate the effects potential natural hazard events may have on the community. • The <i>State of Oregon’s Natural Hazard Mitigation Plan</i> indicates Linn County’s probability for, and vulnerability to, most natural hazards addressed by the NHMP as being high. Developing a continuity plan will assist the County in planning how it will respond in the event of a natural disaster, helping the County mitigate the effects that potential natural hazard events may have on the community. 	
Ideas for Implementation: (Optional)	
<ul style="list-style-type: none"> • Identify existing plans and policies within Linn County that deal with the County’s response to natural hazard events and evaluate their methods for responding to a natural hazard event. • Identify “core governmental operations” necessary for Linn County and the departments and agencies responsible for them. • Develop a method for monitoring, evaluating, and updating Linn County’s continuity of government plan. • When possible, integrate response, recovery, mitigation, and continuity plans to reflect the disaster cycle. 	
Coordinating Organization:	Linn County Administrative Office
Internal Partners:	External Partners:
Emergency Management County Departments	Elected Officials Board of County Commissioners
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-2 Years	
Status:	Deferred - In January 2010, Linn County began participating in a six-county grant award initiative to provide COG and Coop planning for each of the participating counties and their cities. An initial COOP Plan training workshop was conducted in February 2010. A mid-term training will be conducted in June 2010.

Proposed Action Item Identification:	
LT: 2.1.3 Would be a Long Term Action proposed under Goal 2 Objective 2.1	
Proposed Action Title/Description:	
Evaluate current zoning codes to incorporate mitigation principles.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of natural hazards addressed by the NHMP. Implementing mitigation principles through existing zoning codes allows the County to reduce the duplication of efforts. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings [201.6(c)(3)(ii)]. Evaluating and enhancing zoning codes would address the future built environment and would also help further the objectives of Oregon Statewide Land Use Planning Goal 7 - Areas Subject to Natural Disasters and Hazards 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Identify mitigation principles missing from existing zoning codes, or existing codes that mitigation principles could be added to. • Research the possibility for implementing mitigation principles them through zoning codes, and implement if possible. 	
Coordinating Organization:	Linn County Planning & Building Department
Internal Partners:	External Partners:
Emergency Management	Planning Commission Board of County Commissioners
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-3 years	
Status:	Deferred - not completed due to lack of resources and funds.

Proposed Action Item Identification:	
ST: 2.1.4 Would be a Short Term Action proposed under Goal 2 Objective 2.1	
Proposed Action Title/Description:	
Participate in the National Flood Insurance Program's Community Rating System	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high flood risk rating of 220 out of 240. The County currently does not participate in the National Flood Insurance Program's Community Rating System (CRS). Participating in the CRS can help the County to better identify ways to reduce its flood risk and save money by earning reduced insurance premiums. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for a future flood event is high (that the county would be likely to have a major flooding event in the next 10-35 years) and the county's vulnerability to a future flood event is high. Participating in the CRS can help the County to better identify ways to reduce its flood risk and save money by earning reduced insurance premiums. Linn County was significantly impacted by the flooding events in 1996 and 1997, both of which were Presidentially Declared Disasters. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings [201.6(c)(3)(ii)]. Participating in the CRS can help the County to better identify ways to reduce its flood risk and save money by earning reduced insurance premiums. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Determine CRS eligibility requirements • Research and document current activities that Linn County is already conducting. • Complete and submit CRS participation application • Possible Ideas: <ul style="list-style-type: none"> ○ Update Linn County's code to reflect requirements of the CRS ○ Establish outreach projects to provide education flood hazards to Linn County Residents ○ Implement reasonable higher regulatory standards ○ Obtain digital floodplain maps. 	
Coordinating Organization:	Linn County Planning & Building Department
Internal Partners:	External Partners:
Building Official Emergency Management	Board of County Commissioners FEMA Insurance Companies Local Cities
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
3-6 Months	
Status:	Deferred - not completed due to lack of resources and funds.

Proposed Action Item Identification:	
LT: 2.1.5 Would be a Long Term Action proposed under Goal 2 Objective 2.1	
Proposed Action Title/Description:	
Develop management strategies to preserve the function of the floodplain	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high flood risk rating of 220 out of 240. Developing management strategies to preserve the function of the floodplain would affect the types of development, amount of development, and land use practices in the County's floodplain. Monitoring development and land use practices in the floodplain can assist the County in reducing its overall flood risk. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for a future flood event is high (that the county would be likely to have a major flooding event in the next 10-35 years) and the county's vulnerability to a future flood event is high. Developing management strategies to preserve the function of the floodplain would affect the types of development, amount of development, and land use practices in the County's floodplain. Monitoring development and land use practices in the floodplain can assist the County in reducing its overall flood risk. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings [201.6(c)(3)(ii)]. Developing management strategies to preserve the function of the floodplain would affect the types of development, amount of development, and land use practices in the County's floodplain. Monitoring development and land use practices in the floodplain can assist the County in reducing its overall flood risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Identify the functions of the floodplain that are important to Linn County. • Identify the departments and agencies responsible for maintaining and preserving those functions. • Work with those departments and agencies to develop management strategies for preserving those functions. • Develop methods for monitoring, evaluating, and updating those management strategies. 	
Coordinating Organization:	Linn County Planning and Building Department
Internal Partners:	External Partners:
Building Official	Local Cities FEMA DSL ODFW OWRD Watershed Councils
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	2-3 Years
Status:	This action item has been deferred and was not completed due to lack of resources and funds this item was not completed.

Proposed Action Item Identification:	
LT:2.1.6 Would be a Long Term Action Proposed under Goal 2 Objective 2.1	
Proposed Action Title/Description:	
Develop a scour protection plan for Linn County Bridges.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing a scour protection plan for Linn County bridges will protect existing bridges from erosion caused by flooding events 	
Ideas for Implementation:	
<ul style="list-style-type: none"> Coordinate efforts with ODOT and the Army Corps of Engineers who have resources to assist communities in developing scour protection plans. 	
Coordinating Organization:	Road Department
Internal Partners:	External Partners:
Linn County Surveyor; Linn County GIS	State and Federal agencies
Timeline:	If available, estimated cost:
Short Term (0-2 years)	
Long Term(2-4 or more years)	
	ongoing
Status:	New Action Item

Proposed Action Item Identification:	
ST: 2.2.1 Would be a Short Term Action Proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Develop an inventory of county assets including replacement costs	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of natural hazards addressed by the NHMP. Developing an inventory of county assets and replacement costs can assist the County in identifying what community assets are vulnerable to the natural hazards addressed in the NHMP. Assessing its vulnerability to hazards can help the County to better identify ways to reduce its risk to natural hazards. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most natural hazards addressed by the NHMP as being high. Developing an inventory of county assets and replacement costs can assist the County in identifying what community assets are vulnerable to the natural hazards addressed in the NHMP. Assessing its vulnerability to hazards can help the County to better identify ways to reduce its risk to natural hazards. • The Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted [201.6(c)(2)(ii)(A)] and recommends estimating potential dollar losses [201.6(c)(2)(ii)(B)]. Developing an inventory of county assets and replacement costs can assist the County in identifying what community assets are vulnerable to the natural hazards addressed in the NHMP. Assessing its vulnerability to hazards can help the County to better identify ways to reduce its risk to natural hazards. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Identify assets that are important to the County to protect from the affects of natural hazards. • Identify any existing inventories of important assets, including but not limited to: critical facilities and infrastructure, natural and cultural resources, historic sites and buildings, etc. • Create a single server/location database for storing the inventory • Develop methods for updating and maintaining the database and inventory. • Make the outcome of this inventory available through the County's GIS system 	
Coordinating Organization:	Linn County General Services
Internal Partners:	External Partners:
GIS	Linn County Property Management Treasurer Assessor
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-2 Years	
Status:	Deferred - not completed due to lack of resources and funds.

Proposed Action Item Identification:	
ST: 2.2.2 Would be a Short Term Action proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Re-run DOGAMI HAZUS with local refined data for the earthquake hazard	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • HAZUS is a GIS mapping tool that can be used to estimate loss for potential natural hazard events such as earthquakes. HAZUS can assist communities determine in losses, allowing for emergency preparedness, response and recovery planning, and future risk reduction decisions. HAZUS is able to provide more accurate estimates when it has more refined data to work with. Adding better local data can allow Linn County to use the software to obtain more accurate estimates. Better estimates allow the County to better identify mitigation strategies that can assist it in reducing its risk to earthquakes. • In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Re-running HAZUS with more refined local data can assist Linn County in obtaining better estimates for potential losses from earthquakes. Better estimates allow the County to better identify mitigation strategies that can assist it in reducing its risk to earthquakes. • The Disaster Mitigation Act of 2000 requires that communities identify their vulnerability to the hazards that affect the community, and how the community will be impacted [201.6(c)(2)(ii)(A)]. Re-running HAZUS with more refined local data can assist Linn County in obtaining better estimates for potential losses from earthquakes, assisting the County in identifying its vulnerability to earthquakes. Better estimates of its vulnerability allow the County to better identify mitigation strategies that can assist the County in reducing its risk to earthquakes. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Obtain HAZUS training for appropriate County staff (GIS technicians, planners, etc...) • Identify and collect local refined data. • Obtain any new HAZUS updates. • Ensure that any new HAZUS software updates are compatible with the County's existing servers, programs, and software. • Re-run HAZUS with refined local data. 	
Coordinating Organization:	Linn County GIS Department
Internal Partners:	External Partners:
Emergency Management Planning and Building Departments	Assessor DOGAMI FEMA
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1 Year	
Status:	Deferred - Linn Co. Updated the information from the final DOGAMI Hazus information provided. Since HB 3375 (2003)

Proposed Action Item Identification:	
LT: 2.2.3 Would be a Long Term Action proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Update Flood Insurance Rate Maps (FIRM)	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high flood risk rating of 220 out of 240. Updated Flood Insurance Rate Maps can assist the County in more accurately predicting its risk to a future flooding event. Better predictions can assist the County to better identify mitigation strategies to reduce its flood risk. The existing FIRM is dated September 29, 1986. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for a future flood event is high (that the county would be likely to have a major flooding event in the next 10-35 years) and the county's vulnerability to a future flood event is high. Updated Flood Insurance Rate Maps can assist the County in more accurately predicting its risk to a future flooding event. Better predictions can assist the County to better identify mitigation strategies to reduce its flood risk. • The Disaster Mitigation Act of 2000 requires communities to identify geographic extent of hazards known to impact the community [201.6(c)(2)(i)]. Updated Flood Insurance Rate Maps can assist the County better defining the flood hazard within the community given the development that has taken place since the current FIRMS were created. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Contact the State Floodplain Manager at DLCD to get more information on the Flood Map Modernization Program • Determine whether or not the County has the capability to become a Cooperating Technical Partner in order to assist FEMA update the County's FIRMS. 	
Coordinating Organization:	Linn County Planning and Building Department
Internal Partners:	External Partners:
Emergency Management Building Official	Insurance Companies Local Cities FEMA OEM
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
September 2010	
Status:	Deferred - In progress during update.

Proposed Action Item Identification:	
ST: 2.2.4 Would be a Short Term Action proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Develop pre-storm strategies for coordinated debris removal following wind and winter storms.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high windstorm risk rating of 230 out of 240. Developing pre-storm response strategies for debris removal after wind and winter storms can assist the County in coordinating its response efforts. Coordinating resources assists the County in more efficiently and effectively using resources and responding when a wind or winter storm does happen. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for a future windstorm or winter storm is high (that the county would be likely to have a major windstorm or winter storm event in the next 10-35 years) and the county's vulnerability to a future windstorm or winter storm is high. Pre-planning to coordinate resources assists the County in more efficiently and effectively using resources and responding when a wind or winter storm does happen. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Identify and prioritize areas most likely to have debris to be removed following a wind or winter storm. • Identify departments and agencies that could assist with debris removal. • Work with departments, agencies and private organizations that can assist in developing coordinated strategies for removing debris after a wind or winter storm. Elements to include in strategies could include: <ul style="list-style-type: none"> ○ Tasks and responsibilities for each department and agency. ○ Routes to respond to prioritized areas. ○ Locations for depositing collected debris, or methods for dealing with collected debris. ○ Methods for responding to reports of debris caused by wind and winter storms. 	
Coordinating Organization:	Linn County Roads Department
Internal Partners:	External Partners:
Emergency Management	Sheriff 911 Coordinator Utility Companies Local Cities
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	
<u>Long Term</u> (2-4 or more years)	
1 Year	
Status:	Deferred - not completed due to lack of resources and funds.

Proposed Action Item Identification:	
LT: 2.2.5. Would be a Long Term Action proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Action 2.2.5. Inventory buildings, infrastructure and critical facilities that are vulnerable to sever weather.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Power lines, older buildings and trees are susceptible to damage from wind, ice and snow loads from winder storms. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Coordinate efforts with local communities, utility companies and Linn County GIS Department to identify areas of high risk. 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
GIS, Planning and Building, Road Department	Utility companies, Oregon State College of Engineering, local communities.
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	<u>3 years</u>
Status:	Deferred - not completed due to lack of resources and funds. Action Item was modified.

Proposed Action Item Identification:					
ST: 2.2.6 Would be a Short Term Action Proposed under Goal 2 Objective 2.2					
Proposed Action Title/Description:					
Support local agency programs that promote measures to reduce water use during drought emergencies.					
Rationale for Proposed Action Item:					
<ul style="list-style-type: none"> • During severe drought situations it may be necessary to require curtailment of water use 					
Ideas for Implementation:					
<ul style="list-style-type: none"> • Develop public awareness and water conservation programs. 					
Coordinating Organization:	Board Of Commissioners				
Internal Partners:	External Partners:				
Planning and Building; Emergency Management; Parks and Recreation Department	NRCS; Department of Agriculture; WRD; Local Water Districts				
Timeline:	If available, estimated cost:				
<table border="1"> <tr> <td>Short Term (0-2 years)</td> <td>Long Term(2-4 or more years)</td> </tr> <tr> <td>ongoing</td> <td></td> </tr> </table>	Short Term (0-2 years)	Long Term(2-4 or more years)	ongoing		
Short Term (0-2 years)	Long Term(2-4 or more years)				
ongoing					
Status:	New Action Item				

Proposed Action Item Identification:	
LT: 2.2.7 Would be a Short Term Action Proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Geo-code the location, type, footprint and elevation data for buildings, infrastructure, and critical facilities in natural hazard areas.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Identifying buildings, infrastructure, and critical facilities in natural hazards areas can help in identifying whether these facilities are vulnerable to natural hazards and to what extent the damage could be during an event. This information can also be used to develop appropriate mitigation action items to reduce future impacts from natural hazard events. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Geo-coding the location, type, footprint, and elevation data for buildings, infrastructure, and critical facilities in natural hazard areas can be used to identify whether facilities are vulnerable to natural hazards and appropriate mitigation actions that the county can implement. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Use DOGAMI's 2007 Rapid Visual Survey to identify Linn County buildings that should be geo-coded. • Coordinate geo-coding efforts with DOGAMI's hazard mapping efforts 	
Coordinating Organization:	Linn County GIS Department
Internal Partners:	External Partners:
Assessor; Planning & Building Dept.; Emergency Management; Road Dept.	FEMA; OEM; DOGAMI; Cities; Insurance Companies
Timeline:	If available, estimated cost:
Short Term (0-2 years)	Long Term(2-4 or more years)
	ongoing
Status:	Deferred - not completed due to lack of resources and funds.

Proposed Action Item Identification:	
ST: 2.2.8 Would be a Short Term Action Proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Continue to improve identification of debris flow areas in Linn County by using mapping with current data and technology.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Using improved methods to map debris flow areas would provide more refined local data and assist Linn County in obtaining better estimates for potential losses from landslides. Better estimates allow the County to better identify mitigation strategies that can assist it in reducing its risk to landslides. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on existing buildings and infrastructure [201.6(c)(3)(ii)]. Identifying debris flow areas in Linn County by using mapping technology can identify areas vulnerable to landslide events and help determine whether new buildings and infrastructure should be located there. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Study the feasibility of conducting a LIDAR analysis of Linn County to better understand areas of debris flow. • Coordinate mapping of debris flow areas with the Department of Geology and Mineral Industries (DOGAMI). 	
Coordinating Organization:	GIS Department
Internal Partners:	External Partners:
Board Of Commissioners	DOGAMI
Timeline:	If available, estimated cost:
Short Term (0-2 years)	Long Term(2-4 or more years)
	2-4 years
Status:	New Action Item

Proposed Action Item Identification:	
LT:2.2.9 Would be a Long Term Action Proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Implement Linn County existing development standards for proposed structures located within a “mass movement area”.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on future buildings and infrastructure [201.6(c)(3)(ii)]. Implementing Linn County’s existing development standards for proposed structures located within a “mass movement area” will reduce the impact of landslides on future buildings and infrastructure. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Follow the permitting process for review of properties within the “mass movement area” the Linn County Planning and Building Department. • Provide landslide information to landowners within these areas. 	
Coordinating Organization:	Linn County Planning and Building
Internal Partners:	External Partners:
GIS Department, Emergency Management	DOGAMI
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	ongoing
Status:	New Action Item

Proposed Action Item Identification:	
LT:2.2.10 Would be a Long Term Action Proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Develop a County wide list of and Evaluate for flood; scour; seismic and structural integrity of all bridge crossings leading to private structures on private and public lands.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing a county-wide list of bridge crossings that lead to private structures on private and public lands, and evaluating these crossings for flood, scour, and seismic activity, can greatly reduce the impact of floods and earthquakes to existing buildings in Linn County. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Conduct an inventory of all bridge crossings in Linn County using GIS • Conduct visual surveys of bridge crossings to provide a preliminary evaluation for flood, scour, and seismic issues. FEMA's <i>Rapid Visual Screening of Buildings for Seismic Risk: A Handbook</i> can assist in conducting preliminary evaluations 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
Road Department	Private land owners; Public Agencies
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	ongoing
Status:	New Action Item

Proposed Action Item Identification:	
LT:2.2.11. Would be a Long Term Action Proposed under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Discuss funding opportunities to conduct a new hydraulic study for Linn County.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> 	
Ideas for Implementation:	
<ul style="list-style-type: none"> Conduct a hydraulic study in coordination with other agencies to minimize damage. 	
Coordinating Organization:	Road Department
Internal Partners:	External Partners:
Linn County Surveyor; Linn County GIS	State and Federal agencies
Timeline:	If available, estimated cost:
Short Term (0-2 years)	
Long Term (2-4 or more years)	
	ongoing
Status:	New Action Item

Proposed Action Item Identification:	
LT:2.2.12. Would be a Long Term Action Propose under Goal 2 Objective 2.2	
Proposed Action Title/Description:	
Develop a risk analysis for each section identified in the Linn County Natural Hazard Mitigation Plan	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • A risk analysis involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment, and (2) the likelihood or probability of the harm occurring. Hazards US (HAZUS) is a risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes and can assist communities in completing the risk analysis phase. In HAZUS-MH current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after a disaster occurs. Currently there is insufficient data to conduct a detailed risk analysis for the drought, earthquake, landslide, flood, wildfire, and severe weather hazards in Linn County. Completing a risk analysis for each of these hazards can help in prioritizing areas for mitigation, better planning for infrastructure improvements, or prevent events from occurring. • The Disaster Mitigation Act of 2000 recommends that communities estimate the potential dollar losses to vulnerable structures. [201.6(c)(2)(ii)(B)]. Completing a risk analysis for hazards addressed in this plan will provide Linn County with an estimate of the potential effects impacts of a hazard event. Currently there is insufficient data to conduct a detailed risk analysis for hazards in Linn County. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Use LIDAR data to complete this hydraulic modeling to conduct a more accurate and detailed risk analysis for flood events in Linn County. • Order the HAZUS-MH software free of charge from the FEMA Publication Warehouse. Information can be found at http://www.fema.gov/plan/prevent/hazus/index.shtm. Federal, State, and local government agencies and the private sector can order this information. • Coordinate efforts to complete a risk analysis with the Department of Geology and Mineral Industries (DOGAMI) who has used HAZUS-MH software for several counties and cities across Oregon. • Use the results from the HAZUS software to update Linn County’s vulnerability assessment and develop appropriate mitigation actions as needed.. 	
Coordinating Organization:	Steering Committee
Internal Partners:	
External Partners:	
Linn County Departments	State and Federal agencies
Timeline:	
If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	ongoing
Status:	New Action Item

Proposed Action Item Identification:	
ST: 2.3.1 Would be a Short Term Action proposed under Goal 2 Objective 2.3	
Proposed Action Title/Description:	
Update the Emergency Operations Plan.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of natural hazards addressed by the NHMP. Updating the Emergency Operations Plan allows the County to update its ability to provide support and maintain the ability of the emergency services system in order to prevent or reduce the impact of injuries. This allows the County to improve its ability to mitigate the potential affects of the natural hazards addressed by the NHMP. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most natural hazards addressed by the NHMP as being high. Updating the Emergency Operations Plan allows the County to update its ability to provide support and maintain the ability of the emergency services system in order to prevent or reduce the impact of injuries. This allows the County to improve its ability to mitigate the potential affects of the natural hazards addressed by the NHMP. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Updating the Emergency Operations Plan allows the County to update its ability to provide support and maintain the ability of the emergency services system in order to prevent or reduce the impact of injuries. This allows the County to improve its ability to mitigate the potential affects of the natural hazards addressed by the NHMP. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Evaluate the current Emergency Operations Plan and identify areas that need to be updated or altered to reflect the current conditions and situation of the community. • Ensure that links and references between the Emergency Operations Plan and the mitigation, recovery, and continuity of operations plans are made. • Develop a method for scheduling updates and evaluations of the Emergency Operations Plan. 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
County Administrator Road Department	Sheriff State Police COG Utility Companies Local Cities 911 Coordinator
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1 Year	
Status:	Deferred - Since the update is not completed. The deadline for the Linn County to complete the update is July 2012. The County is working on a revision of the Basic Plan portion of the EOP.

Proposed Action Item Identification:	
ST: 2.3.2 Would be a Short Term Action proposed under Goal 2 Objective 2.3	
Proposed Action Title/Description:	
Consolidate mitigation plan, Emergency Operations Plan, recovery plans, and continuity of government plans into a Unified Disaster Plan.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having an above average or high risk to the majority of natural hazards addressed by the NHMP. Consolidating the County's plans that address natural hazards improves the County's efficiency and effectiveness in mitigating, responding, and recovering from natural hazards. This can assist the County in reducing its overall risk to the natural hazards addressed by the NHMP. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most natural hazards addressed by the NHMP as being high. Consolidating the County's plans that address natural hazards improves the County's efficiency and effectiveness in mitigating, responding, and recovering from natural hazards. This can assist the County in reducing its overall risk to the natural hazards addressed by the NHMP. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Consolidating the County's plans that address natural hazards improves the County's efficiency and effectiveness in mitigating, responding, and recovering from natural hazards. This can assist the County in reducing its overall risk to the natural hazards addressed by the NHMP. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Research the plans to identify areas of overlap, areas that could be combined, and areas that are specific to only one plan. • Ensure that links and references between the the mitigation, recovery, emergency operations, and continuity of operations plans are made. • Schedule a Steering Committee meeting to address consolidating the mitigation plan, EOP, recovery plans, and continuity of governemnt plans. Develop a method for consolidating the plans. 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
County Administrator Road Department	COG Local Cities 911 Coordinator State Police Utility Companies
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
June 2112	
Status:	Deferred – The County is in the process of developing the EOP.

Proposed Action Item Identification:	
ST: 2.3.3. would be a short term action proposed under Goal 2 Objective 2.3	
Proposed Action Title/Description:	
Identify and evaluate county-owned emergency transportation routes and determine which roads and bridges are critical to the transportation network	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Emergency transportation routes are essential to evacuating residents and visitors from hazardous areas and to responding to a natural hazard event. Identifying and evaluating county-owned emergency transportation routes and determining which roads and bridges are essential for evacuation and response efforts will make Linn County more resilient to natural hazard events. • Identifying and evaluating county-owned emergency transportation routes and bridges can assist in identifying areas that need further mitigation efforts to reduce the impact of natural hazards. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Review emergency transportation routes in coordination with Emergency Management Department and Linn County Fire Departments to determine which roads and bridges are critical to the transportation network. • Conduct a preliminary evaluation of bridges to determine whether the bridges are able to withstand a natural hazard event. 	
Coordinating Organization:	Linn County Emergency Mangement
Internal Partners:	External Partners:
Road Department, GIS Department, Fire Departments	OEM, FEMA, ODOT
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-3 years	
Status:	Deferred - This is an ongoing process to provide continual improvement to the County wide Transportation network.

Proposed Action Item Identification:	
ST: 2.4.1 Would be a Short Term Action proposed under Goal 2 Objective 2.4	
Proposed Action Title/Description:	
Develop a program to implement non-structural retrofit of County staff offices and workspaces	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Developing a program to implement non-structural retrofit projects in County staff offices will reduce the vulnerability of staff offices to earthquakes. This cannot only reduce the potential for injuries to staff that might be caused by a future earthquake, but can assist the county in reducing its risk to earthquakes. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for a future earthquake is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county's vulnerability to earthquakes is high. Developing and implementing non-structural retrofit projects in County staff offices will reduce the vulnerability of staff offices to earthquakes, reducing the potential for earthquake-caused injuries. This can assist the County in reducing its overall earthquake risk. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Developing and implementing non-structural retrofit projects in County staff offices will reduce the vulnerability of staff offices to earthquakes, reducing the potential for earthquake-caused injuries. This can assist the County in reducing its overall earthquake risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Develop manuals, brochures, or hazard forms to help raise awareness of the need to mitigate non-structural hazards. • Provide new employees, through new employee orientation, information on the hazards facing the county. • Inventory County staff offices to determine needed non-structural retrofitting projects. • Estimate costs of identified non-structural retrofit projects. • Prioritize identified projects based on cost-benefit analysis. • Identify resources and funding to complete retrofit projects. • Develop a plan/schedule for completing retrofit projects. 	
Coordinating Organization:	Linn County Safety Committee
Internal Partners:	External Partners:
General Services	County Insurance Carrier OEM OR-OSHA BC
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1 Year	
Status:	Deferred - Due to lack of resources and funds this item was not completed.

Proposed Action Item Identification:	
LT: 2.4.2 Would be a Long Term Action proposed under Goal 2 Objective 2.4	
Proposed Action Title/Description:	
Complete a seismic vulnerability assessment of all county-owned structures and prioritize vulnerable publicly owned structures	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Completing a seismic vulnerability assessment of all county-owned structures can assist the County in identifying its vulnerability to earthquakes. A better understanding of its vulnerability to earthquakes can assist the County to better identify mitigation strategies to reduce its overall earthquake risk. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for a future earthquake is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county's vulnerability to earthquakes is high. Completing a seismic vulnerability assessment of all county-owned structures can assist the County in identifying its vulnerability to earthquakes. A better understanding of its vulnerability to earthquakes can assist the County to better identify mitigation strategies to reduce its overall earthquake risk. • The Disaster Mitigation Act of 2000 requires communities to assess their vulnerability to natural hazards, particularly by identifying the types and number of buildings, infrastructure, and critical facilities that could be affected [201.6(c)(2)(ii)(A)]. Completing a seismic vulnerability assessment of all county-owned structures can assist the County in identifying its vulnerability to earthquakes. A better understanding of its vulnerability to earthquakes can assist the County to better identify mitigation strategies to reduce its overall earthquake risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Create list of all County-owned structures to assess. • Develop a list of potential publicly owned structures to assess. Prioritize list based on a cost-benefit analysis for completing a structural vulnerability assessment. • Research the possibility of completing <i>Rapid Visual Assessments</i> to determine vulnerability; research the possibility of hiring professionals to complete seismic vulnerability assessments. • Determine which facilities have had their seismic vulnerability analyzed. For the facilities that have been assessed, find out when assessment was done to determine if a new assessment should be completed to address new seismic standards. • For facilities that have had no seismic vulnerability analysis completed, work with facility operators to perform analysis. • Prioritize facilities based on vulnerability. • Ensure that data collected for the vulnerability assessment is captured in the County's GIS system • Encourage County staff to attend state-sponsored <i>Rapid Visual Assessment</i> trainings. 	
Coordinating Organization:	Linn County Engineer
Internal Partners:	
External Partners:	
General Services Building Official	Board of County Commissioners DOGAMI OEM Safety Committee Assessor
Timeline:	
If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	5 Years
Status:	Deferred - Due to lack of resources and funds this item was not completed.

Proposed Action Item Identification:	
LT: 2.4.3 Would be a Long Term Action proposed under Goal 2 Objective 2.4	
Proposed Action Title/Description:	
Implement structural mitigation projects for prioritized, vulnerable publicly owned structures identified in Action 2.4.2.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Implementing projects to reduce public facilities' seismic vulnerability can reduce the impact earthquakes will have on the facilities. Such actions help to reduce the County's overall risk to potential earthquakes. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates that Linn County's probability for a future earthquake is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county's vulnerability to earthquakes is high. Implementing projects to reduce public facilities' seismic vulnerability can reduce the impact earthquakes will have on the facilities. Such actions help to reduce the County's overall risk to potential earthquakes. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Developing and implementing projects to reduce public facilities' seismic vulnerability can reduce the impact earthquakes will have on the facilities. Such actions help to reduce the County's overall risk to potential earthquakes. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Use the seismic vulnerability assessments completed for publicly owned structures in Action Item 2.4.2, develop projects to reduce the seismic vulnerability of the highest prioritized structures. • Identify funding sources to implement projects. 	
Coordinating Organization:	General Services
Internal Partners:	
External Partners:	
Planning and Building Department	Board of County Commissioners FEMA DOGAMI OEM ODOT U.S. Dot
Timeline:	
If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	<u>5 Years</u>
Status:	New Action Item, 2005 Action Item 2.4.4 included publicly owned structures and County Owned Bridges. Since the Road Department is responsible for Bridges and General Services is responsible for structures, the Steering Committee separated the Action Item.

Proposed Action Item Identification:	
LT: 2.4.4 Would be a Long Term Action proposed under Goal 2 Objective 2.4	
Proposed Action Title/Description:	
Complete seismic vulnerability assessment of all County-owned bridges on lifeline routes and prioritize vulnerable bridges.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Assessing the seismic vulnerability of all County-owned bridges can assist the County in understanding its vulnerability to potential earthquakes. Having an improved understanding of its earthquake vulnerability can assist the County in better identifying mitigation efforts and directing mitigation funding to prioritized projects. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates that Linn County's probability for a future earthquake is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county's vulnerability to earthquakes is high. Assessing the seismic vulnerability of all County-owned bridges can assist the County in understanding its vulnerability to potential earthquakes. Having an improved understanding of its earthquake vulnerability can assist the County in better identifying mitigation efforts and directing mitigation funding to prioritized projects. • The Disaster Mitigation Act of 2000 requires communities to assess their vulnerability to natural hazards, particularly by identifying the types and number of buildings, infrastructure, and critical facilities that could be affected [201.6(c)(2)(ii)(A)]. Assessing the seismic vulnerability of all County-owned bridges can assist the County in understanding its vulnerability to potential earthquakes. Having an improved understanding of its earthquake vulnerability can assist the County in better identifying mitigation efforts and directing mitigation funding to prioritized projects. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Create list of all County-owned bridges along lifeline routes to assess. • Research the possibility of completing <i>Rapid Visual Assessments</i> to determine vulnerability; research the possibility of hiring professionals to complete seismic vulnerability assessments. • Determine which bridges have already had their seismic vulnerability analyzed. For the bridges that have been assessed, find out when assessment was done to determine if a new assessment should be completed to address new seismic standards. • For bridges that have had no seismic vulnerability analysis completed, perform analysis. • Prioritize bridges based on the findings of the vulnerability assessments. 	
Coordinating Organization:	Linn County Roads Department
Internal Partners:	External Partners:
County Engineer	Board of County Commissioners FEMA DOGAMI OEM ODOT Fire Marshall 911 Coordinator Sheriff
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	5 Years
Status:	Deferred - funding have not been made available to complete new assessment
Proposed Action Item Identification:	

LT: 2.4.5 Would be a Long Term Action proposed under Goal 2 Objective 2.4

Proposed Action Title/Description:

Implement structural mitigation projects for prioritized, vulnerable County Owned Bridges identified in Action 2.4.4.

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Implementing projects to reduce public facilities’ seismic vulnerability can reduce the impact earthquakes will have on the facilities. Such actions help to reduce the County’s overall risk to potential earthquakes.
- The *State of Oregon’s Natural Hazard Mitigation Plan* indicates that Linn County’s probability for a future earthquake is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county’s vulnerability to earthquakes is high. Implementing projects to reduce public facilities’ seismic vulnerability can reduce the impact earthquakes will have on the facilities. Such actions help to reduce the County’s overall risk to potential earthquakes.
- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Developing and implementing projects to reduce public facilities’ seismic vulnerability can reduce the impact earthquakes will have on the facilities. Such actions help to reduce the County’s overall risk to potential earthquakes.

Ideas for Implementation:

- Use the seismic vulnerability assessments completed for County Owned Bridges in Action Item 2.4.4, develop projects to reduce the seismic vulnerability of the highest prioritized structures.
- Identify funding sources to implement projects.

Coordinating Organization: Linn County Engineer

Internal Partners:

Road Department

External Partners:

Board of County Commissioners
 FEMA
 DOGAMI
 OEM
 ODOT
 U.S. Dot

Timeline:

Short Term (0-2 years)	Long Term (2-4 or more years)
	5 Years

If available, estimated cost:

Status Modified to create Action 2.4.3

Proposed Action Item Identification:	
ST: 3.1.1 Would be a Short Term Action proposed under Goal 3 Objective 3.1	
Proposed Action Title/Description:	
Develop public awareness campaign aimed at homeowners, children, the elderly, and Spanish speaking residents to make them aware of what they can do to prepare for natural hazard events	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high risk to the majority of hazards addressed by the NHMP. Conducting outreach to educate the public and special needs groups on the importance of having emergency kits, supplies, and plans better prepares citizens for natural hazard events, helping reduce the county's overall risk to natural hazards. • To increase natural hazard mitigation and emergency preparedness in Linn County, residents must be aware of the risk and know what they should do before and after the disaster occurs. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Conducting outreach to educate the public on the importance of having emergency kits, supplies, and plans better prepares citizens for natural hazard events, helping reduce the county's overall risk to natural hazards. • The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Conducting outreach to educate the public on the importance of emergency kits, supplies, and plans would be a way to keep the public informed of, and involved in, the County's actions to mitigate hazards. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Encourage the development of 72-hour kits. • Encourage elderly and special needs populations to make plans for emergency supplies and care before an event occurs. • Develop education and outreach materials to make residents aware of the flood hazard and the availability of flood insurance. • Develop education and outreach materials to make residents aware of the earthquake hazard and the availability of earthquake insurance. • Develop awareness campaign that encourages residents to implement structural and non-structural mitigation for the earthquake hazard. • Provide information to residents on landslide prevention (e.g. FEMA Homeowners Landslide Guide for Hillside Flooding, Debris Flow, Erosion and Landslide Control and Hillside Drainage). • Partner with utility providers to make homeowners aware of the importance of tree and limb maintenance. • Partner with insurance providers to provide insurance related information to homeowners and renters. 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
Public Information Officer	Red Cross; COG; Local Cities; Linn Benton ESD; United Way; State Agencies; Hospitals; Insurance Companies; Children and Families Commission
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-2 Years	
Status:	Deferred – Due to Lack of resources and funds this item was not completed.

Proposed Action Item Identification:	
LT: 3.1.2 Would be a Long Term Action Proposed under Goal 3 Objective 3.1	
Proposed Action Title/Description:	
Support local agency programs for farmers and ranchers that provide education and training on water conservation measures, including drought management practices for crops and livestock.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Farmers and ranchers depend on water to grow crops and raise livestock. However, in years with severe droughts, water is in limited supply, putting the livelihood of ranchers and farmers at risk. Supporting local agency programs for farmers and ranchers that provide education and training on water conservation measures can assist farmers and ranchers in preserving their livelihoods during severe water shortages. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Cooperation with OSU extension services and agricultural organizations prominent and respected within the farming and ranching community, build on existing outreach methods with the goal of providing water conservation/drought management training to farmers and ranchers. 	
Coordinating Organization:	Linn County Board of Commissioners
Internal Partners:	External Partners:
Planning and Building, Emergency Management	OSU Extension Services; NRCS; Farm Bureau; WRD; ODFW; Watershed Councils; Water Districts
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	<u>2-5 Years</u>
Status:	New Action Item

Proposed Action Item Identification:	
ST: 3.1.3 Would be a Short Term Action proposed under Goal 3 Objective 3.1	
Proposed Action Title/Description:	
Use and publicize the NOAA debris flow warning system	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • The NOAA debris flow warning system is intended to alert people when certain areas become unsafe because of the danger of fast moving landslides. Linn County can use NOAA system to alert citizens who travel or live under steep slopes that are vulnerable to landslides. • In a self-completed hazard analysis, Linn County rated itself as having an average risk rating to landslides of 125 out of 240. Utilizing the debris flow warning system can assist Linn County in protecting citizens from landslides, helping the County reduce its overall risk to landslides. The County was impacted during the 1996 flood and landslide events • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates that Linn County's probability for a future landslide is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county's vulnerability to earthquakes is low. Utilizing the warning system to alert citizens of a potential threatening landslide can assist the County in reducing its overall risk to landslides. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Utilizing the warning system to alert citizens of a potential threatening landslide can assist the county in reducing its overall risk to landslides. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Determine steps necessary to use the debris warning system in Linn County. • Identify areas in Linn County vulnerable to landslide that might need to be notified of potential threatening landslides; maintain a list of vulnerable areas. • Develop partnerships with local media outlets to notify citizens of the warning system's existence. • Develop partnerships with local media outlets (particularly television and radio) and develop methods for alerting systems when a landslide occurs. 	
Coordinating Organization:	Emergency Management
Internal Partners:	External Partners:
Road Department	ODF OEM DOGAMI NOAA ODOT
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
	Ongoing
Status:	Deferred and Modified – The debris flow warning system information is now included in National Weather Service issued flood warnings. Refer to the Portland NWS web site for current information. Since the operating agency has changed the action item LS-ST #1 has been changed to reflect the NOAA debris flow warning system instead of DOF debris flow warning system.

Proposed Action Item Identification:	
ST: 3.1.4 Would be a Short Term Action proposed under Goal 3 Objective 3.1	
Proposed Action Title/Description:	
Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> The Department of Geology and Mineral Industries (DOGAMI) has several informational brochures on the landslide hazard at its website. Using this information in a public education campaign in Linn County can greatly increase public awareness of landslide events in Linn County. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> Distribute the DOGAMI landslide informational brochure through the Linn County website, at the Linn County Courthouse, and in local cities. 	
Coordinating Organization:	Emergency Management
Internal Partners:	External Partners:
Planning and Building Department; Road Department	DOGAMI; OEM;
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
Ongoing	
Status:	New Action Item

Proposed Action Item Identification:	
LT: 3.2.1 Would be a Long Term Action proposed under Goal 3 Objective 3.2	
Proposed Action Title/Description:	
Encourage small businesses to develop recovery plans and to implement non-structural mitigation.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Local economies can be severely impacted by disasters when local businesses have to close for extended periods of time due to physical and/or infrastructure damage. In a self-completed hazard analysis, Linn County rated itself as having a high risk to the majority of hazards addressed by the NHMP. Encouraging small businesses to develop recovery plans and implement non-structural mitigation can assist their recovery in the event of a natural hazard, mitigating the impact of natural hazards on the County's economic assets. Such mitigation efforts can assist the County in recovering more effectively and efficiently after the occurrence of a natural hazard. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates Linn County's probability for, and vulnerability to, most hazards addressed by the NHMP as being high. Encouraging businesses to develop recovery plans and implement non-structural mitigation activities can assist their recovery in the event of a natural hazard, mitigating the impact of natural hazards on the County's economic assets. Such mitigation efforts can assist the County in recovering more effectively and efficiently after the occurrence of a natural hazard. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Encouraging businesses to develop recovery plans and implement non-structural mitigation activities can assist their recovery in the event of a natural hazard, mitigating the impact of natural hazards on the County's economic assets. Such mitigation efforts can assist the County in recovering more effectively and efficiently after the occurrence of a natural hazard. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Contact the Institute for Business and Home Safety for information on their training and software that can assist businesses in developing business continuity plans. • Determine what materials and resources already exist to assist businesses in developing recovery plans and identify non-structural mitigation techniques and activities. • Develop methods to disseminate information and resources to small businesses. Possible methods could include: <ul style="list-style-type: none"> ○ Generating a list of small businesses and mailing information packets to those businesses. ○ Staffing a booth with information at County events. ○ Keeping packets of information at certain County agency offices and notifying small businesses of the existence of the packets. ○ Identify funding sources, if necessary, for any communication methods. • Hold a County-sponsored small business symposium regarding the development of recovery plans and identifying non-structural mitigation activities. 	
Coordinating Organization:	Linn County Chamber of Commerce
Internal Partners:	External Partners:
Emergency Management Public Information Officer	Business Development Coordinator; COG; LBCC Business Development; Local Cities
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	
<u>Long Term</u> (2-4 or more years)	
	Ongoing
Status:	Deferred – lack of funding or resources

Proposed Action Item Identification:	
ST: 3.3.1 Would be a Short Term Action proposed under Goal 3 Objective 3.3	
Proposed Action Title/Description:	
Assist K-12 schools, childcare facilities and schools to develop vulnerability assessments and mitigation projects to improve safety	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high earthquake risk rating of 223 out of 240. Assisting schools and childcare facilities to develop vulnerability assessments and mitigation projects can improve the safety of citizens in Linn County and mitigate the affect that natural hazards have on the County's assets and critical infrastructure. Such activities can assist in reducing the County's overall earthquake risk. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates that Linn County's probability for a future earthquake is high (that the county would be likely to have a major earthquake event in the next 10-35 years) and the county's vulnerability to earthquakes is high. Assisting schools and childcare facilities to develop vulnerability assessments and mitigation projects can improve the safety of citizens in Linn County and mitigate the affect that natural hazards have on the County's assets and critical infrastructure. Such activities can assist in reducing the County's overall earthquake risk. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Assisting schools and childcare facilities to develop vulnerability assessments and mitigation projects can improve the safety of citizens in Linn County and mitigate the affect that natural hazards have on the County's assets and critical infrastructure. Such activities can assist in reducing the County's overall earthquake risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Develop a list of all K-12 schools, childcare facilities, and other schools within Linn County. • Determine if any schools have already had their seismic vulnerability analyzed. For the facilities that have been assessed, find out when assessment was done to determine if a new assessment should be completed to address new seismic standards. • For facilities that have had no seismic vulnerability analysis completed, work with each facility to perform analysis. • Use vulnerability assessments to identify mitigation projects. • Create programs to cover the costs of the projects, or to cost-share the costs of the projects with facilities (for example, the County pays for 75% and the facility pays for 25% of identified projects). 	
Coordinating Organization:	Linn-Benton Educational Service District
Internal Partners:	External Partners:
Emergency Management	School Districts Private Schools American Red Cross DOGAMI OEM Commission on Children and Families
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-2 Years	
Status:	Deferred - The Linn-Benton Educational Service District lost the position duet o cut backs and has not completed or made progress on this action item.

Proposed Action Item Identification:	
LT: 3.3.2 Would be a Long Term Action proposed under Goal 3 Objective 3.3	
Proposed Action Title/Description:	
Encourage multi-objective stream and river enhancement projects that maximize flood mitigation	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County rated itself as having a high flood risk rating of 230 out of 240. Multi-objective stream and river enhancement projects can not only assist flood mitigation efforts, but can also reduce the duplication of efforts. Minimizing duplication allows the County to maximize its resources for natural hazard mitigation efforts, assisting the County in reducing its overall flood risk. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates that Linn County's probability for a future flood is high (that the county would be likely to have a major flooding event in the next 10-35 years) and the county's vulnerability to a future flood is high. Multi-objective stream and river enhancement projects can not only assist flood mitigation efforts, but can also reduce the duplication of efforts. Minimizing duplication allows the County to maximize its resources for natural hazard mitigation efforts, assisting the County in reducing its overall flood risk. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Implementing multi-objective stream and river enhancement projects that maximize flood mitigation efforts assist the County in reducing its overall flood risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Identify stream and river enhancement projects, and locations of projects, that mitigate Linn County's flood risk. • Identify any existing projects that are already scheduled for the same or close-by areas identified for mitigation projects. • Contact the departments and/or agencies responsible for the already scheduled projects; discuss the potential for adding flood mitigation components to existing projects. • Identify sources of funding for any potential cost of compensating or funding projects. • Develop methods for external partners to submit proposals for multi-objective projects to the Board of County Commissioners or Steering Committee. • Partner with community service organizations, such as Northwest Youth Corp to complete stream enhancement projects. 	
Coordinating Organization:	Linn County Board of County Commissioners
Internal Partners:	External Partners:
Emergency Management	Watershed Councils DEQ Water Control Districts FEMA DSL USCE ODFW Local Cities DOF
Timeline:	If available, estimated cost:
Short Term (0-2 years)	Long Term (2-4 or more years)
	Ongoing
Status:	Deferred - Linn County works in a cooperative partnership with the North Santiam Watershed Council, South Santiam Watershed Council, and the Calapooia Watershed Council. Linn County Road Department has supported the efforts of these councils by providing technical support, and match funds for certain projects and programs.

Proposed Action Item Identification:	
LT: 3.3.3 Would be a Long Term Action proposed under Goal 3 Objective 3.3	
Proposed Action Title/Description:	
Conduct community based fuel reduction demonstration projects in the wildland-urban interface.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County reported itself as having an above average wildland-urban interface fire (WUI) risk of 183 out of 240. Demonstrating fuel reduction projects to communities in the WUI can assist in showing residents how easy and aesthetically pleasing fuels reduction projects can be. Community residents may be more likely to share responsibility for mitigating the fire risk on their own properties and implement fuel reduction measures after viewing a demonstration. Such actions can assist the County in reducing its overall WUI fire risk. • The <i>State of Oregon's Natural Hazard Mitigation Plan</i> indicates that Linn County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and the county's vulnerability to a future WUI fire is medium. Demonstrating fuel reduction projects to communities in the WUI can assist in showing residents how easy and aesthetically pleasing fuels reduction projects can be. Community residents may be more likely to share responsibility for mitigating the fire risk on their own properties and implement fuel reduction measures after viewing a demonstration. Such actions can assist the County in reducing its overall WUI fire risk. • The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Conducting demonstrations of fuel reduction projects in WUI communities is a way to involve residents in sharing the responsibility of mitigating the WUI fire risk, and demonstrate the ease of implementing fuel reduction projects. Such actions can not only continue to involve the public in the County's mitigation efforts, but can also assist the County in reducing its overall WUI fire risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Conduct public outreach to try to determine which fuels reduction methods Linn County WUI residents would be supportive of and likely to implement on their own properties. • Identify target communities within the WUI where the County wants to conduct fuels reduction project demonstrations. • Develop demonstration presentations and identify demonstration facilitators. • Develop informational materials to disseminate to residents at the demonstrations. • Identify funding sources to fund demonstrations and the production of informational materials. • Develop methods for advertising the demonstrations to community residents, and methods for encouraging attendance. • Encourage demonstration projects that highlight that fuel reduction projects can be aesthetically pleasing 	
Coordinating Organization:	Emergency Management
Internal Partners:	External Partners:
	State Fire Marshall ODF Fire Districts Local Cities OEM
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	
<u>Long Term</u> (2-4 or more years)	
	Ongoing
Status:	Deferred and Modified - This program should continue to be listed on the Long Term Action Item list. Fuels reduction projects will continue based on future available funding. The Steering Committee has decided to deferred this action item and include it in the 2010 update.

Proposed Action Item Identification:	
ST: 3.3.4 Would be a Short Term Action proposed under Goal 3 Objective 3.3	
Proposed Action Title/Description:	
Partner with the Oregon Department of Forestry and Rural Fire Districts to promote home site assessment programs for the wildfire hazard	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • In a self-completed hazard analysis, Linn County reported itself as having an above average wildland-urban interface fire (WUI) risk of 183 out of 240. Promoting home site assessments for locations within Linn County’s WUI can assist property owners in identifying their vulnerability to WUI fire and identifying mitigation activities. Assisting property owners with this may increase the likelihood that property owners would share responsibility for WUI fire mitigation on their properties and implement mitigation activities. Such actions can assist the County in reducing its overall WUI fire risk. • The <i>State of Oregon’s Natural Hazard Mitigation Plan</i> indicates that Linn County’s probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and the county’s vulnerability to a future WUI fire is medium. Promoting home site assessments for locations within Linn County’s WUI can assist property owners in identifying their vulnerability to WUI fire and identifying mitigation activities. Assisting property owners with this may increase the likelihood that property owners would share responsibility for WUI fire mitigation on their properties and implement mitigation activities. Such actions can assist the County in reducing its overall WUI fire risk. • The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Promoting home site assessment programs would be a way to conduct outreach to inform homeowners of the county’s risk to WUI fire and keep them involved in the County’s efforts to mitigate that risk. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Determine if the home site assessments would be free for homeowners; free if they participate in a County survey, attend a community forum, etc.; or offered at a reduced cost to homeowners. • Work with partners to identify at-risk communities to target for the program. • Work with partners to develop home site assessment programs. Components of the program could include: <ul style="list-style-type: none"> • Determining what the assessments of home sites would include, and who would be responsible for conducting them. • Determining if there is a need to prioritize at-risk communities based on vulnerability, and begin the program in the most vulnerable, highest priority communities first. • Identifying and developing the most appropriate methods of communication to reach at-risk homeowners. • Identify funding sources to fund the program. 	
Coordinating Organization:	Linn County Emergency Management
Internal Partners:	External Partners:
Land Management	ODF Local Cities Rural Fire Districts OEM State Fire Marshall
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)
1-2 Years	
Status:	Deferred - Home site assessments were completed during 2007 and 2008. The entire portion of Linn County lying within Oregon Department of Forestry boundaries were assessed and documented. Since this action item is ongoing, the Steering Committee decided to defer it from the 2010 update.

Proposed Action Item Identification:	
LT:3.3.5 Would be a Long Term Action Proposed under Goal 2 Objective 2.4	
Proposed Action Title/Description:	
Implement a routine bridge inspection program for bridges identified in Action 2.2.10 to ensure the bridges continues to be structurally sound.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on a new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Implementing a routine bridge inspection program would ensure that Linn County bridges continue to be structurally sound. • Bridges are essential to any road network, and they can be easily damaged by floods, landslides, and earthquakes. Routine bridge inspections are important in ensuring that bridges remain structurally sound. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Model a bridge inspection program after the federal highway administration's National Bridge Inspection Standards available at: http://www.fhwa.dot.gov/bridge/nbis.htm. • Conduct bridge inspections on an annual basis, focusing on the bridges identified under action item 2.2.10. 	
Coordinating Organization:	Road Department
Internal Partners:	External Partners:
Road Department; Planning and Building; Emergency Management	Private land owners; Public Agencies; Linn County Fire Defense Board
Timeline:	If available, estimated cost:
Short Term (0-2 years)	Long Term (2-4 or more years)
	ongoing
Status:	Deferred - The Linn County Road Department has been working in cooperation with the Oregon Department of Transportation to identify county wide emergency transportation routes and bypass routes in the event of an emergency whether it be associated with an accident or a natural disaster. Ongoing action item.

Proposed Action Item Identification:	
LT:3.3.6 Would be a Long Term Action Proposed under Goal 3 Objective 3.3	
Proposed Action Title/Description:	
Develop a partnership to identify areas where required visual buffers along designated scenic highways have potential blow down issues endangering life and infrastructure.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • State forest practices rules require visual buffers of trees along scenic highways to maintain the aesthetic qualities provided by forests. • Only ODOT can determine whether there may be an undue risk in certain areas that would require removal of the trees. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Develop a partnership between ODOT, ODF, private timber companies and private landowners that would inventory and summarize areas of high hazard for blow down after removal of adjacent standing timber. • Develop a timeline with scheduled harvest to minimize visual impacts but to maintain safety. • Identify ownership of potential hazard trees. • Identify party responsible for harvest activity. • Develop educational material for County residents and neighbors 	
Coordinating Organization:	Emergency Management
Internal Partners:	External Partners:
Road Department	ODOT; ODF; Private land owners; Private timber owners
Timeline:	If available, estimated cost:
Short Term (0-2 years)	
Long Term(2-4 or more years)	
	ongoing
Status:	New Action Item

Proposed Action Item Identification:	
LT:3.3.7 Would be a Long Term Action Proposed under Goal 3 Objective 3.3	
Proposed Action Title/Description:	
Create database of private resources including equipment, labor, special expertise and operating area as well as contact information that could be mobilized rapidly in event of fire, earthquake, flood or severe weather impacts.	
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Linn County has experienced impacts from each of the above mentioned events. • The county and public agencies may not have appropriate equipment or an adequate labor force during emergency situations. • Many private organizations already have resources located closer to impact areas and may be providing these services to their own, neighbors or clients property. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Consider an incident command structure and provide training that would coordinate resources included in the database. • Allow updating by private organizations through use of online technology accessible following registration of the organization. • Develop educational resources for private organizations wishing to participate in the database that will identify goals, implementation and updating requirements. • Develop inspection and evaluation procedures of the potential resources. • Determine database fields that would provide adequate information to make product useful. • Develop training exercises to test capabilities and prepare for actual events. 	
Coordinating Organization:	Emergency Management
Internal Partners:	External Partners:
Road Department; Linn County Information Technology Dept.; Sheriffs Office; Planning and Building Department	Rural and City Fire Departments; Private road builders, contractors, logging companies, timber companies, aggregate companies and fire fighting companies
Timeline:	If available, estimated cost:
Short Term (0-2 years)	Long Term(2-4 or more years)
	ongoing
Status:	New Action Item

Appendix C:

Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies.

Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or

4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

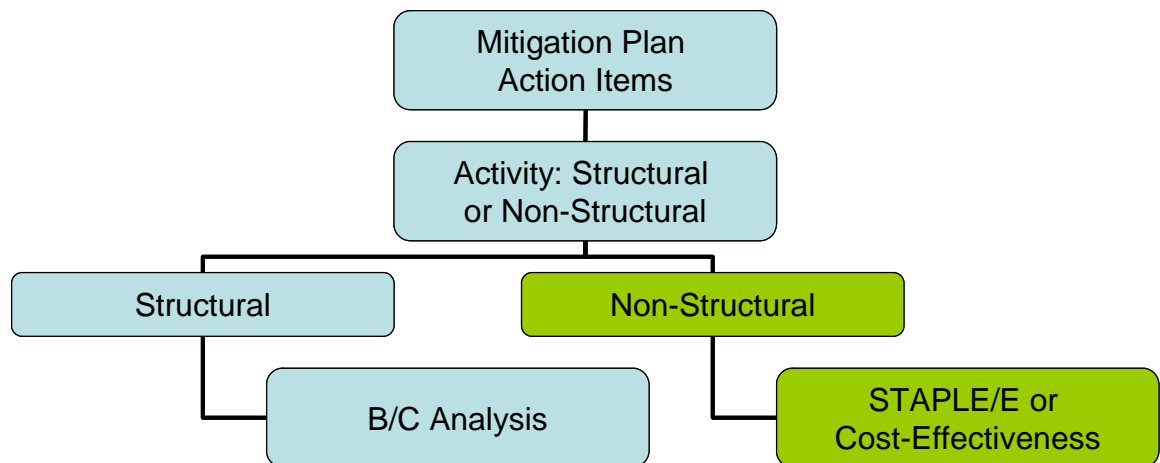
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure A.1: Economic Analysis Flowchart



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Source: Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center, 2005

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- **Estimate the benefits.** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- **Consider costs and benefits to society and the environment.** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- **Determine the correct discount rate.** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- **Net present value.** Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- **Internal rate of return.** Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is

assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed “indirect” effects, but they can have a very direct effect on the economic value of the owner’s building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small

business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

CUREe Kajima Project, *Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics, Inc., 1996

Federal Emergency Management Agency, *Report on the Costs and Benefits of Natural Hazard Mitigation*. Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in the City of Portland*, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects Volume V, Earthquakes*, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olsen Associates, Prepared for Oregon State Police, Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000.)

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

Appendix D
DOGAMI Earthquake HAZUS Models

Earthquake Scenarios and Ground Motion Maps

CRUSTAL EARTHQUAKE SCENARIO DETAILS FOR LINN COUNTY

Crustal Earthquake Scenario: A magnitude 6.7 earthquake on the Mill Creek Fault.

For the magnitude 6.7 earthquake on the Mill Creek Fault scenario, we defined the fault source using the “deterministic seismic source” option within HAZUS-MH (Figure D1) (FEMA, 2003b). The fault and earthquake event were chosen by examination of USGS (2004) data and data in the Geomatrix Consultants, Inc. (1995) *Seismic Design Mapping, State of Oregon* report prepared for the Oregon Department of Transportation. In general, a likely worst-case scenario was selected. Figure D1 has the location of the fault, shown as the dark line, and the census tracts within Linn County. Figure D2 displays the peak ground acceleration (PGA) for the crustal scenario.

Scenario Name	Mill Creek M6.7
Type of Earthquake	Source
Fault Name	Mill Creek Fault
Historical Epicenter ID #	70
Probabilistic Return Period	NA
Longitude of Epicenter	-123.015
Latitude of Epicenter	44.7428
Earthquake Magnitude	6.7
Depth (km)	0.00
Rupture Length (km)	27.11
Rupture Orientation (degrees)	0.00
Attenuation Function	Reverse-Slip

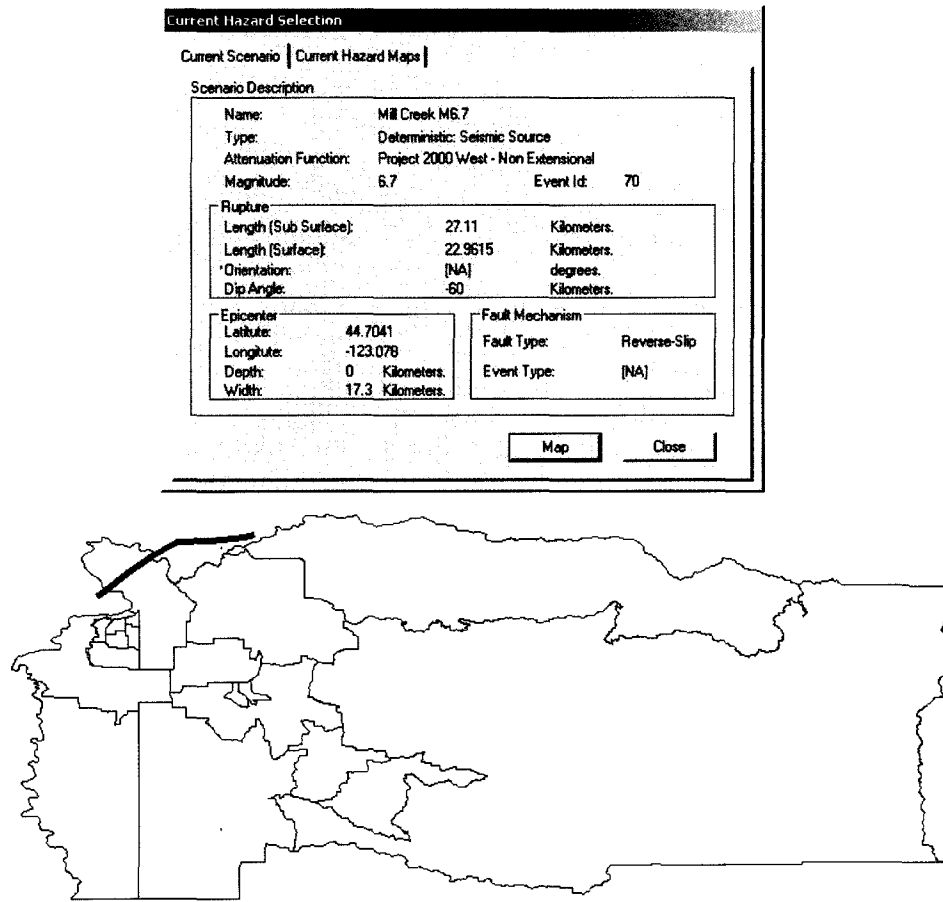


Figure D1. Mill Creek Fault details from HAZUS-MH (FEMA, 2003b). The location of the fault is shown as the dark line.

Crustal Earthquake Scenario Ground Motion Map

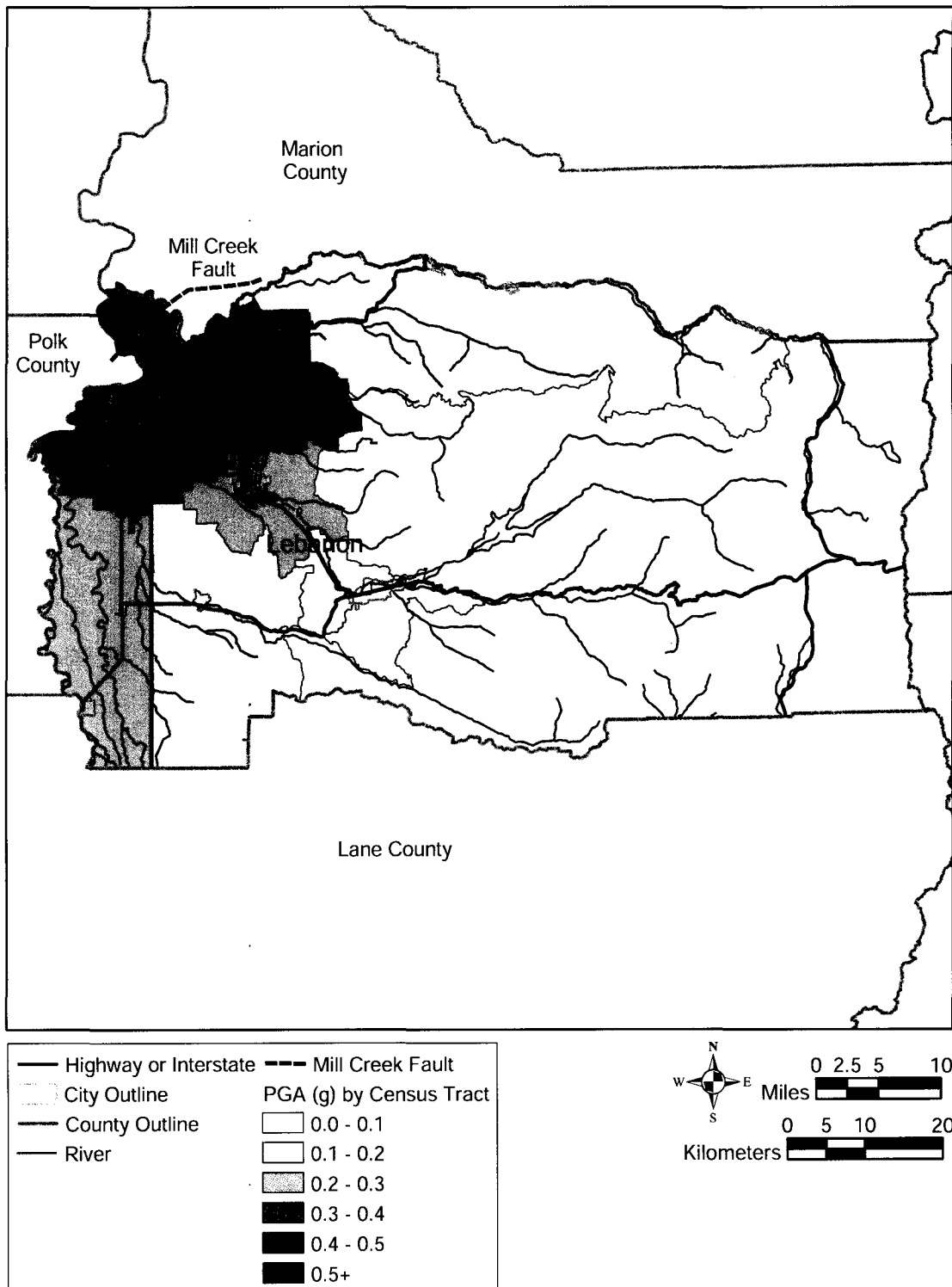


Figure D2. Peak ground acceleration (PGA) by census tracts map for the crustal earthquake scenario, Linn County, Oregon (FEMA, 2003b).

SUBDUCTION ZONE EARTHQUAKE SCENARIO DETAILS FOR LINN COUNTY

Subduction Zone Scenario: A magnitude 9.0 earthquake on the Cascadia Subduction Zone was selected for the subduction zone earthquake scenario.

For the Cascadia Subduction Zone earthquake scenario, we used the “user-defined event” option within HAZUS-MH to incorporate ground motion maps developed by the Cascadia Region Earthquake Workgroup (CREW, 2003) to model damage and loss from a magnitude 9.0 earthquake (Figure D3). The CREW maps were developed from ground motion data provided by the U.S. Geological Survey. The CREW earthquake scenario required the input of four sets of GIS files that are included within the HAZUS-MH study region: regional peak ground acceleration (PGA), peak ground velocity (PGV), and the spectral velocity at 0.3 s and 1.0 s (CREW, 2003). Figure D4 displays the PGA for the subduction zone scenario.

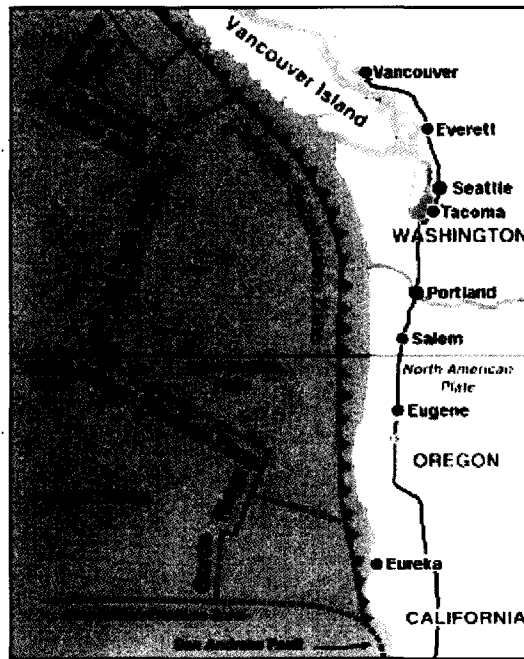


Figure D3. Location of the Cascadia Subduction Zone (CREW, 2003).

Subduction Zone Earthquake Scenario Ground Motion Map

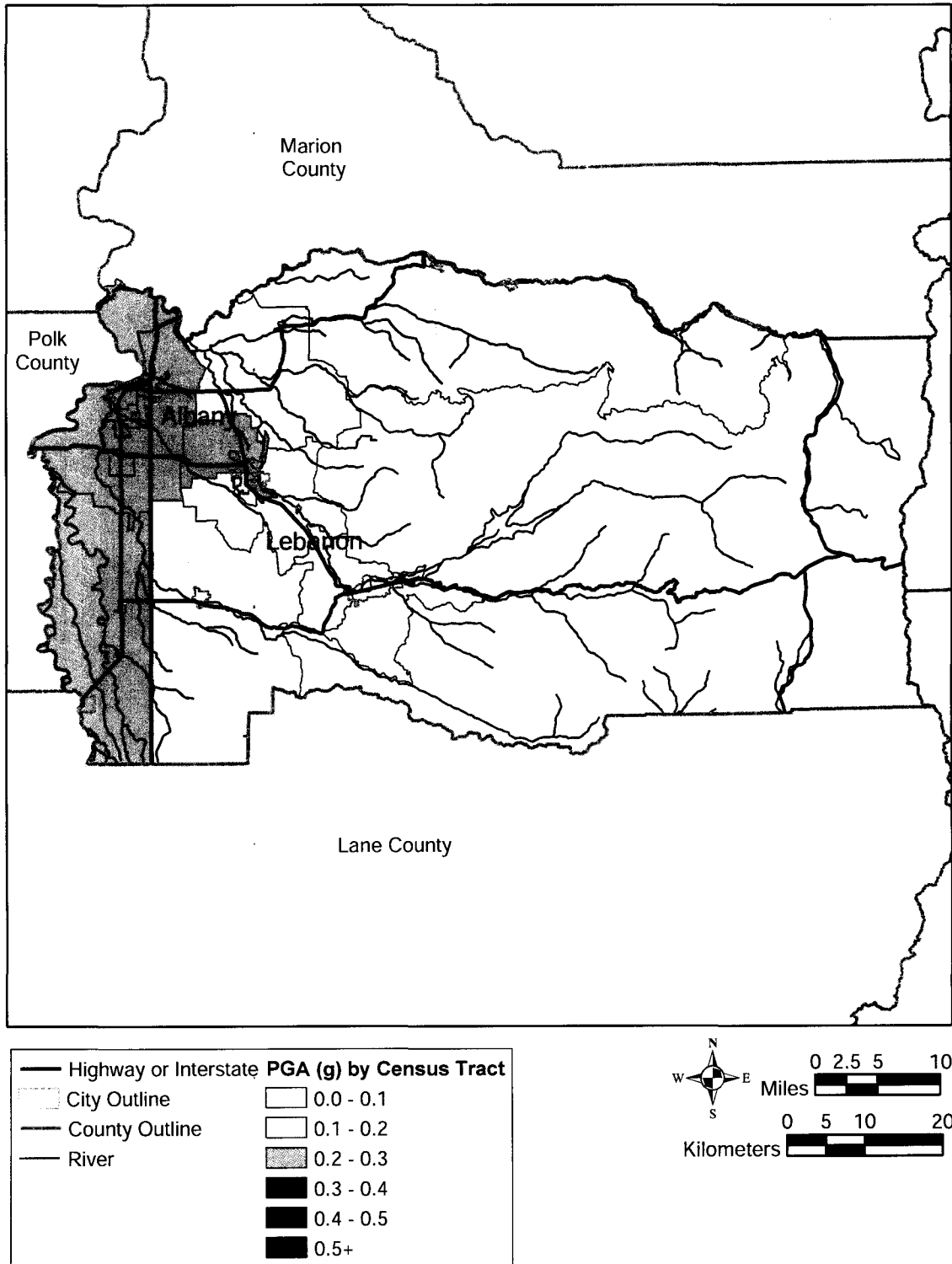


Figure D4. Peak ground acceleration (PGA) by census tracts map for the Cascadia Subduction Zone earthquake scenario, Linn County, Oregon (FEMA, 2003b).

GEOLOGIC HAZARD MAPS

Relative Ground-Shaking Amplification Susceptibility Map

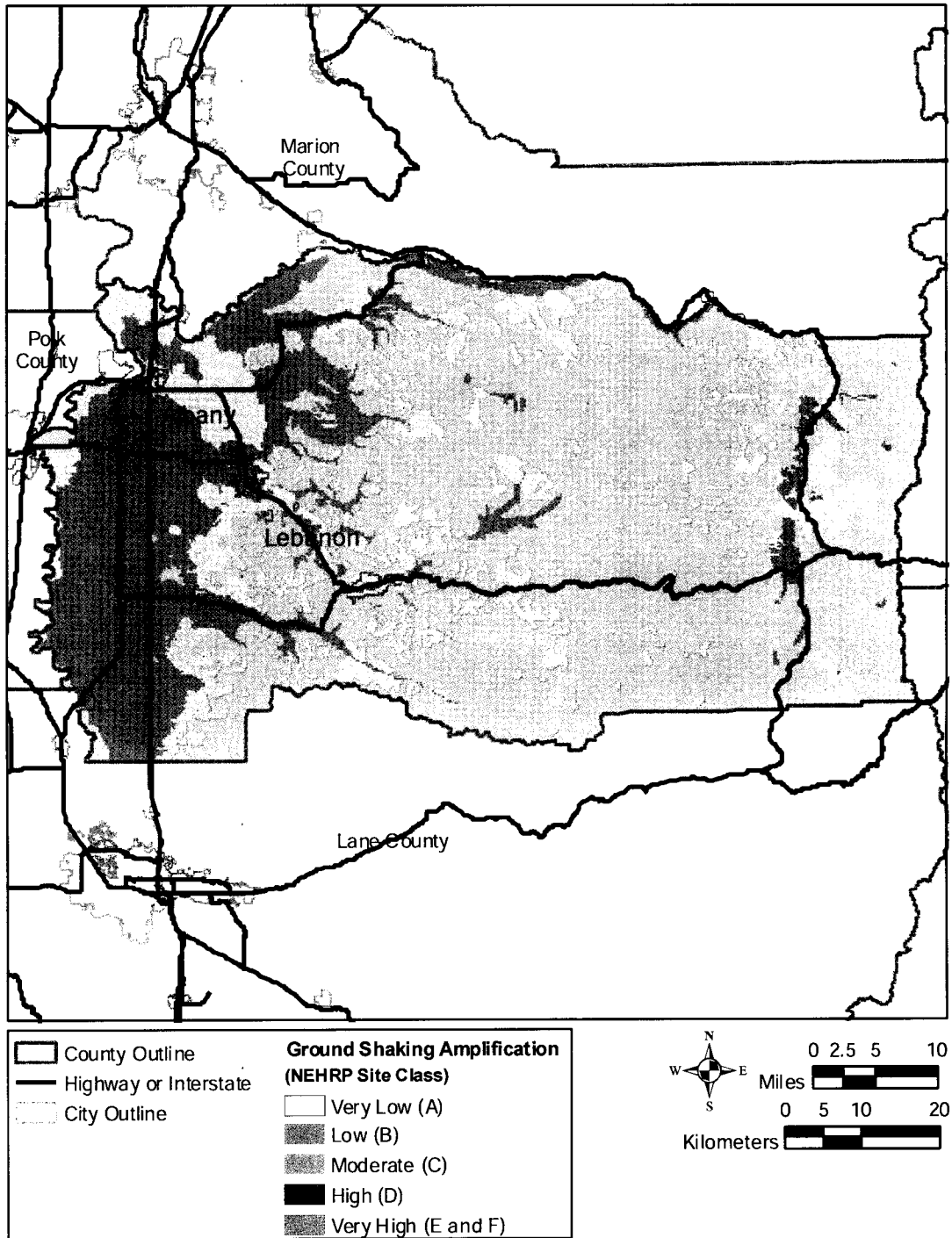


Figure D5. Relative ground-shaking amplification susceptibility map for Linn County, Oregon.

Relative Liquefaction Hazard Susceptibility Map

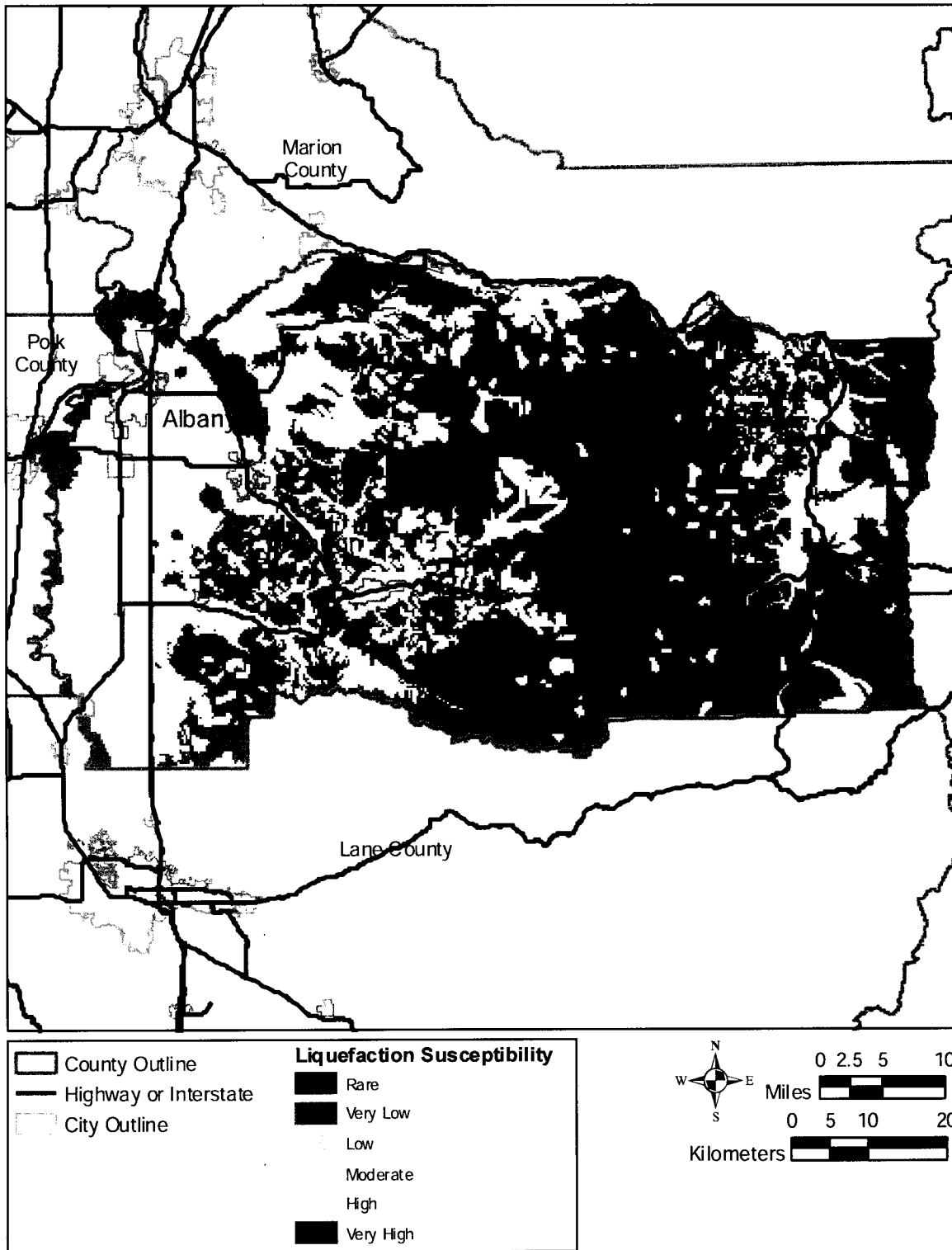


Figure D6. Relative liquefaction susceptibility map for Linn County, Oregon.

Relative Earthquake-Induced Landslide Susceptibility Map

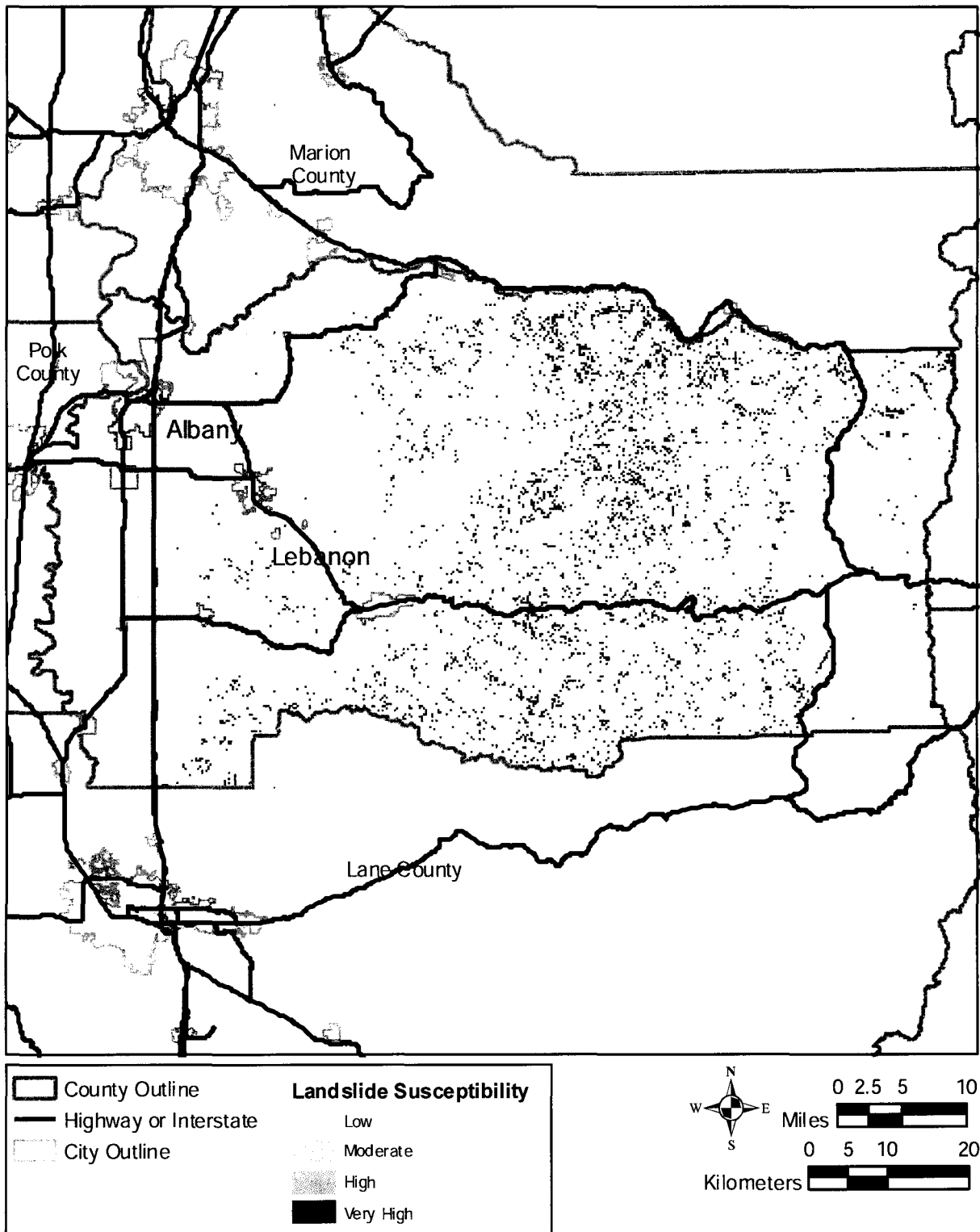


Figure D7. Relative earthquake-induced landslide susceptibility map for Linn County, Oregon.

Identified Landslide Areas Map

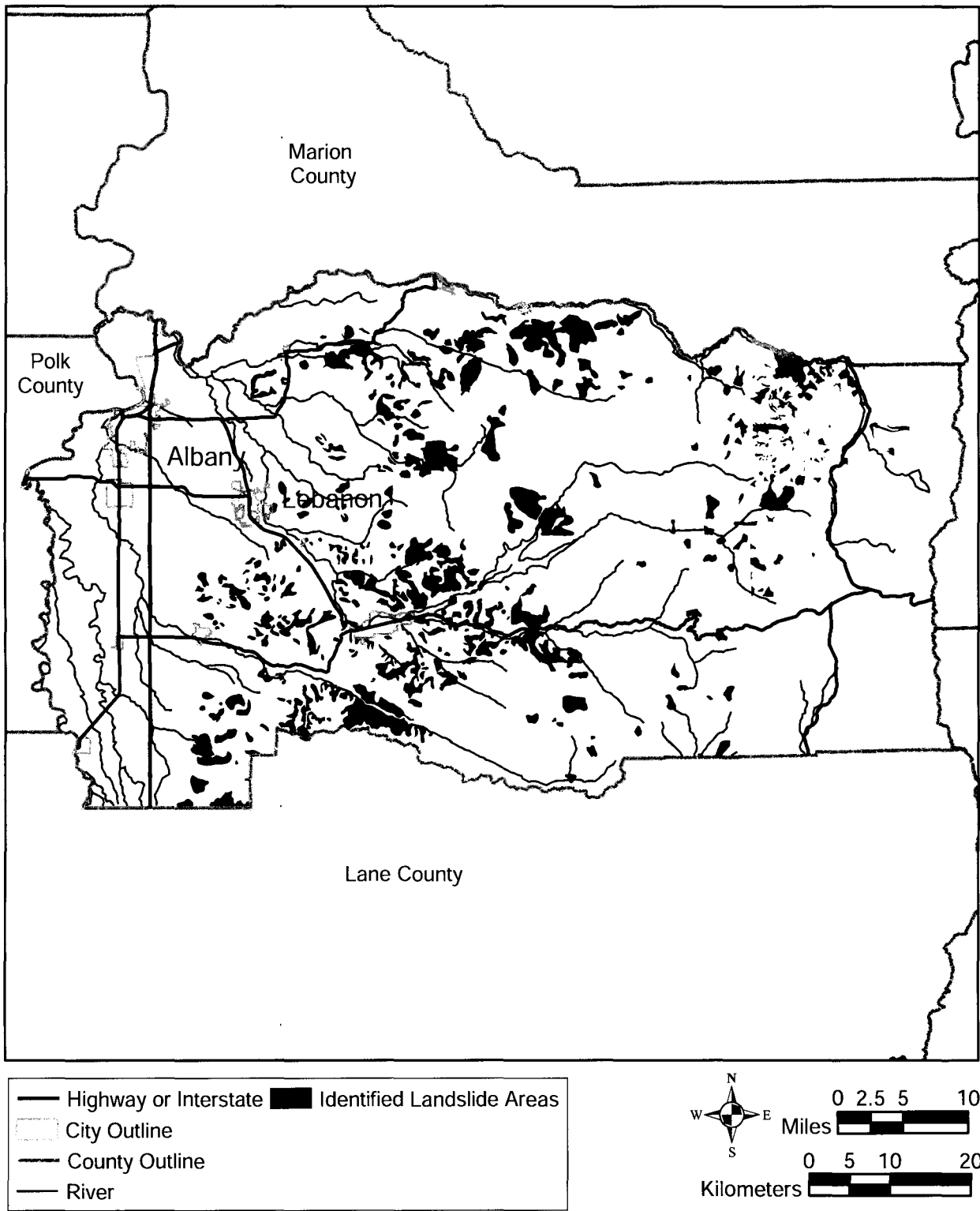


Figure D8. Identified landslide map for Linn County, Oregon.

HAZUS-MH: Earthquake Event Report



Region Name: *Linn Crustal*

Earthquake Scenario: *Mill Creek M6.7*

Print Date: *March 18, 2005*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Oregon

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,304.63 square miles and contains 20 census tracts. There are over 39 thousand households in the region and has a total population of 103,069 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 36 thousand buildings in the region with a total building replacement value (excluding contents) of 5,669 (millions of dollars). Approximately 99.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 4,440 and 1,278 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 36 thousand buildings in the region which have an aggregate total replacement value of 5,669 (millions of dollars). Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 80% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 71 beds. There are 64 schools, 13 fire stations, 5 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 11 dams identified within the region. Of these, 6 of the dams are classified as 'high hazard'. The inventory also includes 69 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 2 and 3.

The total value of the lifeline inventory is over 5,718.00 (millions of dollars). This inventory includes over 400 kilometers of highways, 122 bridges, 19,117 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	122	1,732.10
	Segments	71	1,421.20
	Tunnels	0	0.00
	Subtotal		3,153.30
Railways	Bridges	0	0.00
	Facilities	1	2.50
	Segments	110	209.90
	Tunnels	0	0.00
	Subtotal		212.40
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		0.00
Bus	Facilities	1	1.20
	Subtotal		1.20
Ferry	Facilities	0	0.00
	Subtotal		0.00
Port	Facilities	0	0.00
	Subtotal		0.00
Airport	Facilities	26	160.10
	Runways	26	913.10
	Subtotal		1,073.30
	Total		4,440.10

Table 3: Utility System Lifeline inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	191.20
	Facilities	4	150.50
	Pipelines	0	0.00
	Subtotal		341.70
Waste Water	Distribution Lines	NA	114.70
	Facilities	10	752.60
	Pipelines	0	0.00
	Subtotal		867.30
Natural Gas	Distribution Lines	NA	76.50
	Facilities	1	1.20
	Pipelines	0	0.00
	Subtotal		77.70
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		0.00
Electrical Power	Facilities	3	372.90
	Subtotal		372.90
Communication	Facilities	7	0.80
	Subtotal		0.80
Total			1,660.40

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Mill Creek M6.7
Type of Earthquake	Source
Fault Name	Mill Creek Fault
Historical Epicenter ID #	70
Probabilistic Return Period	NA
Longitude of Epicenter	-123.08
Latitude of Epicenter	44.70
Earthquake Magnitude	6.70
Depth (Km)	0.00
Rupture Length (Km)	22.96
Rupture Orientation (degrees)	0.00
Attenuation Function	Project 2000 West - Non Extensional

Building Damage

Building Damage

HAZUS estimates that about 12,431 thousand buildings will be at least moderately damaged. This is over 34.00 % of the total number of buildings in the region. There are an estimated 2,671 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summarizes the expected damage by general occupancy for the buildings in the region. Table 5 summarizes the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	0.00	0	0.01	0	0.01	0	0.01	0	0.01
Commercial	46	0.28	27	0.39	52	0.77	52	1.72	63	2.35
Education	1	0.00	1	0.01	2	0.04	3	0.09	3	0.12
Government	4	0.02	1	0.01	1	0.02	1	0.03	1	0.04
Industrial	6	0.04	4	0.05	8	0.11	9	0.30	11	0.39
Other Residential	2,583	15.40	1,122	16.05	1,648	24.46	1,241	41.07	962	35.99
Religion	2	0.01	1	0.01	1	0.02	1	0.04	1	0.05
Single Family	14,124	84.24	5,832	83.46	5,026	74.58	1,714	56.74	1,631	61.04
Total	16,767		6,988		6,739		3,021		2,672	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	20	0.01	1	0.01	1	0.02	2	0.06	3	0.09
MH*	2,390	14.26	924	13.22	1,404	20.84	1,111	36.79	817	30.58
Precast	7	0.03	3	0.04	7	0.10	9	0.30	11	0.40
RM*	3	0.02	1	0.02	3	0.05	4	0.14	5	0.17
Steel	22	0.01	1	0.02	3	0.05	6	0.19	12	0.44
UM*	124	0.74	58	0.83	84	1.25	77	2.55	115	4.29
Wood	14,201	84.65	5,973	85.48	5,177	76.82	1,747	57.85	1,638	61.32
Total	16,767		6,988		6,739		3,021		2,672	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 71 hospital beds available for use. On the day of the earthquake, the model estimates that only 3 hospital beds (4.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 20.00% of the beds will be back in service. By 30 days, 62.00% will be operational.

Table 6: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Least Moderate Damage > 50%	Complete Damage > 50%	# likely Functional on day 1
Hospitals	1	1	0	0
Schools	64	22	0	42
EOCs	0	0	0	0
PoliceStations	5	3	0	2
FireStations	13	3	0	10

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	After Day 7
Highway	Segments	71	0	0	71	71
	Bridges	122	12	0	111	119
	Tunnels	0	0	0	0	0
Railways	Segments	110	0	0	110	110
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	1	0	0	1
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	1	0	0	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	26	6	0	23	26
	Runways	26	0	0	26	26

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	Total #	# of Locations			
		With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	4	2	0	2	4
Waste Water	10	4	0	5	10
Natural Gas	1	0	0	1	1
Oil Systems	0	0	0	0	0
Electrical Power	3	1	0	2	3
Communication	7	2	0	6	7

Table 9 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	9,559	308	266
Waste Water	5,735	243	211
Natural Gas	3,824	260	225
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	39,541	2,084	1,157	117	0	0
Electric Power		11,371	7,251	3,254	776	15

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 6 ignitions that will burn about 0.06 sq. mi (0.00 % of the region's total area.) The model also estimates that the fires will displace about 142 people and burn about 8 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 42.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 3,683 households to be displaced due to the earthquake. Of these, 927 people (out of a total population of 103,069) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	8	2	0	1
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	3	1	0	0
	Industrial	12	4	1	1
	Other-Residential	281	72	8	14
	Single Family	344	77	5	8
	Total	650	156	14	25
2 PM	Commercial	518	159	26	52
	Commuting	1	1	1	0
	Educational	83	25	4	8
	Hotels	1	0	0	0
	Industrial	92	28	4	9
	Other-Residential	64	17	2	3
	Single Family	79	18	1	2
	Total	838	248	39	74
5 PM	Commercial	406	125	21	40
	Commuting	9	11	20	4
	Educational	10	3	1	1
	Hotels	1	0	0	0
	Industrial	58	17	3	5
	Other-Residential	107	28	3	6
	Single Family	138	31	2	3
	Total	729	215	49	59

Economic Loss

The total economic loss estimated for the earthquake is 1,700.28 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 1,315.72 (millions of dollars); 10 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 66 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	3.04	32.06	1.43	2.72	39.25
	Capital-Related	0.00	1.29	28.26	1.10	1.06	31.71
	Rental	19.36	22.41	15.53	0.59	1.33	59.22
	Relocation	2.12	0.60	0.84	0.06	0.46	4.08
	Subtotal	21.47	27.34	76.69	3.18	5.57	134.25
Capital Stock Loses							
	Structural	101.77	34.82	43.94	10.49	7.52	198.54
	Non_Structural	382.11	164.12	123.22	40.72	32.04	742.22
	Content	96.57	34.58	57.77	26.76	17.12	232.79
	Inventory	0.00	0.00	2.64	5.08	0.20	7.92
	Subtotal	580.45	233.52	227.57	83.06	56.88	1,181.47
	Total	601.92	260.86	304.26	86.24	62.44	1,315.72

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,421.20	\$12.85	0.90
	Bridges	1,732.06	\$116.85	6.75
	Tunnels	0.00	\$0.00	0.00
	Subtotal	3153.30	129.70	
Railways	Segments	209.93	\$2.21	1.05
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	2.46	\$1.15	46.70
	Subtotal	212.40	3.40	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Bus	Facilities	1.23	\$0.63	51.16
	Subtotal	1.20	0.60	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Airport	Facilities	160.12	\$36.02	22.49
	Runways	913.13	\$2.25	0.25
	Subtotal	1073.30	38.30	
	Total	4440.10	172.00	

Table 14: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	150.50	\$27.50	18.27
	Distribution Line	191.20	\$6.55	3.43
	Subtotal	341.69	\$34.05	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	752.60	\$112.79	14.99
	Distribution Line	114.70	\$5.18	4.52
	Subtotal	867.29	\$117.98	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	1.20	\$0.07	5.79
	Distribution Line	76.50	\$5.54	7.25
	Subtotal	77.70	\$5.61	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Electrical Power	Facilities	372.90	\$54.84	14.71
	Subtotal	372.90	\$54.84	
Communication	Facilities	0.80	\$0.11	13.44
	Subtotal	0.79	\$0.11	
Total		1,660.38	\$212.59	

Table 15. Indirect Economic Impact with outside aid
 (Employment as # of people and Income in millions of \$)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	(67)	-7.10
Second Year			
	Employment Impact	0	0.00
	Income Impact	(91)	-9.63
Third Year			
	Employment Impact	0	0.00
	Income Impact	(100)	-10.69
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	(100)	-10.69
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(100)	-10.69
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(100)	-10.69

Appendix A: County Listing for the Region

Linn, OR

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Oregon	Linn	103,069	4,821	847	5,669
Total State		103,069	4,821	847	5,669
Total Region		103,069	4,821	847	5,669

HAZUS-MH: Earthquake Event Report



Region Name: *Linn Cascadia*

Earthquake Scenario: *Cascadia M9.0*

Print Date: *March 18, 2005*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Oregon

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 2,304.63 square miles and contains 20 census tracts. There are over 39 thousand households in the region and has a total population of 103,069 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 36 thousand buildings in the region with a total building replacement value (excluding contents) of 5,669 (millions of dollars). Approximately 99.00 % of the buildings (and 85.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 4,440 and 1,278 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 36 thousand buildings in the region which have an aggregate total replacement value of 5,669 (millions of dollars). Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 80% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 71 beds. There are 64 schools, 13 fire stations, 5 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 11 dams identified within the region. Of these, 6 of the dams are classified as 'high hazard'. The inventory also includes 69 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 2 and 3.

The total value of the lifeline inventory is over 5,718.00 (millions of dollars). This inventory includes over 400 kilometers of highways, 122 bridges, 19,117 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	122	1,732.10
	Segments	71	1,421.20
	Tunnels	0	0.00
	Subtotal		3,153.30
Railways	Bridges	0	0.00
	Facilities	1	2.50
	Segments	110	209.90
	Tunnels	0	0.00
	Subtotal		212.40
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		0.00
Bus	Facilities	1	1.20
	Subtotal		1.20
Ferry	Facilities	0	0.00
	Subtotal		0.00
Port	Facilities	0	0.00
	Subtotal		0.00
Airport	Facilities	26	160.10
	Runways	26	913.10
	Subtotal		1,073.30
	Total		4,440.10

Table 3: Utility System Lifeline inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	191.20
	Facilities	4	150.50
	Pipelines	0	0.00
	Subtotal		341.70
Waste Water	Distribution Lines	NA	114.70
	Facilities	10	752.60
	Pipelines	0	0.00
	Subtotal		867.30
Natural Gas	Distribution Lines	NA	76.50
	Facilities	1	1.20
	Pipelines	0	0.00
	Subtotal		77.70
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		0.00
Electrical Power	Facilities	3	372.90
	Subtotal		372.90
Communication	Facilities	7	0.80
	Subtotal		0.80
		Total	1,660.40

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Cascadia M9.0
Type of Earthquake	User-defined
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	8.50
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Building Damage

HAZUS estimates that about 10,372 thousand buildings will be at least moderately damaged. This is over 29.00 % of the total number of buildings in the region. There are an estimated 2,470 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summarizes the expected damage by general occupancy for the buildings in the region. Table 5 summarizes the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.01	0	0.01	0	0.02
Commercial	18	0.10	21	0.26	53	1.00	62	2.40	86	3.47
Education	1	0.00	1	0.01	2	0.04	3	0.11	3	0.13
Government	1	0.01	1	0.01	2	0.03	2	0.07	2	0.09
Industrial	2	0.01	2	0.03	7	0.13	10	0.40	16	0.64
Other Residential	1,161	6.66	1,039	12.41	1,942	36.65	1,950	74.89	1,463	59.20
Religion	1	0.01	1	0.01	1	0.02	1	0.05	2	0.08
Single Family	16,259	93.21	7,304	87.26	3,291	62.12	575	22.07	899	36.37
Total	17,444		8,370		5,298		2,604		2,471	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	7	0.00	0	0.00	1	0.02	2	0.09	4	0.16
MH*	860	4.93	813	9.71	1,779	33.59	1,870	71.80	1,324	53.60
Precast	2	0.01	1	0.02	6	0.11	10	0.38	16	0.64
RM*	1	0.01	1	0.01	3	0.06	5	0.19	6	0.26
Steel	5	0.00	0	0.00	2	0.04	5	0.19	17	0.67
UM*	83	0.47	66	0.78	103	1.95	90	3.45	116	4.71
Wood	16,486	94.50	7,471	89.26	3,348	63.20	546	20.97	880	35.63
Total	17,444		8,370		5,298		2,604		2,471	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 71 hospital beds available for use. On the day of the earthquake, the model estimates that only 63 hospital beds (90.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 90.00% of the beds will be back in service. By 30 days, 90.00% will be operational.

Table 6: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Least Moderate Damage > 50%	Complete Damage > 50%	# likely Functional on day 1
Hospitals	1	0	0	1
Schools	64	0	0	64
EOCs	0	0	0	0
PoliceStations	5	0	0	5
FireStations	13	0	0	13

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Number of Locations					
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %		
					After Day 1	After Day 7	
Highway	Segments	71	0	0	71	71	
	Bridges	122	0	0	122	122	
	Tunnels	0	0	0	0	0	
Railways	Segments	110	0	0	110	110	
	Bridges	0	0	0	0	0	
	Tunnels	0	0	0	0	0	
	Facilities	1	0	0	1	1	
Light Rail	Segments	0	0	0	0	0	
	Bridges	0	0	0	0	0	
	Tunnels	0	0	0	0	0	
	Facilities	0	0	0	0	0	
Bus	Facilities	1	0	0	1	1	
Ferry	Facilities	0	0	0	0	0	
Port	Facilities	0	0	0	0	0	
Airport	Facilities	26	0	0	26	26	
	Runways	26	0	0	26	26	

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	Total #	# of Locations			
		With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	4	1	0	3	4
Waste Water	10	2	0	2	10
Natural Gas	1	0	0	1	1
Oil Systems	0	0	0	0	0
Electrical Power	3	0	0	2	3
Communication	7	0	0	7	7

Table 9 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	9,559	451	191
Waste Water	5,735	357	151
Natural Gas	3,824	382	161
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	39,541	777	259	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 36.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 2,563 households to be displaced due to the earthquake. Of these, 653 people (out of a total population of 103,069) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	9	3	0	1
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	4	1	0	0
	Industrial	16	5	1	2
	Other-Residential	340	87	9	17
	Single Family	194	43	3	5
	Total	563	139	14	25
2 PM	Commercial	619	193	32	63
	Commuting	0	0	0	0
	Educational	96	30	5	10
	Hotels	1	0	0	0
	Industrial	121	37	6	12
	Other-Residential	77	20	2	4
	Single Family	45	10	1	1
	Total	960	290	46	90
5 PM	Commercial	494	152	26	49
	Commuting	0	0	0	0
	Educational	10	3	1	1
	Hotels	1	0	0	0
	Industrial	76	23	4	7
	Other-Residential	127	33	4	7
	Single Family	77	17	1	2
	Total	785	229	35	67

Economic Loss

The total economic loss estimated for the earthquake is 1,310.63 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 1,150.68 (millions of dollars); 13 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 51 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	2.45	43.02	2.09	3.16	50.72
	Capital-Related	0.00	1.04	37.44	1.53	1.16	41.17
	Rental	10.27	20.13	19.59	0.80	1.51	52.29
	Relocation	1.18	0.62	1.09	0.07	0.51	3.47
	Subtotal	11.45	24.23	101.14	4.49	6.34	147.65
Capital Stock Loses							
	Structural	54.39	39.13	57.54	14.03	9.68	174.77
	Non_Structural	209.37	160.93	155.67	51.51	35.46	612.94
	Content	55.41	31.54	68.41	32.40	17.48	205.23
	Inventory	0.00	0.00	3.15	6.65	0.29	10.09
	Subtotal	319.16	231.60	284.77	104.59	62.91	1,003.03
	Total	330.61	255.83	385.92	109.07	69.25	1,150.68

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,421.20	\$4.44	0.31
	Bridges	1,732.06	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Subtotal	3153.30	4.40	
Railways	Segments	209.93	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	2.46	\$0.65	26.32
	Subtotal	212.40	0.60	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Bus	Facilities	1.23	\$0.34	27.99
	Subtotal	1.20	0.30	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Airport	Facilities	160.12	\$22.00	13.74
	Runways	913.13	\$1.09	0.12
	Subtotal	1073.30	23.10	
	Total	4440.10	28.50	

Table 14: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	150.50	\$12.57	8.35
	Distribution Line	191.20	\$5.62	2.94
	Subtotal	341.69	\$18.19	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	752.60	\$83.55	11.10
	Distribution Line	114.70	\$4.44	3.87
	Subtotal	867.29	\$88.00	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	1.20	\$0.10	8.25
	Distribution Line	76.50	\$4.75	6.21
	Subtotal	77.70	\$4.85	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Electrical Power	Facilities	372.90	\$20.33	5.45
	Subtotal	372.90	\$20.33	
Communication	Facilities	0.80	\$0.07	8.32
	Subtotal	0.79	\$0.07	
Total		1,660.38	\$131.43	

Table 15. Indirect Economic Impact with outside aid
 (Employment as # of people and Income in millions of \$)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	(65)	-6.90
Second Year			
	Employment Impact	0	0.00
	Income Impact	(85)	-9.04
Third Year			
	Employment Impact	0	0.00
	Income Impact	(93)	-9.92
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	(93)	-9.92
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(93)	-9.92
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(93)	-9.92

Appendix A: County Listing for the Region

Linn, OR

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Oregon	Linn	103,069	4,821	847	5,669
Total State		103,069	4,821	847	5,669
Total Region		103,069	4,821	847	5,669

Appendix E

Grant Programs

Hazard Mitigation Programs

Post-Disaster Federal Programs

- Hazard Mitigation Grant Program
 - The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.
 - <http://www.fema.gov/government/grant/hmgrp/>
- Physical Disaster Loan Program
 - When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters.
 - <http://www.sba.gov/services/disasterassistance/index.html>

Pre-Disaster Federal Programs

- Pre-Disaster Mitigation Grant Program
 - The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.
 - <http://www.fema.gov/government/grant/pdm/index.shtm>
- Flood Mitigation Assistance Program
 - The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:
 - Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;
 - Encouraging long-term, comprehensive hazard mitigation planning;
 - Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
 - Complementing other federal and state mitigation programs with similar, long-term mitigation goals.

- <http://www.fema.gov/government/grant/fma/index.shtm>

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY10 Hazard Mitigation Assistance Unified Guidance, available at <http://www.fema.gov/library/viewRecord.do?id=3649>

For Oregon Emergency Management grant guidance on Federal Hazard Mitigation Assistance, visit: http://www.oregon.gov/OMD/OEM/plans_train/grant_info/hma.pdf

OEM contact: Dennis Sigrist, dsigrist@oem.state.or.us

State Programs

- Community Development Block Grant Program
 - Promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low and moderate income persons. Eligible Activities Most Relevant to Hazard Mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare.
 - <http://www.hud.gov/offices/cpd/communitydevelopment/programs/>
- Oregon Watershed Enhancement Board
 - While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately \$20 million in funding annually.
 - <http://www.oweb.state.or.us/>

Federal Mitigation Programs, Activities & Initiatives

Basic & Applied Research/Development

- National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation. Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology (NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of buildings and other structures, societal impacts, and emergency response and recovery. <http://www.nehrp.gov/>
- Decision, Risk, and Management Science Program, National Science Foundation. Supports scientific research directed at increasing the understanding and effectiveness of

decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423&org=SES

Hazard ID and Mapping

- National Flood Insurance Program: Flood Mapping; FEMA. Flood insurance rate maps and flood plain management maps for all NFIP communities. <http://www.fema.gov/plan/prevent/fhm/index.shtm>
- National Digital Orthophoto Program, DOI – USGS. Develops topographic quadrangles for use in mapping of flood and other hazards. <http://www.ndop.gov/>
- Mapping Standards Support, DOI-USGS. Expertise in mapping and digital data standards to support the National Flood Insurance Program. <http://ncgmp.usgs.gov/ncgmpstandards/>
- Soil Survey, USDA-NRCS. Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. <http://soils.usda.gov/survey/>

Project Support

- Coastal Zone Management Program, NOAA. Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration. <http://coastalmanagement.noaa.gov/>
- Community Development Block Grant Entitlement Communities Program, HUD. Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- income persons. <http://www.hud.gov/offices/cpd/communitydevelopment/programs/entitlement/>
- National Fire Plan (DOI – USDA) Provides technical, financial, and resource guidance and support for wildland fire management across the United States. Addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability. <http://www.forestsandrangelands.gov/NFP/index.shtml>
- Assistance to Firefighters Grant Program, FEMA. Grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (SAFER). <http://www.firegrantsupport.com/>
- Emergency Watershed Protection Program, USDA-NRCS. Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events. <http://www.nrcs.usda.gov/programs/EWP/>

- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs. <http://www.usda.gov/rus/>
- Rural Development Assistance – Housing, USDA. Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary. <http://www.rurdev.usda.gov/rhs/>
- Public Assistance Grant Program, FEMA. The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. <http://www.fema.gov/government/grant/pa/index.shtm>
- National Flood Insurance Program, FEMA. Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements. <http://www.fema.gov/business/nfip/>
- HOME Investments Partnerships Program, HUD. Grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons. <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/>
- Disaster Recovery Initiative, HUD. Grants to fund gaps in available recovery assistance after disasters (including mitigation). <http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/driquickfacts.cfm>
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs. <http://www.fema.gov/government/grant/empg/index.shtm#0>
- Partners for Fish and Wildlife, DOI – FWS. Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. <http://www.fws.gov/partners/>
- North American Wetland Conservation Fund, DOI-FWS. Cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats. <http://www.doi.gov/partnerships/wetlands.html>
- Federal Land Transfer / Federal Land to Parks Program, DOI-NPS. Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space. http://www.nps.gov/ncrc/programs/flp/flp_questions.html
- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements. <http://www.nrcs.usda.gov/Programs/WRP/>
- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Reauthorized for FY2008-2011, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public

schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. <http://www.fs.fed.us/srs/>