Linn-Benton Community College

Natural Hazards Mitigation Plan

November 2017

MEMO

To: Federal Emergency Management Agency

From: Linn Benton Community College; Marcene Olson, Director, Safety & Loss Prevention

Date: November 1, 2017

PURPOSE

This memo describes the 2017 Linn-Benton Community College (LBCC) Natural Hazard Mitigation Plan (NHMP) update process.

PROJECT BACKGROUND

Upon NHMP adoption by LBCC and approval by the Federal Emergency Management Agency (FEMA), LBCC will be eligible to pursue mitigation grant funding from the Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Programs (HMGP). The plan is at the five-year mark for updating with FEMA. Over the past year, the LBCC Natural Hazard Mitigation Update Committee has been working to make updates based on facilities changes, personnel changes, expanded locations, and re-assessment of risks posed by natural disasters.

VOLUME I: BASIC MITIGATION PLAN

Volume I: Basic Mitigation Plan addresses the federal regulations contained in 44 CFR 201.6. This volume provides the overall plan framework for the 2017 LBCC NHMP. Volume I contains the following sections: Executive Summary; Section 1: Introduction; Section 2: Risk Assessment; Section 3: Mitigation Strategy; and Section 4: Plan Implementation and Maintenance.

EXECUTIVE SUMMARY

The 2017 NHMP includes an executive summary that provides information about the purpose of natural hazards mitigation planning, summarizes changes from the 2012 plan, and describes how the updated plan will be implemented.

SECTION 1: INTRODUCTION

Section 1 introduces the concept of natural hazards mitigation planning and answers the question, "Why develop a mitigation plan?" Additionally, Section 1 summarizes the 2017 update process and provides an overview of how the plan is organized.

SECTION 2: RISK ASSESSMENT

Section 2: Risk Assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Hazard identification involves the identification of hazard geographic extent, its

intensity, and probability of occurrence. The second phase attempts to predict how different types of property and population groups will be affected by the hazard. Lastly, the third phase involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time.

SECTION 3: MITIGATION STRATEGY

This section provides the basis and justification for the mission, goals, and mitigation actions identified in the NHMP.

Action items were formulated for the updated 2017 Natural Hazard Mitigation Plan based upon continuous campus needs, the identification of hazards, and current needs based upon the community risk assessment. They are designed to be feasibly accomplished within the next five years and can be found in Appendix A.

SECTION 4: PLAN IMPLEMENTATION AND MAINTENANCE

This section details the formal process that will ensure that the LBCC NHMP remains an active and relevant document.

VOLUME II: HAZARD ANNEXES

Volume II contains individual hazard annexes. The hazard annexes provide detailed risk assessments for earthquake, flood, volcano, wildfire, windstorms, winter storms, and climate change. Content follows OPDR's templates, which are organized to follow the three phases of a risk assessment (campus-wide hazard identification, campus-wide vulnerability assessment, and risk analysis). The structure of OPDR's hazard annexes facilitates the FEMA plan review processes.

In terms of content, the Hazard Annexes document a hazard's history, provide descriptions of the causes and characteristics, and include detailed descriptions of LBCC's vulnerability to each hazard. The hazard annexes describe "existing mitigation" efforts for all hazards and list the new or updated action items.

VOLUME III: APPENDICES

Volume III contains supporting documentation and technical resources for use in implementing the NHMP. Each appendix is described further below.

APPENDIX A: ACTION ITEM FORMS

Appendix A specifically documents each action item contained in the LBCC NHMP. Action items are detailed recommendations for activities that college departments, staff, and faculty could engage in to reduce risk. This appendix contains detailed action item forms for each of the mitigation strategies identified in this plan.

APPENDIX B: PLANNING AND PUBLIC PROCESS

Appendix B includes documentation of the public processes utilized to develop the plan. It includes invitation lists, agendas, sign-in sheets, summaries of steering committee meetings, and public involvement meetings or outreach strategies.

APPENDIX C: ECONOMIC ANALYSIS OF NATURAL HAZARD MITIGATION PROJECTS

Appendix C describes FEMA requirements for benefit cost analyses in natural hazards mitigation as well as various approaches for conducting economic analyses of proposed mitigation activities.

APPENDIX D: CAMPUS PROFILE

Appendix D presents a profile of LBCC. The campus profile describes LBCC's physical environment, demographics, built infrastructure, and institutional systems.

APPENDIX E: GRANT PROGRAMS

Appendix E lists state and federal resources and programs.

APPENDIX F: LOCAL MITIGATION PLAN REVIEW TOOL

Appendix F demonstrates how the plan meets the regulations and offers states and FEMA mitigation planners an opportunity to provide feedback to the community.

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VOLUME I: BASIC MITIGATION PLAN

EXECUTIVE SUMMARY

LBCC developed this NHMP in an effort to prepare for the long-term effects resulting from natural hazards. It is impossible to predict exactly when hazards will occur or the extent to which they will affect the college. However, with careful planning and collaboration, it is possible to create a resilient campus that will benefit from long-term recovery planning efforts.

FEMA defines mitigation as "the effort to reduce loss of life and property by lessening the impact of disasters […] through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk." Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long- and short-term strategies. Example strategies include policy changes (such as updated administrative rules), projects (such as seismic retrofits to critical facilities), and education and outreach to targeted audiences (such students or faculty). Natural hazard mitigation is the responsibility of the whole community—individuals, private businesses and industries, state and local governments, and the federal government.

44 CFR 201.6 – The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. . . .

WHY DEVELOP THIS MITIGATION PLAN?

In addition to establishing a comprehensive campus-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. With campus and federal approval of this plan, LBCC will gain eligibility for pre- and post-disaster mitigation project grants.

44 CFR 201.6(a)(1) – A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants . . .

WHO PARTICIPATED IN DEVELOPING THE PLAN?

The LBCC Natural Hazards Mitigation Plan is the result of a collaborative effort by the project steering committee, which included representatives from the following departments:

- Finance & Operations
- Accounting & Budget
- Information Services

- College Advancement
- Student Affairs
- LBCC Regional Centers
- Facilities
- Academic Affairs
- Safety & Loss Prevention

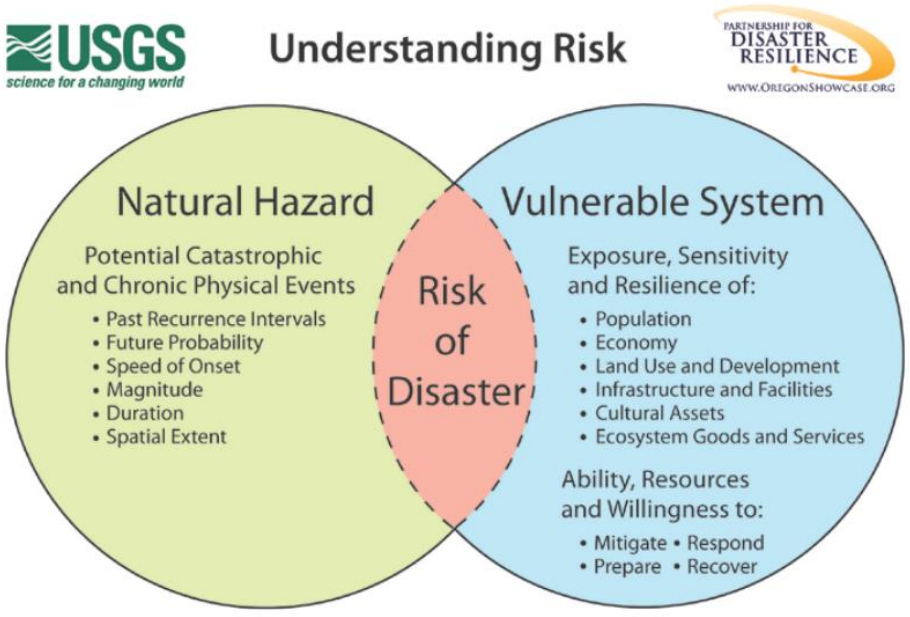
44 CFR 201.6(c)(1) – Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

The LBCC Office of Safety & Loss Prevention convened the planning process and will take the lead in implementing, maintaining, and updating the plan. The LBCC NHMP Update Committee participated in eight meetings to work towards identifying hazards, risk, and mitigation activities. The committee invited comment from members of the campus and local community.

HOW DOES THIS MITIGATION PLAN REDUCE RISK?

44 CFR 201.6(c)(2) – A Risk Assessment that provides the factual basis for activities proposed in the strategy . . .

This natural hazard mitigation plan is intended to assist LBCC in reducing the risks from natural hazards by identifying mitigation resources, information, and strategies. It is also intended to guide and coordinate mitigation activities throughout the main campus and satellite locations. A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis.



Source: OPDR

By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, LBCC will be better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

WHAT IS THE COLLEGE'S OVERALL RISK TO HAZARDS?

LBCC conducted a risk assessment to evaluate the probability of each hazard as well as the vulnerability of the college to that hazard. The table below presents the overall risk assessment for LBCC. The hazards are listed in rank order from high to low, taking into consideration historical events, vulnerability to populations, maximum threat, and probability of a particular hazard event.

Hazard	Vulnerability	Probability	Total Threat Score	Ranking
Earthquake	8.7	5.8	194.1	1
Winterstorm	7.0	7.2	159.0	2
Windstorm	5.2	5.8	127.0	3
Flood	4.5	5.3	126.6	4
Climate Change	4.8	6.3	126.1	5
Dam Failure	5.0	2.5	98.5	6
Volcanic Eruption	3.0	1.3	70.7	7
Wildland Fire	2.8	2.8	70.2	8

Source: LBCC Risk Assessment Update Committee Meeting, January 2017

WHAT IS THE PLAN'S MISSION?

The mission of the LBCC NHMP is to "reduce the risk natural hazards pose to LBCC human and infrastructure assets."

WHAT ARE THE PLAN GOALS?

The plan goals describe the overall direction that the participating departments, offices, faculty, staff, and students can take toward mitigating risk from natural hazards. LBCC's plan goals include:

44 CFR 201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

GOAL 1: PROTECT LIVES

Protect the lives of all campus populations.

GOAL 2: STRUCTURAL MITIGATION

Mitigate known structural deficiencies to college buildings and infrastructure.

GOAL 3: COORDINATION

Enhance coordination and communication among district stakeholders to develop, implement, and maintain campus mitigation strategies.

GOAL 4: AWARENESS

Increase hazard risk and mitigation awareness through education and outreach.

HOW ARE THE ACTION ITEMS ORGANIZED?

44 CFR 201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The action items are organized within an action item matrix (located in Section 3), which lists all of the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection, research, and the update process resulted in the development of the action items. The action item matrix portrays the overall plan framework and identifies linkages between the plan goals and actions. The matrix documents the title of each action along with the coordinating organization, timeline, and the plan goals addressed. Action items are further detailed in individual action item forms located in Appendix A. The LBCC NHMP identifies the following actions by natural hazard:

ALL HAZARD ACTIONS

- Provide an all-hazards campus outreach
- Develop "safe rooms" at each new LBCC facility for on-campus sheltering during and after extreme weather and other natural hazard events
- Develop additional reserves of food and water stores for emergency response on campus properties
- Encourage faculty to develop online course shells to enable offering classes online during a hazardous event precluding travel to campus.

DAM FAILURE

Note: Dam failure actions are included in the natural hazard mitigation plan as a subset of flood hazard for logistic reasons only. Dam failure is not a natural hazard in itself. LBCC is aware that campus assets are vulnerable to a dam failure event. As such, the committee did elect to include two dam failure action items.

- Coordinate with Lane County Emergency Management to receive a dam failure notification.
- Educate LBCC community about response timelines associated with potential dam failure

FLOOD ACTIONS

- Coordinate employee outreach and continuity plan associated with transportation issues in a flood event

EARTHQUAKE ACTIONS

- Conduct a tier III seismic assessment on the Red Cedar Hall
- Conduct a tier II seismic assessment on the Service Center
- Conduct a tier III seismic assessment on the Calapooia Center
- Conduct a tier II seismic assessment on the Activities Center
- Implement non-structural mitigation measures to secure hazardous materials on all campuses

SEVERE WEATHER ACTIONS

- Identify hazardous trees at the centers and map safety issues
- Identify safe pedestrian access routes for new buildings in the event of a severe winter and/or windstorm.

UTILITY FAILURE ACTIONS

- Identify funding to purchase additional generators to support campus operations in the event of utility failure

WILDFIRE ACTIONS

- Create defensible space around all property and structures vulnerable to wildfire

VOLCANIC ERUPTION ACTIONS

- [LBCC completed mitigation of this hazard in the 2012 iteration of the LBCC NHMP]

CLIMATE CHANGE ACTIONS

- Plan more green energy options in new construction (i.e. solar panels or other sources to generate electricity)
- Purchase institutional vehicles powered by more energy efficient and/or non-fossil fuel

HOW WILL THE PLAN BE IMPLEMENTED?

44 CFR 201.6(c)(3)(iii) – An action plan describing how the actions . . . will be prioritized, implemented and administered . . .

44 CFR 201.6(c)(4) – A plan maintenance process . . .

The plan maintenance section details the formal process that will ensure that the LBCC NHMP remains an active and relevant document. The plan will be implemented, maintained, and updated by a convener. The LBCC Safety & Loss Prevention Director will serve as the plan convener. The convener is responsible for overseeing annual review processes. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section describes how the college will integrate public participation throughout the plan maintenance process.

PLAN ADOPTION

44 CFR 201.6(c)(5) – Documentation that the plan has been formally adopted by the governing body of the jurisdiction . . .

44 CFR 201.6(d) – Plan review [process] . . .

Once the plan is drafted, reviewed, and deemed complete by the committee, LBCC will submit it to the State Hazard Mitigation Officer at the Oregon Military Department, Office of Emergency Management (OEM). OEM will review and forward the plan to FEMA (Region X) for review.[1] Upon pre-approval by FEMA, the LBCC Board of Education will formally approve the plan in accordance with LBCC Board Policy 5100.[2] Once LBCC sends confirmation of plan approval to FEMA, it will formally approve the plan. At that point, LBCC will gain eligibility to apply directly for Pre-Disaster Mitigation Grant Program funds, Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance Program funds.

Implementation of the NHMP goals and actions will depend upon the maintenance of a competent steering committee and adequate support from the board, departments, and offices reflected in the plan. Thorough familiarity with this NHMP will increase the efficient and effective implementation of appropriate mitigation activities and facilitate a reduction in the risk and loss potential from future natural hazard events.

WHAT HAS CHANGED WITH THIS UPDATE?

LBCC's NHMP is at the five-year mark for updating with FEMA. Over the past year, the committee has been working to make updates based on facilities changes, personnel changes, expanded locations, and re-assessment of risks posed by natural disasters.

The table below provides a brief summary of the updates made to the 2012 plan:

Section:	Changes in 2017 Plan:
Title Page & Contents	• Updated title page • Added FEMA memo • Added Table of Contents
Volume I: Basic Mitigation Plan	
Executive Summary	• Updated risk assessment summary • Updated the action item summary, including the addition of Dam Failure and Climate Change risks • Added the table showing action items completed, deleted, or revised from 2012 plan
Section 1: Introduction	• Updated the revision timeline for plan development • Updated information
Section 2: Risk Assessment	• Updated the hazard identification table • Added hazard summaries for Dam Failure and Climate Change

[1] This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201.
[2] Once the NHMP is approved, the president will bring forward any necessary LBCC Administrative Rule AR5100-01 revisions to the College Council for approval. AR 5100-01 guides the implementation of BP 5100. College Council approval of any administrative rule changes is an internal matter and will not impact final FEMA approval of the plan.

	• Updated the Hazard Probability and Vulnerability Assessment Summaries
Section 3: Mitigation Strategy	• Updated the Action Item Matrix • Updated information
Section 4: Plan Implementation and Maintenance	• Updated the LBCC NHMP Steering Committee membership table • Updated information
Volume II: Hazard Annexes	
Earthquake Annex	• Updated earthquake risk assessment analysis • Updated seismic retrofit information • Updated earthquake mitigation action items
Winter Storm Annex	• Updated the history of wind storm table used • Updated the winter storm hazard analysis • Updated the existing mitigation actions taken
Windstorm Annex	• Updated the windstorm history table used • Updated the tornado history table used • Updated the windstorm hazard analysis; • Updated the existing mitigation actions taken and the new mitigation action items
Flood Annex	• Added information about dam failure • Updated the flood history chart used • Updated the flood hazard analysis • Updated the flood mitigation action item
Climate Change Annex	• Added new annex
Volcano Annex	• Updated volcano history information • Updated the volcanic eruption hazard analysis • Updated existing mitigation activity information
Wildfire Annex	• Updated the wildfire hazard analysis • Added information about fire in relation to new centers
Volume III: Mitigation Resources	
Appendix A: Action Item Forms	• Updated the action item table • Updated the action item forms for each identified action
Appendix B: Planning and Public Process	• Added a contents list for the planning process section • Updated the planning process information, chart of LBCC NHMP Steering Committee members, and timeline and plans for public input • Added the plan development meeting agendas and minutes • Added the 2012-2017 plan maintenance minutes and progress
Appendix C: Economic Analysis	• Updated information
Appendix D: Campus Profile	• Updated information • Updated enrollment charts • Updated staff and faculty charts and occupancy information • Updated community events chart • Updated economic generation information with the 2017 economic impact report information • Updated the institutional organization chart • Updated built environment information with current statement of values • Updated the main campus map • Updated the chart of highest at risk buildings

	• Updated cultural assets section
Appendix E: Grant Programs	• Updated information
Appendix F: Local Mitigation Plan Review Tool	• Added

ACTION ITEMS COMPLETED/REMOVED FROM 2012-2017 NHMP

Action Item	Priority	Proposed Action Title	Coordinating Organization	Internal Partners	Timeline	Estimated Cost	Alignment with Plan Goals			
							Protect Lives	Structural Mitigation	Coordination	Awareness
Multi-Hazard (MH) Action Items										
MH #1	Med.	Identify "safe rooms" at each LBCC campus location that can be used for on campus sheltering during and after extreme weather and other natural hazard events	Safety & Loss Prevention Office	Facilities	ST/LT	Unknown	x			x
Dam Failure (DF) Action Items										
DF #1	Low	Coordinate with Linn and Benton County Emergency Management to develop an evacuation plan for all LBCC campuses in the event of dam failure.	Safety and Loss Prevention		LT	Unknown	x			x
DF #2	Med.	Coordinate with Linn, Benton, and Lane County Emergency Management to develop a dam failure notification procedures for all LBCC campuses	Safety and Loss Prevention		ST	Unknown	x		x	
Flood Hazard (FH) Action Items										
FH #1	Med.	Coordinate with Linn County and City of Albany Public Works to mediate storm water drainage obstructions in parking lot #4 to reduce localized flooding	Facilities	Safety and Loss Prevention	Ongoing	Unknown		x	x	
FH #2	Med.	Assess the potential for flooding at the newly acquired 10-acre Advanced Transportation Center property	Safety and Loss Prevention	Facilities, Auto Tech Program, VP Finance	ST	Unknown	x	x		x

				and Operations						
Earthquake Hazard (EH) Action Items										
EH #3	Low	Conduct a structural seismic assessment on Takena Hall	Finance and Operations	Grant Admin.	LT					
EH # 5	High	Prioritize the use of seismically sound buildings/classrooms for educational purposes	Academic Affairs		Ongoing	Low	x	x	x	x
EH # 6	High	Develop a prioritization strategy for seismic retrofit of campus buildings and facilities for the main campus and all centers	Facilities	Finance and Operations, Academic Affairs, Grant Administration	Ongoing	Low	x	x		
Severe Weather (SW) Action Items										
SW #1	High	Identify and catalogue all campus trees that may pose a significant threat to campus critical infrastructure and pedestrian safety in a winter or windstorm	Facilities	Grounds, Safety and Loss Prevention, Ag/Horticulture Faculty	ST	Low	x			x
SW #2	High	Develop a hazardous tree policy for how to manage hazard prone trees in specifically high pedestrian use areas	Safety and Loss Prevention	Facilities, Grounds	ST	Low	X			x
SW #3	High	Identify safe pedestrian access routes throughout the main campus that will be put into effect during a severe winter and/or windstorm	Safety and Loss Prevention	Facilities, Grounds	Ongoing	Low	x			x
Volcanic Eruption (VE) Action Items										
VE #1	Med.	Develop a strategy to install air intake covers for LBCC facilities to prevent the intake of ash in the event of a nearby volcanic eruption	Facilities		ST	Low-Moderate		x		

SECTION I: INTRODUCTION

This section provides a general introduction to natural hazard mitigation planning at LBCC. In addition, this section addresses the planning process requirements contained in 44 CFR 201.6(b), thereby meeting the planning process documentation requirement contained in 44 CFR 201.6(c)(1). The section concludes with a general description of how the plan is organized.

WHAT IS NATURAL HAZARD MITIGATION?

FEMA defines mitigation as "the effort to reduce loss of life and property by lessening the impact of disasters […] through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk." Example strategies include policy changes (such as updated campus procedures), projects (such as seismic retrofits to critical facilities or buildings), and education and outreach to targeted audiences (such as students and employees). Natural hazard mitigation is the responsibility of what FEMA refers to as the "whole community"—individuals, private businesses and industries, state and local governments, and the federal government. This plan addresses the whole community by linking LBCC to county, regional, and state mitigation planning. Further, this plan is intended to engage all members of the campus community.

WHY DEVELOP A CAMPUS MITIGATION PLAN?

The purpose of the LBCC NHMP is to reduce future loss of life and damage to campus property resulting from natural hazards. Engaging in mitigation activities provides LBCC with a number of benefits, including:

- reduced vulnerability to future hazard events, specifically reduced loss of life, property, essential services, critical facilities, and economic hardship;
- reduced short- and long-term recovery and reconstruction costs;
- quicker resumption of campus functions;
- increased cooperation and communication throughout the campus through the planning process; and
- increased potential for state and federal funding for hazard mitigation projects.

This plan applies to the main LBCC campus in Albany as well as its centers in Corvallis, Lebanon, Sweet Home and other locations throughout the district. It is impossible to predict exactly when natural hazard events will occur or the extent to which they will affect community assets; however, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 and the regulations contained in 44 CFR 201 require that states, communities, and tribal governments maintain an approved NHMP in order to receive federal funds for pre- and post-disaster mitigation projects. In the mid-2000's, FEMA developed a program called

the Disaster Resilient University (DRU) initiative, acknowledging that "disasters have affected university and college campuses with disturbing frequency, sometimes causing death and injury, but always imposing monetary losses and disruption of the institution's teaching, research, and public service."[3] The DRU program provided resources and guidance for universities working to protect their campus from natural hazards. Through the DRU program, the University of Oregon has lead a statewide initiative to support the development of NHMPs on university and college campuses throughout the state. Federal approval of this plan will allow LBCC to apply for federal pre- and post-disaster mitigation project grant funds directly. More importantly, LBCC will benefit from a comprehensive and collaborative process to develop a mitigation strategy that identifies project priorities, resources, and strategies to reduce risk at the campus scale.

WHAT FEDERAL REQUIREMENTS DOES THIS PLAN ADDRESS?

The Disaster Mitigation Act of 2000 is the latest federal legislation addressing mitigation planning. It reinforces the importance of planning and emphasizes planning for natural hazards before they occur. The act established the Pre-Disaster Mitigation Grant Program and new requirements for the Post-Disaster Hazard Mitigation Grant Program. Section 322 specifically addresses mitigation planning at the state and local levels (including universities, colleges, and special districts). State and local jurisdictions must have approved mitigation plans in place in order to qualify to receive funds. Mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and their capabilities.

Development of this NHMP is in compliance with 44 CFR 201.6. These regulations address plan requirements, the planning process, plan content, and plan review in four subsections. Subsection (a) provides an outline of the overall plan requirements, including an overview of plan components, exceptions to requirements, and multi-jurisdictional participation. Subsection (b) outlines the requirements of the planning process, with particular focus on public involvement in the update process; the role of local agencies, organizations, and other relevant entities in the development process; and standards for adequate levels of review and incorporation of existing plans and policies. Subsection (c) outlines requirements concerning the plan update's content, including an overview of necessary components for the update's planning process, risk assessment, mitigation strategy, plan maintenance, and overall process documentation. Subsection (d) outlines the steps and agencies required for proper review of the plan before adoption by their communities.

WHAT IS THE POLICY FRAMEWORK FOR NATURAL HAZARDS PLANNING IN OREGON?

Planning for natural hazards is an integral element of Oregon's statewide land use planning program, which began in 1973. All Oregon cities and counties have comprehensive plans and implement ordinances that are required to comply with the statewide planning goals.

[3] FEMA. *Building a Disaster Resistant University*, 2003. PDF.

Statewide land-use planning Goal 7: Areas Subject to Natural Hazards calls for local plans to include inventories, policies, and ordinances to guide development in or away from hazard areas. Goal 7, along with other land-use planning goals, has helped to reduce losses from natural hazards. Through risk identification and the recommendation of risk-reduction actions, this plan aligns with the goals of local plans and helps each jurisdiction meet the requirements of Goal 7. Because land-use and development activity at LBCC must comply with local plans and their implementing ordinances, LBCC should be addressing natural hazard impacts.

The primary responsibility for the development and implementation of risk reduction strategies lies with local jurisdictions. However, resources also exist at the state and federal levels. Some of the key agencies in this area include Oregon Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

HOW DID LBCC DEVELOP THIS PLAN?

LBCC originally developed this plan with support from the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. The plan was funded in part through Hazard Mitigation Grant Program funds provided to Oregon after severe storms, flooding, landslides, and mudslides that occurred between December 1-17, 2007.[4]

The NHMP convener facilitated the plan update in a similar fashion to the original process used in 2012. In addition, the committee reviewed and incorporated applicable information from the Oregon, Linn County, Benton County, and the City of Albany in preparing updates to the LBCC plan.

[4] DR-1733.0010-P

HOW IS THE PLAN ORGANIZED?

Each volume of the mitigation plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing LBCC facilities, students, employees, and community partners. Combined, the sections work in synergy to create a mitigation plan that furthers LBCC's mission: "to engage in an education that enables all of us to participate in, contribute to and benefit from the cultural richness and economic vitality of our communities."[5]

VOLUME I: NATURAL HAZARD MITIGATION PLAN

SECTION I: INTRODUCTION

This section briefly describes campus mitigation planning efforts and the methodology used to develop the plan.

SECTION II: COMMUNITY RISK ASSESSMENT

This section provides the factual basis for the mitigation strategies contained in Section III. It includes a listing of existing plans, policies, and programs; a listing of community organizations; a summary of existing mitigation actions; and an overview of the hazards addressed in the plan. This section discusses LBCC's sensitivities—those community assets and characteristics that may be impacted by natural hazards as well as the college's resilience— and its ability to manage risk and adapt to hazard event impacts.

SECTION III: MISSION, GOALS, AND ACTION ITEMS

This section documents the plan vision, mission, goals, and actions. It also describes the components that guide implementation of the identified mitigation strategies. Actions are based on community sensitivity and resilience factors and the hazard assessments in Section II and the Hazard Annexes.

SECTION IV: PLAN IMPLEMENTATION AND MAINTENANCE

This section provides information on the implementation and maintenance of the plan. It describes the process for prioritizing projects, and includes a suggested list of tasks for updating the plan at the semi-annual and five-year review meetings.

VOLUME II: HAZARD-SPECIFIC ANNEXES

The hazard annexes summarize the best available local data for each hazard, including history, location, extent, vulnerability, impact, and probability. The annexes utilize and build upon information contained in the Linn and Benton County NHMPs as well as other relevant sources.

The following hazard annexes are included with this plan:

[5] Linn-Benton Community College Board Policy 1005

- Earthquake;
- Flood (Dam Failure);
- Wildfire;
- Windstorm;
- Winter Storm;
- Volcanoes; and
- Climate Change

VOLUME III: RESOURCE APPENDICES

The resource appendices are designed to provide the users of the LBCC NHMP with additional information to assist them in understanding the contents of the mitigation plan and provide them with potential resources to assist with plan implementation.

APPENDIX A: ACTION ITEM FORMS

This appendix contains the detailed action item forms for each of the mitigation strategies.

APPENDIX B: PLANNING AND PUBLIC PROCESS

This appendix documents LBCC's planning and engagement process used to develop the plan. The appendix includes a process summary, meeting agendas, sign-in sheets, and summaries of committee meetings as well as any other campus engagement methods.

APPENDIX C: CAMPUS PROFILE

This appendix provides an overview of campus demographics across student, faculty, and visitor groups; discusses LBCC's revenue generation and business development impacts; provides an overview of the college governance structure and key offices; and outlines college facilities and assets. In addition to describing characteristics and trends, each section identifies the traits that indicate sensitivity to natural hazards.

APPENDIX D: ECONOMIC ANALYSIS OF NATURAL HAZARDS MITIGATION PROJECTS

This appendix describes FEMA requirements for benefit cost analysis in natural hazards mitigation as well as various approaches for conducting economic analysis of proposed mitigation activities.

APPENDIX E: GRANT PROGRAMS

This appendix lists state and federal resources and programs.

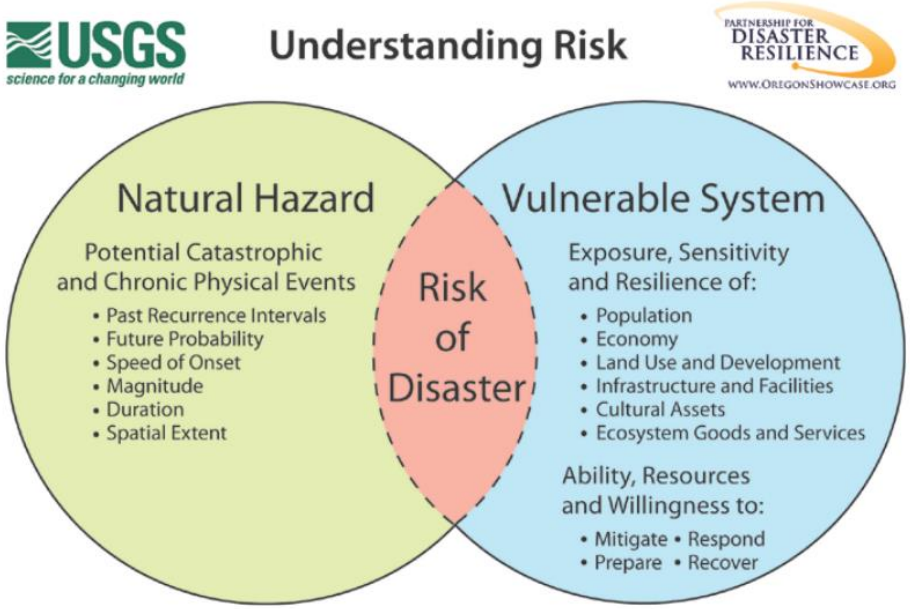
APPENDIX F: LOCAL MITIGATION PLAN REVIEW TOOL

This appendix demonstrates how the plan meets the relevant regulations.

SECTION II: ALL-HAZARD RISK ASSESSMENT

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. Assessing natural hazard risk begins with the identification of hazards that can impact the college. Included in the hazard assessment is an evaluation of potential hazard impacts—type, location, extent, etc. The second step is the identification of important college assets and system vulnerabilities. Example vulnerabilities include student populations, community-based service programs, campus buildings, roads, cultural assets, and utility infrastructure. The last step is to evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the college.

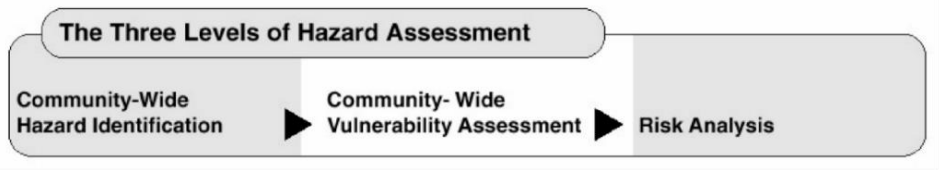
The information presented below, along with hazard-specific information presented in the Hazard Annexes and college characteristics presented in the Campus Profile Appendix, will be used as the institution-level rationale for the risk-reduction actions identified in Section III – Mitigation Strategy. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.



Source: Oregon Partnership for Disaster Resilience. 2012.

WHAT IS A RISK ASSESSMENT?

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis. For the purposes of this plan, "community-wide" refers to the college.



Source: Planning for Natural Hazards: Oregon Technical Resource Guide. 1998.

The first phase, hazard identification, involves the identification of the geographic extent of a hazard, its intensity, and its probability of occurrence. This level of assessment typically involves producing a map. The outputs from this phase can also be used for land use planning, management, and regulation; public awareness; defining areas for further study; and identifying properties or structures appropriate for acquisition or relocation.[6]

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.[7]

The third phase, 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.

This three-phase approach to developing a risk assessment should be conducted sequentially because each phase builds upon data from prior phases. However, gathering data for a risk assessment need not occur sequentially.

HAZARD IDENTIFICATION

LBCC identifies seven natural hazards that could have an impact on the college. These hazards include earthquake, flood, dam failure, volcanic event, wildfire, windstorm, winter storm, (windstorm and winter storm later combine as severe weather hazards in discussion of action items), and climate change. The following table categorizes the hazards identified by LBCC and compares them to the regional hazards identified in Linn and Benton Counties and the State of Oregon NHMP for the mid-southern Willamette Valley region, which includes LBCC. Notably, severe wind and ice storms have been separated into two independent hazards (i.e. windstorm and winter storm). Due to the topography surrounding LBCC campus locations, landslide is not a significant threat to campus assets. Similarly, the committee did not feel that drought posed a significant threat to specific campus populations, assets, or services.

LBCC[1]	Benton County[2]	Linn County[3]	Mid-Southern Willamette Valley Hazards[4]—OR NHMP
Earthquake	Earthquake	Pandemic	Drought
Winter Storm	Flood	Windstorm	Earthquake
Windstorm	Wildfire	Flood	Flood

[6] Burby, R. 1998 Cooperating with Nature. Washington, DC: Joseph Henry Press, 126.
[7] Burby, R. 1998 Cooperating with Nature. Washington, DC: Joseph Henry Press, 133.

Flood	Winter Storm	Earthquake	Landslide
Climate Change	Windstorm	Wildland Fire	Volcano
Dam Failure	Landslide	Volcano	Wildfire
Volcanic Eruption	Drought	Wind Storm	Windstorm
Wildland Fire	Volcano	Dam Failure	Winter Storm

1 LBCC NHMP Steering Committee, 2017
2 Benton County Multi-Jurisdictional Natural Hazards Mitigation Plan, April 2016
3 Linn County Emergency Operations Plan, 2016
4 State of Oregon Natural Hazard Mitigation Plan, Region 3: Mid-Southern Willamette Valley, September 2015

EARTHQUAKE

CHARACTERISTICS

Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) shallow crustal events within the North American Plate; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) the off-shore Cascadian Subduction Zone.

LBCC has only experienced minor earthquakes (with no reported impacts), but the surrounding region has experienced multiple earthquakes of estimated magnitudes of four and greater, with major earthquakes in 1949 (magnitude 7.1), 1962 (magnitude 5.2), and 2001 (magnitude 6.8). Primary earthquake hazards include ground shaking amplification, liquefaction, and earthquake-induced landslides. There are no high concentrations of earthquakes in northern Oregon, and all recent major quakes in northwest Oregon have been shallow.

LOCATION/EXTENT

Within the LBCC main campus and satellite locations, specific buildings and structures on campus pose the most risk during an earthquake. Many of the structures on campus were built before the 1980s and thus are not seismically sound. A few buildings have been seismically retrofitted, but many need to undergo retrofitting to mitigate potential loss of life and structure damage. The extent of the damage to structures and harm to people will depend upon the type of earthquake, proximity to the epicenter, and the magnitude and duration of the event.

FLOOD

CHARACTERISTICS

The principal types of flood that occur on the LBCC main campus include riverine and urban flooding. Riverine flooding directly affects the parts of LBCC that are located along either the Calapooia or North Santiam Rivers and located within the FEMA flood plain. However, flooding of campus assets rarely occurs. That said, regional transportation impacts due to

flooding do periodically impact the ability of LBCC's student, faculty, and staff to access campus locations. Riverine floods can be slow or fast-rising but usually develop over a period of days. The danger of riverine flooding occurs mainly during the winter months, with the onset of persistent, heavy rainfall, and during the spring, with melting of snow in the Coast Range. [8]

Urban flooding occurs where land has been converted from open space to areas consisting of homes; parking lots; and commercial, industrial and public buildings and structures. In such areas, the ability of water to filter into the ground is often prevented by the extensive impervious surfaces associated with urban development. During periods of urban flooding, streets can rapidly become swift moving rivers, and basements and backyards can quickly fill with water. Storm drains and smaller creeks can back up due to yard waste and debris. Clogged storm drainage systems have resulted in localized flooding events on the LBCC main campus.[9]

LOCATION/EXTENT

The LBCC Horse Center is the only main campus location thst has the potential to be affected by riverine flooding based on its location in a mapped floodplain zone. The Horse Center is located along the Calapooia River but has not historically experienced flooding. All campus locations could potentially be affected by residual flooding if any number of the dams located in the region were to fail.

The main flooding risk to the LBCC main campus is urban flooding. Due to storm water management systems that were constructed around campus, the landscape was slightly altered. Excess rainwater and drainage does not always drain off properly, and debris can backup in the swale/culvert system. Historically, urban flooding occurs in certain parking lot areas on campus, with particular emphasis on parking lot #4. The flooding can be severe and limit access and available parking as well as pose a safety and infrastructure issue for the campus.

The Sweet Home and Lebanon Centers are not located within floodplains. However, it is important to note that major access routes, including Highway 20, Highway 99, and Highway 34 may be impassable during a major flood. The closure of roads due to flooding will likely impact campus operations. Even though the main campus and the community center facilities may not be directly at risk to riverine flooding, many of the students, staff, and faculty may be affected.

The northeast corner of the parking lot for the 757 Polk Benton Center property is located in the 100-year flood plain as well as the south parking lot for the 931 NW Reiman Benton Center property.

DAM FAILURE (ASSESSED FOR RISK AS A SUBSET OF FLOODING)

[8] Marion County Natural Hazard Mitigation Plan. 2011.
[9] LBCC Steering Committee, September 2012

CHARACTERISTICS

LBCC has evaluated the risk of dam failure as a subset of flooding that could impact institutional property and lives. As identified by the Army Corps of Engineers, Foster, Green Peter, Hills Creek, Cougar, Dexter, Fall Creek and Look Out Point Reservoirs have the potential for floodwaters to inundate various campus facilities.

LOCATION/EXTENT

There are many dams in the region surrounding LBCC. Catastrophic dam failure would cause widespread flooding and transportation interruption for employees living in Lane and Linn Counties.

VOLCANIC EVENT

CHARACTERISTICS

LBCC and the Pacific Northwest lie within the "ring of fire," an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth's tectonic plates. Volcanic eruptions have the potential to coincide with numerous other hazards, including ash fall, earthquakes, lava flows, pyroclastic flows, lahars and debris flows, and landslides. Ash fall and earthquakes are the two associated hazards that have the potential to impact LBCC directly.

LOCATION/EXTENT

Active volcanoes that could impact LBCC include Mount Jefferson, Three Sisters and Broken Top, Mount Hood, Mount St. Helens, and Mount Rainier. If any of these volcanoes erupted, there would be a possibility of ash that could affect air and water quality. LBCC utility infrastructure (primarily air handling) could be severely impacted by volcanic ash falls derived from regional volcanic activity. The extent of damage from these hazards depends on the distance from the volcano, vent location, and type of hazardous events that occur during an eruption. The main concern for LBCC campuses is ash clogging air ventilation systems and causing wastewater drainage backup.

WILDFIRE (WUI)

CHARACTERISTICS

While more common to the arid areas of central and eastern Oregon, the potential for losses due to Wildland Urban Interface (WUI) fires in the urbanized region should not be ignored. Wildfire that has the potential to affect the LBCC main campus is interface wildfire. Ignition of a wildfire may occur naturally from lightning or from human causes such as debris burns, arson, careless smoking, and recreational activities or from an industrial accident. Once started, fuel, topography, weather, and development conditions affect fire behavior.

LOCATION/EXTENT

LBCC main campus has several empty and overgrown lots surrounding the property, which pose a threat if a fire was to spread from one of these lots. The Horse Center, just north of main campus on 53rd Street, and the Advanced Transportation Technology Center at 200 W. Oak in Lebanon, are surrounded by fields that could also pose a threat to the facilities. The extent of damage to LBCC from WUI fires is dependent on a number of factors, including temperature, wind speed and direction, humidity, proximity to fuels, and steepness of slopes. WUI fires can be intensified by development patterns, vegetation, and natural fuels and can merge into unwieldy and unpredictable events.

WINDSTORM

CHARACTERISTICS

Extreme winds occur throughout Oregon, and most communities have some level of vulnerability to windstorms. Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, and damaged traffic signals, streetlights, and parks, among other impacts. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Windstorms can cause flying debris that can also damage utility lines; overhead power lines can be damaged even in relatively minor windstorm events

Although rare, tornadoes can and do occur in Oregon. Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating winds and strong vertical motion, which possess remarkable strength and cause widespread damage.

LOCATION/EXTENT

Windstorms that affect LBCC usually occur from October to March, and their extent is determined by their track, intensity (the air pressure gradient they generate), and local terrain.[10]

Oregon and other western states have experienced tornadoes on occasion, many of which have produced significant damage and occasionally injury or death. Most of the tornadoes that develop in Oregon are caused by intense local thunderstorms. These storms also produce lightning, hail, and heavy rain and are more common during the warm season from April to October.[11] LBCC experiences windstorms several times during the years, with the major concern being tree hazards scattered throughout campus.

WINTER STORM

[10] State of Oregon Natural Hazards Mitigation Plan. Oregon Partnership for Disaster Resilience, 2012.
[11] Elson, David. A Climatological History of Tornadoes in Northwest Oregon and Southwest Washington, August 1996.

CHARACTERISTICS

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting LBCC typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.[12]

While snow is relatively rare in western Oregon, when cold air moves westward through the Columbia Gorge and sinks southward into the Willamette Valley, snow events can occur. If a wet Pacific storm happens to reach the area at the same time that cold air is present, larger than average snow events may result.[13]

Like snow, ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation, including freezing rain, sleet, and hail. Freezing rain can be the most damaging of ice formations. While sleet and hail can create hazards for motorists when it accumulates, freezing rain can cause the most dangerous conditions within a community. Ice buildup can bring down trees, communication towers, and wires, creating hazards for motorists and pedestrians alike.

LOCATION/EXTENT

The magnitude or severity of severe winter storms is determined by a number of meteorological factors, including the amount and extent of snow or ice, air temperature, wind speed, and event duration. Like windstorms, the major hazard risk for the campus is tree hazards and pedestrian walks becoming inaccessible.

CLIMATE CHANGE

CHARACTERISTICS

The overall climate in the Pacific Northwest is largely determined by atmospheric conditions in the Pacific Ocean, resulting in El Niño and La Niña. However, human actions are causing temperature change that ultimately affects climate, shifting the seasonal timing, creating earlier snowmelt from the mountains, and increasing peak stream flows.

Several hazards identified in LBCC's NHMP—winter storms, windstorms, fire, and floods—are identified in the State of Oregon's NHMP and the Oregon Climate Adaptation Framework as having an underlying climate component.

LOCATION/EXTENT

Seasonal projections of future temperature and precipitation show temperature increases in the Pacific Northwest directly related to the increase in global greenhouse emissions. By

[12] State of Oregon Natural Hazards Mitigation Plan. Oregon Partnership for Disaster Resilience, 2012.
[13] National Weather Service, Portland Office.

mid-century, the models show an annual temperature increase of 2.0-8.5° F. The change in seasonal temperatures is projected to result in less snowpack in Oregon, meaning lower water levels for lakes, rivers, and agricultural needs as well as the supply of drinking water. Increased summer temperatures could result in increased wildfires and poor air quality.

HAZARD PROBABILITY

Probability is the likelihood of future occurrence within a specified period of time. LBCC evaluated the best available probability data to develop the probability scores presented below. For the purposes of this plan, the college utilized the Oregon Emergency Management Hazard Analysis methodology probability definitions to determine hazard probability. The definitions are:

- LOW = one incident likely within 76 to 100 years scores between 1 and 3 points
- MEDIUM = one incident likely within 36 to 75 years scores between 4 and 7 points
- HIGH = one incident likely within 10 to 35 years scores between 8 and 10 points

The table below presents the probability scores for each of the natural hazards possible at LBCC. As shown in the table, several hazards are rated with high probabilities, including earthquake, flood, windstorm, and winter storm.

Hazard	Probability Rating
Winter Storm	Medium
Climate Change	Medium
Windstorm	Medium
Earthquake	Medium
Flood	Medium
Wildland Fire	Medium
Dam Failure	Medium
Landslide	Low
Volcanic Eruption	Low

Source: LBCC NHMP Steering Committee, 2017

CAMPUS VULNERABILITY

Vulnerability is a measure of the exposure of campus assets to hazards. Vulnerability includes the percentage of population and property likely to be affected under an “average” occurrence of the hazard. The exposure of campus assets to hazards are critical in the assessment of the degree of risk the campus has to each hazard. Identifying the facilities and infrastructure at risk from various hazards, for example, can assist the college in prioritizing resources for mitigation and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of campus assets to each hazard and potential implications are explained in each hazard section.

Campus vulnerabilities are an important supplement to the NHMP risk assessment. Two important vulnerability categories, population and critical infrastructure, are summarized below.

POPULATIONS

The socio-demographic qualities of the campus population (such as language, race, ethnicity, and age) are significant factors that can influence the campus's ability to cope, adapt to, and recover from natural disasters. Historically, 80% of the disaster burden falls on the public.[14] Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and campus mitigation planning. For planning purposes, it is essential LBCC consider both immediate and long-term socio-demographic implications of hazard resilience.

VULNERABILITIES

- LBCC has many sporting, educational, and cultural events throughout the year. These events bring several hundred people per event to the campus. Campus visitors may be unfamiliar with the campus and the local area, leaving them vulnerable during a natural hazard event.
- LBCC has minor population of students and visitors with disabilities. Individuals with disabilities may require assistance during a natural hazard event.
- Many students come from other language households. Even though the students attending LBCC speak English, their families may not, and during a hazard event, they may require certain considerations, especially if their family member is in an LBCC location during the event.

CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities (i.e. police, fire, and government facilities) and physical infrastructure are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a campus's ability to cope with, respond to, and recover from a natural disaster. Following a disaster, campus may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

VULNERABILITIES

- LBCC may be considered an excellent evacuation site and/or shelter during a hazard event. However, many of the buildings across LBCC locations are not currently seismically sound and thus pose their own threat if an earthquake is to occur.

VULNERABILITY SUMMARY

[14] Hazards Workshop Session Summary #16, Disasters, Diversity, and Equity. (July 200). University of Colorado, Boulder.

LBCC evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this plan, the college utilized the Oregon Emergency Management Hazard Analysis methodology vulnerability definitions to determine hazard probability. The definitions are:

- LOW = less than 1-percent affected scores between 1 and 3 points
- MEDIUM = between 1 and 10-percent affected scores between 4 and 7 points
- HIGH = more than 10-percent affected scores between 8 and 10 points

The table below presents the vulnerability scores for each of the natural hazards possible at LBCC. As shown in the table, the city is highly vulnerable to the following hazards: earthquake, windstorm and winter storm.

Hazard	Vulnerability Rating
Earthquake	High
Winter Storm	High
Windstorm	Medium
Dam Failure	Medium
Climate Change	Medium
Flood	Medium
Volcanic Eruption	Low
Wildland Fire	Low
Landslide	Low

Source: LBCC NHMP Steering Committee, 2017

SECTION III: MISSION, GOALS, AND ACTION ITEMS

This section of the NHMP addresses 44 CFR 201.6(c)(3) – Mitigation Strategy. The information provided in Section 2 and the Hazard Annexes provide the basis for the mitigation actions identified in this plan. This section provides information on the process used to develop the mission, goals, and action items. This section also includes an explanation of how LBCC intends to incorporate the mitigation strategies outlined in the plan into existing campus planning, budgeting, and facility planning processes.

MITIGATION PLAN MISSION

The mission of LBCC is "to engage in an education that enables all of us to participate in, contribute to, and benefit from the cultural richness and economic vitality of our communities." This overarching college mission informs LBCC's approach to hazard mitigation planning. To guide LBCC's NHMP, the committee developed the following mission:

Reduce the risk natural hazards pose to LBCC human and infrastructure assets.

MITIGATION PLAN GOALS

The plan goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. The goals listed here direct the mitigation strategy and serve as checkpoints for campus departments and offices as they begin implementing the plan.

GOAL I: PROTECT LIVES

Protect the lives of all campus populations.

GOAL II: STRUCTURAL MITIGATION

Mitigate known structural deficiencies to college buildings and infrastructure.

GOAL III: COORDINATION

Enhance coordination and communication among district stakeholders to develop, implement, and maintain campus mitigation strategies.

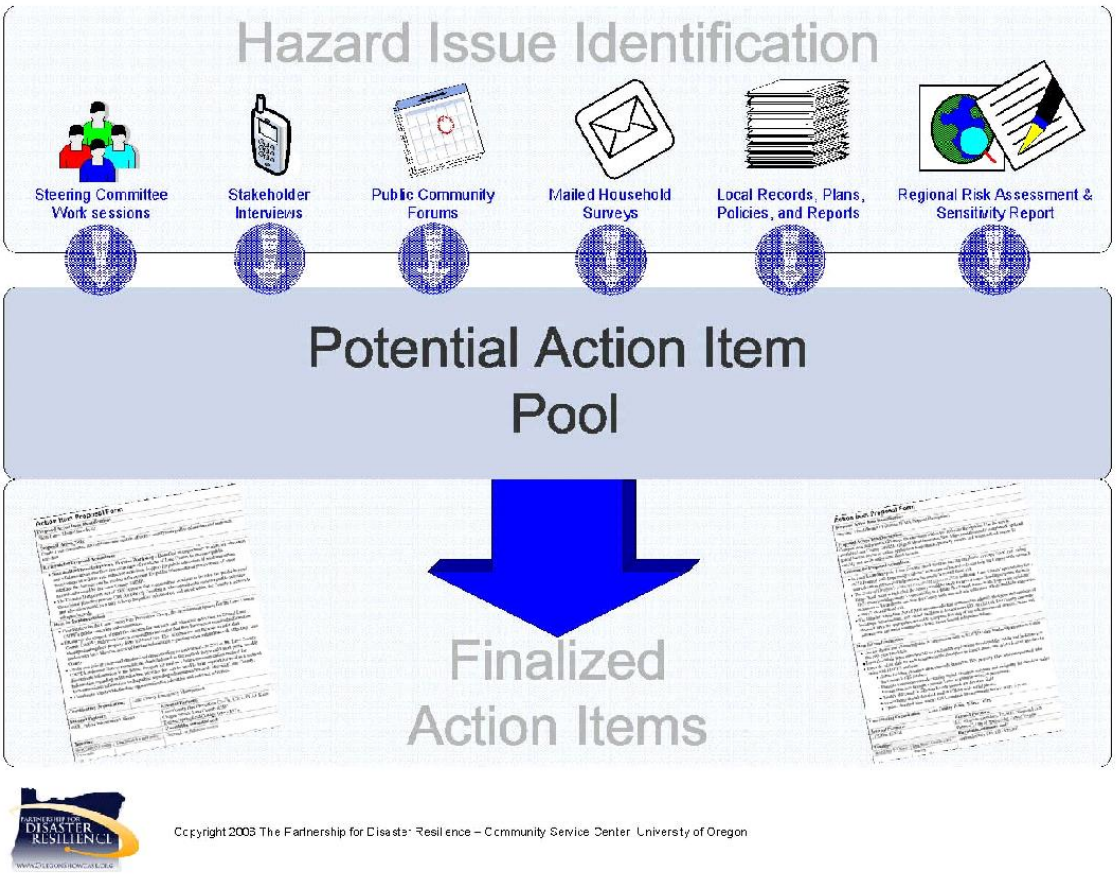
GOAL IV: AWARENESS

Increase hazard risk and mitigation awareness through education and outreach.

MITIGATION PLAN ACTION ITEMS

Short- and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that campus

departments can engage in to reduce risk. They address both multi-hazard and hazard-specific issues. Action items can be developed through a number of sources. The figure below illustrates some of these sources.



Source: Partnership for Disaster Resilience, 2006

ACTION ITEM WORKSHEETS

Each action item has a corresponding worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A.

RATIONALE OR KEY ISSUES ADDRESSED

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from a number of sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk

assessment. The rationale for proposed action items is based on the information documented in Section 2 and the Hazard Annexes.

IDEAS FOR IMPLEMENTATION

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may not prove to be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

IMPLEMENTATION THROUGH EXISTING PROGRAMS

The LBCC NHMP includes a range of action items that, when implemented, will reduce college losses from hazard events. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. This section identifies existing LBCC programs the action item may relate to (e.g. Campus Capital Improvement Plan, Business Continuity Plan, Emergency Response Plan, etc.)

COORDINATOR

The coordinator is the campus department or office with oversight responsibility to address the mitigation action. This may include organizing resources, finding appropriate funding, or overseeing activity implementation, monitoring and evaluation.

INTERNAL AND EXTERNAL PARTNERS

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the committee but not necessarily contacted during the development of the plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

Internal partner organizations are departments within the college that may assist in the implementation of action items by providing relevant resources to the coordinator.

External partner organizations can assist the coordinator in implementing the action items in various functions and may include local, regional, state, or federal agencies as well as local and regional public and private sector organizations.

PLAN GOALS ADDRESSED

The plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals following implementation.

TIMELINE

Action items include both short- and long-term activities. Each action item includes an estimate of the timeline for implementation. Short-term action items (ST) are activities that may be implemented with existing resources and authorities in one to two years. Long-term action items (LT) may require new or additional resources and/or authorities and may take from one to five years to implement.

ACTION ITEM DEVELOPMENT AND PRIORITIZATION

In June of 2017, the committee reviewed actions from the 2012 NHMP to determine which have been completed and can be removed and which actions would be ongoing. New action items to be added were developed based on information gathered during previous meetings and based on the risks and vulnerabilities identified in the risk assessment. Members of the committee were asked to consider: (1) alignment with NHMP goals, (2) what the rationale is for the action, (3) what strategies exist to implement the action, (4) on what timeline action will likely occur, and (5) who will be responsible for implementing the action.

LBCC prioritized actions by considering the proposed timeline and cost: low-cost actions identified as short-term or ongoing received a high-priority designation, actions with a combination of moderate- to high-cost with short- or long-term timelines received a medium-priority designation, and high-cost actions identified as long-term received a low-priority designation. These priority designations are intended to be used as an initial screen; the action item prioritization process described in Section 4 will be used to re-prioritize actions on an as-needed basis.

ACTION ITEM MATRIX

The action item matrix shows the overall action plan framework and identifies linkages between the plan goals, partnerships (coordination and partner organizations), and actions.

Action Item	Priority	Proposed Action Title	Coordinating Organization	Internal Partners	Timeline	Estimated Cost	Alignment with Plan Goals			
							Protect Lives	Structural Mitigation	Coordination	Awareness
Multi-Hazard (MH) Action Items										
MH #1	High	Provide an all-hazard campus outreach	Safety and Loss Prevention, Building Emergency Coordinators	HR, Student Services, Academic Affairs, Information Services	Ongoing	Low	X		X	X

MH #2	High	Develop "safe rooms" at each new LBCC facility for on-campus sheltering during and after extreme weather and other natural hazard events	Safety and Loss Prevention	Facilities	Ongoing	Low	X			X
MH #3	Med.	Develop additional reserves of food and water stores for emergency response on campus properties	Finance and Operations	Facilities, Safety and Loss Prevention	Ongoing	Moderate	X		X	
MH #4	Low	Encourage faculty to develop online course shells to enable offering classes online during a hazardous event precluding travel to campus	Academic Affairs		Ongoing	Moderate	X		X	
Dam Failure (DF) Action Items										
DF #1	Med.	Coordinate with Lane County Emergency Management to receive a dam failure notification	Safety and Loss Prevention		ST	Unknown	X		X	
DF #2	High	Educate LBCC community about response timelines associated with potential dam failure	Safety and Loss Prevention	All department supervisors	ST	Low	X		X	X
Flood Hazard (FH) Action Items										
FH #1	Med.	Employee outreach and continuity plan associated with transportation issues in a flood event	All department	Safety and Loss Prevention	ST	Low	X		X	X
Earthquake Hazard (EH) Action Items										
EH #1	Med.	Conduct a Tier III seismic assessment on Red Cedar Hall	Facilities	Finance and Operations, Grants Administration	LT	Moderate	X	X		X
EH #2	Med.	Conduct a Tier II seismic assessment on the Service Center	Facilities	Finance and Operations, Grants Administration	LT	Moderate	X	X		X
EH #3	Med.	Conduct a Tier III seismic assessment on the Calapooia Center	Facilities	Finance and Operations, Grants Administration	LT	Moderate	X	X		X

EH #4	Med.	Conduct a Tier II seismic assessment on the Activity Center	Facilities	Finance and Operations, Grants Administration	Ongoing	Low	X			X
Severe Weather (SW) Action Items										
SW #1	High	Identify safe pedestrian access routes for new buildings in the event of severe winter weather	Safety and Loss Prevention	Facilities, Ground	Ongoing	Low	X			X
SW #2	Med.	Identify hazardous trees at the center and map safety issues	Facilities, Grounds	Center directors, Safety and Loss Prevention	ST	Low	X	X		
Utility Failure (UF) Action Items										
UF #1	Med.	Identify funding to purchase additional generators to support campus operations in the event of utility failure	Facilities, Grant Administration	Finance and Operations, Safety and Loss Prevention, Information Services	ST/LT	Moderate -High		X	X	
Volcanic Eruption (VE) Action Items										
VE		[Mitigated 2012 NHMP]								
Wildfire (WF) Action Items										
WF #1	Med.	Create defensible space around all property and structures vulnerable to wildfires	Facilities and Grounds	Safety and Loss Prevention	Ongoing	Low-Moderate	X	X		
Climate Change (CC) Action Items										
CC #1	Med.	Plan more green energy options in new construction (i.e. solar panels or other sources to generate electricity)	Facilities, Finance and Operations	Construction Advisory Committee	Ongoing	Moderate				X
CC #2	Med.	Purchase institutional vehicles powered by more energy efficient and/or non-fossil fuel	Purchasing, Finance and Operations	Driver's Education, Facilities, Public Safety, ATTC	Ongoing	Moderate				X

SECTION IV: PLAN IMPLEMENTATION AND MAINTENANCE

This section of the NHMP addresses 44 CFR 201.6(c)(4) – Plan Maintenance. Specifically, the section details the formal process that will ensure that the LBCC NHMP remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the plan annually as well as producing an updated plan every five years. Finally, this section describes how LBCC will integrate campus engagement, outreach, and participation throughout the plan maintenance and implementation process.

IMPLEMENTING THE PLAN

LBCC developed and will implement this NHMP through a collaborative process. Once the plan is drafted, reviewed, and deemed complete by OPDR and LBCC, LBCC will submit it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will review and forward the plan to FEMA (Region X) for review.[15] Upon pre-approval by FEMA, the LBCC President will formally approve the plan in accordance with LBCC Board Policy 5100.[16] Once LBCC sends confirmation of plan approval to FEMA, it will formally approve the plan. At that point, LBCC will maintain eligibility to apply directly for Pre-Disaster Mitigation Grant Program funds, Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance Program funds.

CONVENER

The LBCC Safety & Loss Prevention Manager shall serve as the plan convener. The roles and responsibilities of the plan convener include:

- Coordinating steering committee meeting dates, locations, agendas, and members;
- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the steering committee and campus community;
- Identifying emergency management-related funding sources for natural hazards mitigation projects;
- Coordinating plan update processes;
- Submitting future plan updates to Oregon Emergency Management for review; and
- Coordinating the LBCC Board of Education adoption processes.

COORDINATING BODY

The LBCC Mitigation Plan Steering Committee will continue to serve as the coordinating body for the mitigation plan. The roles and responsibilities of the coordinating body include:

[15] This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201.
[16] Once the NHMP is approved, the president will bring forward any necessary LBCC Administrative Rule revisions to the College Council for approval. AR 5100-01 guides the implementation of BP 5100. College Council approval of any administrative rule changes is an internal matter and will not impact final FEMA approval of the plan.

- Serve as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and Flood Mitigation Assistance Program;
- Prioritize and recommend funding for natural hazard risk reduction projects;
- Document successes and lessons learned;
- Evaluate and update the NHMP following a disaster;
- Evaluate and update the NHMP in accordance with the maintenance schedule; and
- Develop and coordinate ad hoc and/or standing subcommittees as needed.

MEMBERS

The committee consisted of the following individuals representing a variety of campus departments and stakeholder groups:

- Dave Henderson – Vice President, Finance & Operations
- Jess Jacobs – Director, Accounting and Budget
- Dale Stowell – Executive Director, College Advancement
- Scott Krambuhl – Director, Facilities
- Sally Widenmann – Dean of Instruction
- Marcene Olson – Director, Safety & Loss Prevention
- Jeff Davis – Regional Director, Benton County
- Vern Smith – Network Administrator
- Bev Dunigan – Assistant Director, East Linn Centers
- Justene Malosh – Research Analyst, Institutional Research
- Julie Hessel – Program Assistant, Center of Accessibility Resources
- Lara Miller – Catalog, Curriculum, and Scheduling Manager
- Nicole Ballinger – Grant Development Manager
- Duane Jensen - Lead Maintenance Specialist

To make the coordination and review of the LBCC NHMP as broad and useful as possible, the coordinating body will continue to engage campus stakeholders and other relevant hazard mitigation organizations and agencies (e.g. cities and counties) to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual action item forms found in Appendix A.

IMPLEMENTATION THROUGH EXISTING PROGRAMS

The NHMP includes a range of action items that, when implemented, will reduce loss from hazard events at LBCC. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items.

Many of the NHMP's recommendations are consistent with the goals and objectives of other campus plans and policies. Where possible, the committee will implement the plan's recommended actions through existing plans and policies. LBCC has identified the following programs and mechanisms to include future NHMP actions and activities:

- LBCC Capital Improvement Plan
- LBCC Annual Budgeting Process
- LBCC Business Continuity Plan
- LBCC Emergency Response Plan

PLAN MAINTENANCE

Plan maintenance is a critical component of the NHMP. Proper maintenance of the plan ensures that LBCC will maximize campus efforts to reduce the risks posed by natural hazards. The committee is responsible for implementing this process, in addition to maintaining and updating the plan through a series of meetings outlined in the maintenance schedule below.

ANNUAL PLAN MAINTENANCE MEETING

The committee will meet on a semi-annual basis to complete the following tasks:

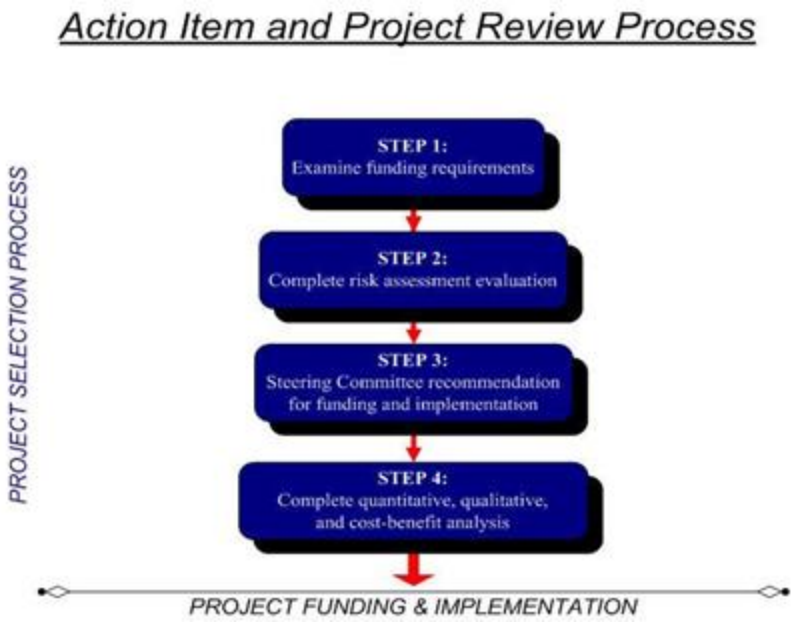
- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the plan and mitigation in general;
- Identify issues that may not have been identified when the plan was developed; and
- Prioritize potential mitigation projects using the methodology described below:
    - Review existing and new risk assessment data;
    - Discuss methods for continued public involvement; and
    - Document successes and lessons learned during the year.

The convener will be responsible for documenting the outcome of the annual plan maintenance meeting in Appendix B. The plan's format allows LBCC to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a plan that remains current and relevant.

During the plan development process, the committee emphasized that additional hazard mitigation meetings will take place throughout the year with subgroups of the coordinating body. The full coordinating body will convene for additional meetings each year on an as-needed basis.

PROJECT PRIORITIZATION PROCESS

The Disaster Mitigation Act of 2000 requires that the NHMP identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore, the project prioritization process needs to be flexible. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment.



Source: Community Service Center's Partnership for Disaster Resilience, 2008.

STEP I: EXAMINE FUNDING REQUIREMENTS

The first step in prioritizing the plan's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for proposed campus mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations. Colleges and universities are encouraged to monitor professional resources such as the International Association of Emergency Managers (IAEM) Universities and Colleges Caucus (UCC), the Disaster Resilient University (DRU) list serve, and FEMA's "Communities of Practice" for additional funding opportunities that may periodically become available.

Because grant programs open and close on different schedules, the committee will examine upcoming funding streams' requirements to determine which mitigation activities would be eligible. The coordinating body may consult with the funding entity, Oregon Emergency Management, or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the committee's quarterly maintenance meetings or as needed.

STEP II: COMPLETE RISK ASSESSMENT EVALUATION

The second step in prioritizing the plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The coordinating body will determine whether or not the plan's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and

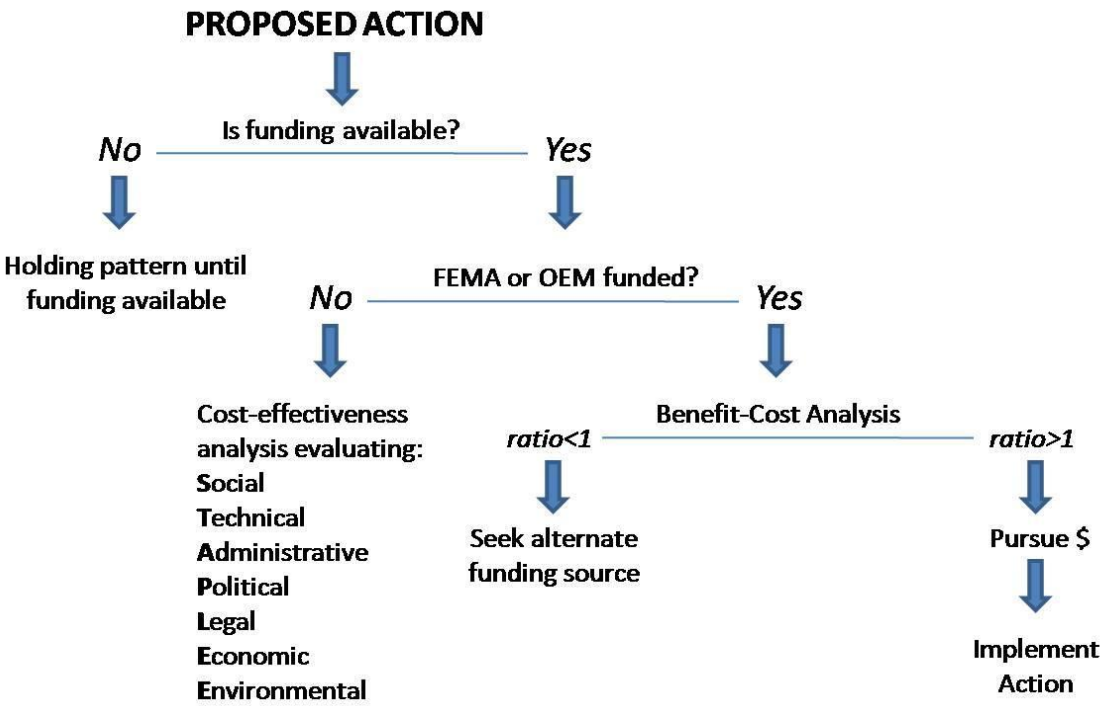
whether community assets are at risk. The coordinating body will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future or are likely to result in severe/catastrophic damages.

STEP III: COMMITTEE RECOMMENDATION

Based on the steps above, the committee will recommend which mitigation activities should be moved forward. If it decides to move forward with an action, the organization designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. The committee will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

STEP IV: COMPLETE QUANTITATIVE AND QUALITATIVE ASSESSMENT AND ECONOMIC ANALYSIS

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures, or projects. Two categories of analysis used in this step are: (1) benefit/cost analysis and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards 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.



Source: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 2010.

If the activity requires federal funding for a structural project, the committee will use a FEMA-approved analysis tool to evaluate the appropriateness of the activity. A project must have a benefit/cost ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or non-structural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions, which stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects this way can help define a project's qualitative cost effectiveness. The STAPLE/E technique has been tailored for use in natural hazard action item prioritization by the Partnership for Disaster Resilience at the University of Oregon's Community Service Center. See Appendix D for a description of the STAPLE/E evaluation methodology.

CONTINUED PUBLIC INVOLVEMENT AND PARTICIPATION

LBCC is committed to involving faculty, staff, and students in the continual reviewing and updating of the NHMP. Specifically, LBCC will provide periodic opportunities for the campus community to review and participate in the continual reshaping and update of the plan. Due to the transitory nature of the student body and instructional faculty, direct participation in implementation of the NHMP will continue to present challenges. That said, there are a number of mechanisms to solicit and encourage campus involvement and participation. Specifically, LBCC will utilize the following strategies to engage the broader campus community:

- Post plan on the college website;
- Provide informational materials at the annual campus Welcome Day;
- Provide periodic briefings to College Council;
- Post educational materials on the college website;
- Send out informational emails and campus bulletins; and
- Ask faculty to include a brief all-hazards awareness statement in course syllabi.

FIVE-YEAR REVIEW OF PLAN

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. The LBCC NHMP is due to be updated in the winter of 2022. The convener will be responsible for organizing the committee to address plan update needs. It will be responsible for updating any deficiencies found in the plan and for ultimately meeting the Disaster Mitigation Act of 2000's plan update requirements.

VOLUME II: HAZARD-SPECIFIC ANNEXES

CAUSES AND CHARACTERISTICS OF EARTHQUAKES

Seismic events were once thought to pose little or no threat to Oregon communities. However, recent earthquakes and scientific evidence indicate that the risk to people and property is much greater than previously thought. Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) shallow crustal events within the North American Plate; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) the off-shore Cascadian Subduction Zone.

CRUSTAL FAULT EARTHQUAKES

Crustal fault earthquakes are the most common types of earthquakes and occur at relatively shallow depths of six to twelve miles below the surface. While most crustal fault earthquakes are smaller than magnitude 4.0 and generally create little or no damage, they can produce earthquakes of magnitudes 7.0 and higher and cause extensive damage. The Mount Angel Fault, a crustal fault located within the United States, produced a 5.7 magnitude quake in 1993.[17]

The western part of Oregon is underlain by a large and complex system of faults (e.g. Portland Hills) that can produce damaging earthquakes. There is a direct relationship between a fault's length and its ability to generate damaging ground motions. Smaller nearby faults produce lower magnitude events, but ground shaking can be strong and damage can be high because of the fault's proximity. Earthquakes can trigger other geologic and soils failures that contribute to damage.

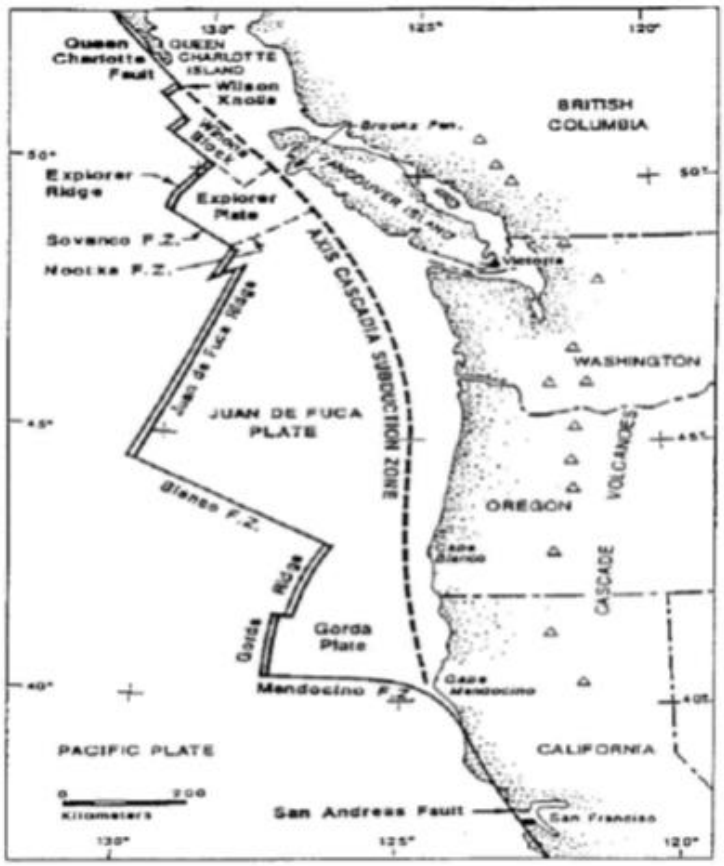
DEEP INTRAPLATE EARTHQUAKES

Occurring at depths from 25 to 40 miles below the earth's surface in the subducting oceanic crust, deep intraplate earthquakes can reach magnitude 7.5.[18] A Washington State earthquake on February 28, 2001 was a deep intraplate earthquake. It produced a rolling motion that was felt from Vancouver, British Columbia to Coos Bay, Oregon and east to Salt Lake City, Utah.[19]

SUBDUCTION ZONE EARTHQUAKES

The Pacific Northwest is located at a convergent plate boundary, where the Juan de Fuca and North American tectonic plates meet. The two plates are converging at a rate of about one to two inches per year. This boundary is called the Cascadia Subduction Zone (CSZ). It extends from British Columbia to northern California. Subduction zone earthquakes are caused by the abrupt release of slowly accumulated stress.

[17] Wong, Ivan G and Jacqueline D.J. Bott. November 1995. "A Look Back at Oregon's Earthquake History, 1841- 1994." Oregon Geology 57 (6): 125
[18] Ibid.
[19] Hill, Richard. "Geo Watch Warning Quake Shook Portland 40 Years Ago." The Oregonian. October 30, 2002.



Source: Benton County Hazard Mitigation Plan: Earthquake Section

While all three types of earthquakes have the potential to cause major damage, subduction zone earthquakes pose the greatest danger. A major CSZ event could generate an earthquake with a magnitude of 9.0 or greater, resulting in devastating damage and loss of life. Such earthquakes may cause great damage to the coastal area of Oregon as well as inland areas throughout western Oregon, including LBCC campus facilities. It is estimated that shaking from a large subduction zone earthquake could last up to five minutes.[20]

Subduction zones similar to the CSZ have produced earthquakes with magnitudes of 8.0 or larger. Historic subduction zone earthquakes include the 1960 Chile earthquake (magnitude 9.5), the 1964 southern Alaska earthquake (magnitude 9.2), and the 2004 Indian Ocean earthquake (magnitude 9.0). Geologic evidence shows that the CSZ has generated great earthquakes, most recently about 300 years ago.

The specific hazards associated with an earthquake are explained below:

GROUND SHAKING

Ground shaking is defined as the motion or seismic waves felt on the Earth's surface caused by an earthquake. Ground shaking is the primary cause of earthquake damage.

[20] UO Community Planning Workshop. 2002.

GROUND SHAKING AMPLIFICATION

Ground shaking amplification refers to the soils and soft sedimentary rocks near the surface that can modify ground shaking from an earthquake. Such factors can increase or decrease the strength as well as the frequency of the shaking.

SURFACE FAULTING

Surface faulting are planes or surfaces in Earth materials along which failure occurs. Such faults can be found deep within the earth or on the surface. Earthquakes occurring from deep lying faults usually create only ground shaking.

LIQUEFACTION

Liquefaction takes place when ground shaking causes granular soils to turn from a solid into a liquid. This in turn causes soils to lose their strength and their ability to support weight.

The severity of an earthquake is dependent upon a number of factors including: 1) the distance from the earthquake's epicenter); 2) the ability of the soil and rock to conduct the earthquake's seismic energy; 3) the degree (angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake.

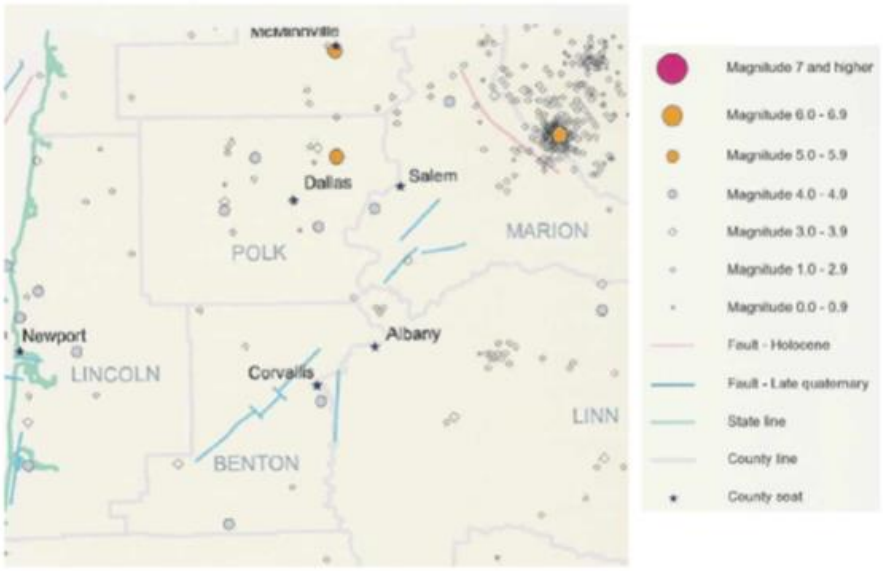
HISTORY OF EARTHQUAKES AFFECTING LBCC

The Willamette Valley, including Linn and Benton Counties, has been affected by earthquakes in the surrounding area of an estimated magnitude of 4.0 and greater. The Pacific Northwest has experienced major earthquakes in 1949 (magnitude 7.1), 1962 (magnitude 5.2), and 2001 (magnitude 6.8). The table below shows the location of selected Pacific Northwest earthquakes.

Date	Location	Magnitude	Comments
February 2001	Nisqually, WA	6.8	The most recent earthquake to be felt in Marion County was the Nisqually earthquake, on February 28, 2001. The earthquake was centered 35 miles southwest of Seattle and registered 6.8 on the Richter Scale. While the quake caused little damage in Marion County, it did temporarily close businesses and schools to assess potential damage.
March 1993	Scotts Mills, OR	5.6	The Scotts Mille Earthquake originated about two miles south of Scotts Mills and twelve to thirteen miles underground. In Salem, the rotunda of the state Capitol cracked, and the Golden Pioneer statue nearly rocked off its base.
March 1963	Salem, OR	4.6	On March 7, 1963, a quake measuring 4.6 on the Richter Scale shook Marion County. Despite the low magnitude of the quake, damage still occurred—especially to older masonry buildings.
November 1962	Vancouver, WA	5.5	Three and a half weeks after the devastating Columbus Day Storm, an earthquake that measured approximately 5.2 on the Richter Scale shook the Portland area. It was the largest quake to be generated by a fault under Portland and Vancouver. The

			Oregon Statesman reported little damage, although much of Marion County was shaken up.
April 1961	Albany, OR	4.5	A quake in April of 1961 caused little damage to the county, but startled many residents. The quake was centered just south of Salem and registered 4.6 on the Richter Scale. Described by most as a double shock, it shook houses and rattled dishes, but damage was very limited. Albany reported some cracked plaster.
November 1957	Salem, OR	4.0	The 1957 earthquake registered a 5.0 on the Richter Scale. Most reports indicated only one sharp jolt or a few seconds of shaking. The earthquake caused slight damage in Salem, and temporary power outages.
April 1949	Olympia, WA	7.1	April 13, 1949, Marion County residents felt an earthquake that was centered near Olympia, Washington. While Marion County was shaken by the quake, damage was minimal. In downtown Salem and West Salem areas building trembled, light-fixtures swayed, and dishes rattle in cupboards.
July 1930	Perrydale, OR	4.0	Cracked plaster.
April 1896	McMinnville, OR	4.0	Felt in Portland.
January 1700	Offshore, Cascadia Subduction Zone	9.0	Generated a tsunami that struck Oregon, Washington, and Japan; destroyed Native American villages along the coast.
1400 BCE, 1050 BCE, 600 BCE, 400, 750, 900	Offshore, Cascadia Subduction Zone	8.0-9.0	Based on studies of earthquake and tsunami at Willapa Bay, Washington. These are the mid-points of the age ranges for these six events.

Source: Oregon State NHMP



Source: Earthquake Epicenters from 1841 to 2002, Benton County Hazard Mitigation Plan: Earthquake Section

There are no high concentrations of earthquakes in northern Oregon, and all major quakes in northwest Oregon have been shallow.

RISK ASSESSMENT

HOW ARE HAZARDS IDENTIFIED?

Primary earthquake hazards include ground shaking amplification, liquefaction, and earthquake-induced landslides. Areas most susceptible to ground amplification and liquefaction have young, soft, alluvial sediments, found along stream channels in most of the Willamette Valley. Landslides are most likely in high, steep, mountainous terrain and at the base of steep canyons.[21] The extent of the damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter, and the magnitude and duration of the event.

PROBABILITY OF FUTURE OCCURRENCE

Scientists estimate the chance in the next 50 years of a large subduction zone earthquake is between 10% and 20%, assuming that the recurrence is on the order of 400 +/- 200 years. A report released in August 2016 from the OSU Geology Department found, using nearly 200 core samples of underwater landslide deposits left behind by past subduction zone earthquakes, that the northern sections of the CSZ are coming due for an earthquake. The department found evidence that at least 43 major earthquakes have occurred in the last 10,000 years.

Previously, experts believed that the section that runs from Newport to Astoria ruptured every 400 to 500 years, but the new data shows that the interval is closer to 350 years. Due to this information, there is about a 20% chance that northern Oregon will experience a magnitude 8.0 or higher quake in the next 50 years.

Establishing a probability for crustal earthquakes is more difficult. There have been five earthquakes above magnitude 4.0 in the mid-Willamette Valley, of which the 1993 Scotts Mills earthquake was the largest. The total number of earthquakes above a magnitude 4.0 centered in the mid-Willamette Valley is small. Therefore, any prediction would be questionable. Earthquakes generated by volcanic activity in the Cascade Range are possible but likewise unpredictable.

Over the last 63 years, seven damaging earthquakes affected the Willamette Valley, ranging from 4.5 to 7.1 in magnitude. This averages out to one damaging earthquake every nine years. Given this recurrence interval, the committee rated the probability of an earthquake occurring as high, meaning that it is likely a damaging earthquake will affect LBCC within 10-35 years.

VULNERABILITY ASSESSMENT

[21] Burns, William, John Hofmeister and Yumei Wang. "Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage Estimates for Six Counties in the Mid/Southern Willamette Valley Including Yamhill, Marion, Polk, Benton, Linn, and Lane Counties, and the City of Albany, Oregon." Oregon Department of Geology and Mineral Industries, 2008

The effects of earthquakes span a large area. The degree to which earthquakes are felt and the damages associated with them may vary. At risk from earthquake damage are unreinforced masonry buildings built before earthquake standards were incorporated into building codes, facilities with hazardous materials, and utility transmission lines that supply critical services.

The committee determined that the campus's vulnerability to earthquakes is high, meaning that more than half the buildings on campus have the potential to be severely damaged or collapse.

RISK ANALYSIS

The committee determined that the history of earthquake is medium, with only minor earthquakes felt on campus with no damage. The maximum threat of an earthquake is high, considering the percentage of population and property that could be impacted under a worst-case scenario.[22]

Earthquakes in the past caused no injuries on campus. However, the potential for injuries or deaths from past events or from similar events in other communities could escalate, resulting in multiple deaths and major injuries and/or extensive impact on campus and community social networks.[23]

Most facilities throughout the college anticipate extensive damage due to an earthquake. In terms of campus operations, classes and college business would experience interruption for a period of a year or longer. Earthquakes have the potential to inflict widespread damage to not only buildings but also the utility infrastructure and transportation network that may inhibit access to campus locations and affect campus operations.

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Earthquake	5	Medium	8.7	High	10	High	5.8	Medium	194.1

Source: LBCC NHMP Steering Committee, 2017

BUILDING COLLAPSE POTENTIAL

LBCC's human and physical assets are at high risk from earthquake hazards in the next 35 years. Earthquake history for the region indicates that several moderate earthquakes have occurred within Linn and Benton Counties; three since 1949 have caused damage in the city.

In 2007, DOGAMI completed a rapid visual screening (RVS) of educational and emergency facilities in communities across Oregon, as directed by the Oregon Legislature in Senate Bill 2 (2005). RVS is a technique used by FEMA to identify, inventory, and rank buildings that are potentially vulnerable to seismic events. DOGAMI surveyed buildings on the LBCC main campus and satellite locations and gave them a "low," "moderate," "high," or "very high" potential of collapse in the event of an earthquake. It is important to note that these rankings represent a probability of collapse based on

[22] LBCC NHMP Steering Committee, 2012
[23] Ibid.

limited observed and analytical data and are therefore approximate rankings.[24] To fully assess a building's collapse potential, a more detailed engineering study completed by a qualified professional is required, but the RVS study can help to prioritize which buildings to survey.

Of the facilities evaluated by DOGAMI using RVS, seven buildings have a high collapse potential and all are located on the LBCC main campus.[25]

Building	Year Built	RVS Type*	RVS Score	Collapse Potential	Collapse %
Activities Center	1975	RM2	0.7	High	>10%
McKenzie Hall		C1	1.4	Moderate	>1%
Calapooia Center	1973	C1	-0.1	Very High	100%
Red Cedar Hall	1973	C1	-0.1	Very High	100%
Industrial A	1973	C1	-0.1	Very High	100%
Luckiamute Center	2004	N/A	N/A	Low	<1%
White Oak Hall**	1973	C1	-0.1	Very High	100%
Service Center	1973	C1	-0.1	Very High	100%
South Santiam Hall	1973	C1	1.9	Moderate	>1%
Forum	1973	C1	-0.1	Very High	100%
Takena Hall**	1979	PC2	0.3	High	>10%
Willamette Hall	1973	C1	-0.1	Very High	100%

* C1 = Concrete Moment-Resisting Frame; RM2 = Reinforced Masonry; PC2 = Precast Concrete Frame.
** LBCC completed an extensive remodel and seismic retrofit of White Oak Hall in 2010 and Takena Hall in 2016.
Source: DOGAMI 2004-2007. Open File Report 07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment

Building	Year Built	RVS Type	RVS Score	Collapse Potential	Collapse %
Benton Center	2004	N/A	N/A	Low	<1%
Lebanon Center	2002	N/A	N/A	Low	<1%
Sweet Home Center*		N/A	N/A	High	>10%

* The Sweet Home Center is now part of the Sweet Home High School that was built new in 2008.
Source: DOGAMI 2004-2007. Open File Report 07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

[24] State of Oregon Department of Geologic and Mineral Industries, Implementation of 2005 Senate Bill 2 Relating to Public Safety, Seismic Safety and Seismic Rehabilitation of Public Building, May 22, 2007, iv.
[25] Ibid.

The degree of damage and injury from earthquake hazards will depend upon the type of earthquake, proximity to the epicenter, and the magnitude and duration of the event. The committee identified relative risks associated with earthquake hazards; it estimates that there will be disruption of social networks, extensive damage to facilities, and an extended interruption of campus operations.

UTILITY FAILURE

Utility failure can be the result of seismic activity near LBCC facilities. Failure includes the loss or disruption of any primary energy source and/or utility source needed to maintain campus operations. The primary sources of energy used at LBCC include electricity, natural gas, oil, and gas. Other utilities to consider include heating, cooling, water, and sewage. Utility disruptions can have a major impact on LBCC's ability to operate and provide adequate safety to students and employees.

Since LBCC mainly relies on the local civic government and private companies for energy and utilities, failures affecting LBCC may be outside of LBCC's ability to control. The magnitude and severity of utility failure, as it affects campus, is dependent on the magnitude of the earthquake, proximity to epicenter, and vulnerable campus populations.

HAZARDOUS MATERIALS

For the purposes of mitigation planning, hazardous materials releases are considered a secondary hazard derived from the impact of a natural hazard event (i.e. an earthquake could knock over combustible chemistry lab chemicals improperly stored in cabinets).

The severity of any hazardous material release on campus as the result of seismic activity depends on several factors, including the toxicity, quantity, and dispersal characteristics of the hazardous material; local conditions such as wind direction, topography, soil, and ground water characteristics; and proximity to campus populations.

While it is most likely a hazardous materials incident involving LBCC will be minor and localized, there is the potential that LBCC campuses could be impacted by a larger scale incident if it were to happen nearby in the surrounding cities or along major transportation corridors. The vulnerability of LBCC to hazardous materials incidents abroad is largely dependent on the location of incident, time of day, effectiveness of evacuation, and materials involved.

EXISTING HAZARD MITIGATION ACTIVITIES

SEISMIC RETROFIT

Several LBCC projects in recent years have improved the structural resilience of buildings on campus. The White Oak Hall upgrade and seismic retrofit project specifically incorporated engineered updates to existing buildings. A major addition to the Benton Center in 2004 also

resulted in new classroom space that meets current seismic standards (though the original portion of the building remains vulnerable). Other buildings on campus that meet current building code standards include Madrone Hall (constructed 2008), Luckiamute Center (constructed 2004), North Santiam Hall (constructed 2005), and Takena Hall (seismic retrofit in 2017).

Seismic Retrofit Success Story – White Oak Hall

LBCC completed seismic upgrades as part of a multi-stage renovation and improvement project to two buildings on campus between 2009 and 2011. The project involved upgrades to White Oak Hall, construction of a new connection between the former Science and Technology (ST) building and Red Cedar Hall (known as the White Oak Hall in-fill), and renovation of the ST building itself.

The project area included faculty offices; the office of the Dean of Science, Engineering, and Technology; a classroom; and study areas. The project, which resulted in the old building becoming part of White Oak Hall, was completed in the summer of 2011.

To complete the seismic retrofits, LBCC leveraged campus capital improvement dollars to obtain additional funding from the state of Oregon's seismic rehabilitation grant program. Under the direction of the Oregon Seismic Safety Policy Advisory Commission, the Seismic Rehabilitation Grant Program awarded $7.5 million in an initial round of funding for 14 projects, including seismic rehabilitation at LBCC.

As a result of this successful project, LBCC is actively pursuing additional capital improvement project opportunities with seismic retrofitting in mind.

EARTHQUAKE MITIGATION ACTION ITEMS

The committee developed the following actions to address earthquake risks. These actions, when implemented, will mitigate a number of the potential effects of earthquakes across LBCC campuses:

- EQ#1: Conduct a Tier III seismic assessment on Red Cedar Hall
- EQ#2: Conduct a Tier II seismic assessment on the Service Center
- EQ#3: Conduct a Tier III seismic assessment on the Calapooia Center
- EQ#4: Conduct a Tier II seismic assessment on the Activity Center
- EQ#5: Implement non-structural mitigation measures to secure hazardous materials and unsafe furnishings on all campuses

FLOOD

CAUSES AND CHARACTERISTICS OF FLOOD

Flooding occurs when climate, geography, and hydrology combine to create conditions where water flows outside of its usual course. The geography and climate of the region surrounding LBCC combine to create chronic seasonal flooding conditions. In Oregon, flooding is most common from November through March when storms from the Pacific Ocean bring intense rainfall. Flooding can be aggravated when rain is augmented by snowmelt and frozen ground. If the ground is saturated or frozen, stream flow can be increased even more by the inability of the soil to absorb additional precipitation.

Even though the LBCC campuses may not be located in designated floodplains, and floods have infrequently impacted the campuses directly, floods in the region can impede access to campus facilities, disrupt business functions, and pose risk to the lives and property of students, staff, and faculty. There are three primary types of flooding that may impact LBCC operations: riverine flooding, urban area flooding, and shallow area flooding or ponding.

RIVERINE FLOODS

Riverine flooding is the most common flood hazard in the region, and it typically occurs on larger rivers and streams when water levels overflow their banks. Riverine floods generally develop from large-scale weather systems that generate prolonged rainfall over a period of several days, thus providing some level of advanced warning.

Riverine flooding occurs mainly during the winter months, with the onset of persistent heavy rainfall, and during the spring, with the melting of snow in the Cascade Range. The primary rivers of concern for LBCC are the Willamette River and its tributaries.[26] Transportation routes within the region can be disrupted from hours to days during a flood event. These circumstances may impede accessibility to the main campus and outlying community centers.

MAIN CAMPUS

Riverine flooding along the Willamette River is a significant issue in the City of Albany particularly north of the LBCC main campus. The northern bank of the Willamette River allows frequent over-bank flooding. Over-bank flooding also occurs along the Calapooia River almost every winter, inundating rural farmland to the west of Albany. Periwinkle Creek, Cox Creek, Burkhart Creek, and Truax Creek were deepened and straightened as flood control projects. The capacity of these creek channels was increased to contain the 100-year flood, and consequently riverine flooding along these four creeks is rare.[27]

[26] Federal Emergency Management Agency (FEMA), Linn County FIS, 09/29/86)
[27] City of Albany Natural Hazard Mitigation Plan. 2010.

The LBCC Horse Center is located approximately one-and-half miles from the main campus. The Horse Center sits along the Calapooia River and is located within the floodplain. The Horse Center is the only LBCC main campus property that exists within a floodplain. The center has few buildings, horses, and faculty and staff that work at the center.

COMMUNITY CENTERS

The Sweet Home and Lebanon centers are not located within floodplains. However, it is important to note that major access routes to LBCC campuses, including Highway 20, Highway 99, and Highway 34 may be impassable during a major flood. The closure of roads due to flooding will likely impact campus operations. Even though the main campus and the community center facilities may not be directly at risk to riverine flooding, many of the students, staff, and faculty may be affected.

The northeast corner of the parking lot for the 757 Polk Benton Center property is located in the 100-year floodplain as well as the south parking lot for the 931 NW Reiman Benton Center property.

SHALLOW AREA FLOODS

Shallow area floods are a special type of riverine flooding. FEMA defines a shallow area flood hazard as an area that is inundated by a 100-year flood with a flood depth between one to three feet. Such areas are generally flooded by low velocity sheet flows of water.

URBAN FLOODS

Urban flooding occurs where land has been converted from fields or woodlands to developed areas consisting of homes, parking lots, and commercial, industrial, and public buildings. In such areas, the ability of water to filter into the ground is often prevented by the extensive impervious surfaces associated with urban development. This in turn results in more water quickly running off into watercourses, which causes water levels to rise above pre-development levels.

During periods of urban flooding, streets can rapidly become swift moving rivers, and basements and backyards can quickly fill with water. Storm drains and smaller creeks can back up due to yard waste and debris. Clogged storm drainage systems often lead to further localized flooding.

DAM FAILURE

There are many dams in the region surrounding LBCC. Catastrophic dam failure would cause widespread flooding, damage campus facilities and transportation patterns, and pose a threat to the safety of students, staff, and faculty, particularly in the area of East Linn (Lebanon Center, Health Occupations Center, Advanced Transportation Technology Center, and Sweet Home Center).

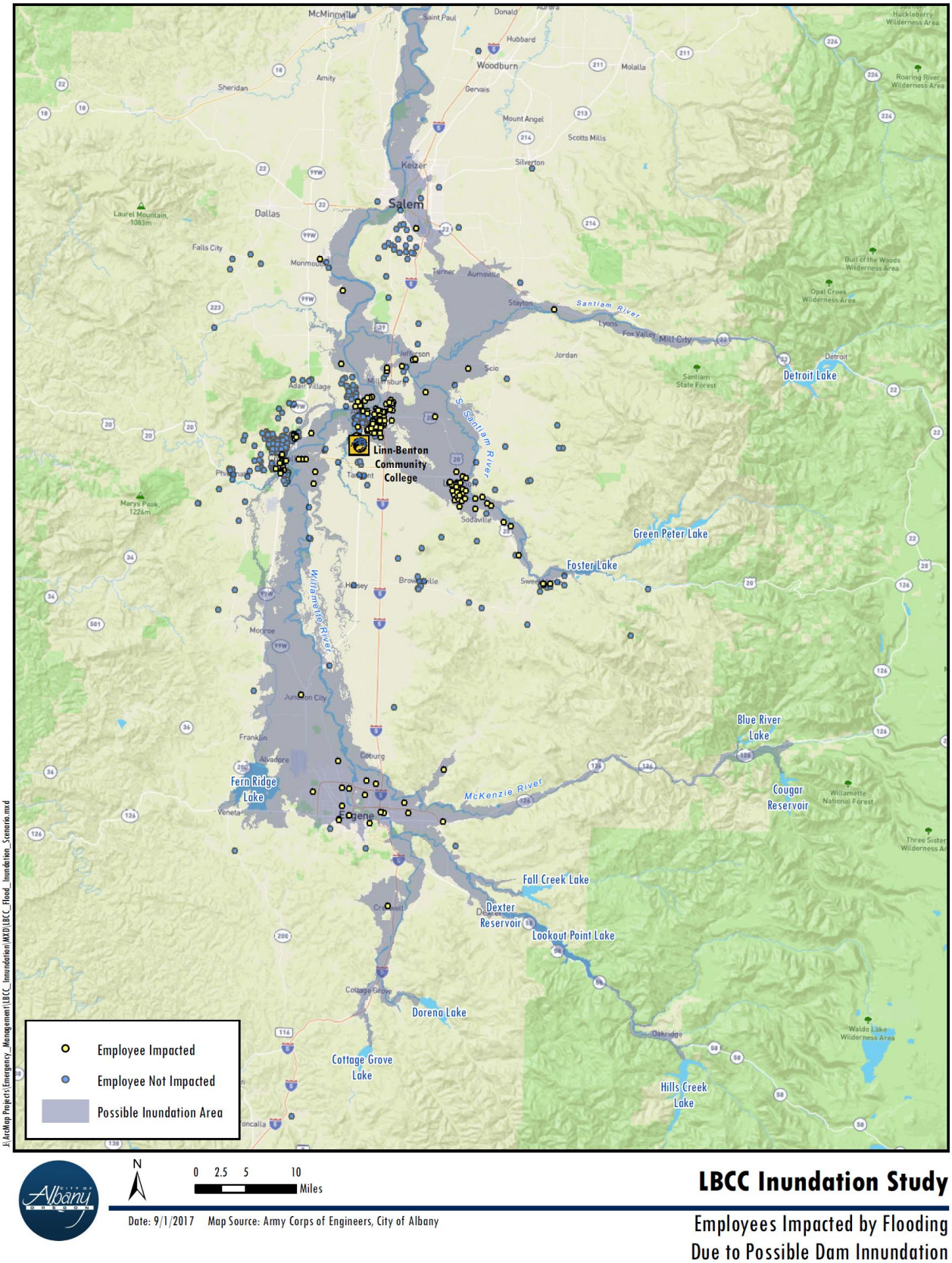
As identified by the Army Corps of Engineers, Foster and Green Peter have the potential for floodwaters to inundate various campus facilities. Timelines for evacuation are limited in some

associated areas. Employees need to be made aware and encouraged to plan for immediate and/or short-notice evacuation.

Dam Failure Times						
Location	**Map Number**	**Wave Cross Section**	**Arrival Time**	**Arrival Elevation**	**Peak Time**	**Peak Elevation**
South Santiam River						
Foster						
Sweet Home	1	A	**Normal High** 0 hr 11 min **Maximum** 0 hr 20 min	506.8 539.8	1 hr 0 min 1 hr 9 min	55.6
Waterloo, river mile 11	3	C	**Normal High** 1 hr 10 min **Maximum** 1 hr 11 min	404.2 437.0	2 hrs 19 min 2 hrs 19 min	441.9 450.5
Up river Lebanon, river mile 16	5	D	**Normal High** 1 hr 50 min **Maximum** 2 hrs 0 min	356.5 392.6	3 hrs 19 min 3 hrs 0 min	393.7 401.6
Lebanon	6	E	**Normal High** 2 hrs 10 min **Maximum** 2 hrs 20 min	330.6 361.0	4 hrs 9 min 3 hrs 39 min	361.7 367.4
River mile 25, Western Veneer Log Pond	9	F	**Normal High** 2 hrs 54 min **Maximum** 4 hrs 39 min	290.7 309.3	6 hrs 19 min 5 hrs 9 min	308.1 309.5
Crabtree, river mile 31	13	G	**Normal High** 3 hrs 51 min **Maximum** 7 hrs 0 min	247.6 267.3	9 hrs 39 min 7 hrs 49 min	265.2 267.5
River mile 36, Rio Robles Rd	14	H	**Normal High** 5 hrs 9 min **Maximum** 9 hrs 19 min	212.3 232.7	14 hrs 30 min 10 hrs 19 min	227.1 232.9
Albany	14a					
Albany	14c					
Albany	14d					
Albany	15					
Parson, river mile 40	17	I	**Normal High** 6 hrs 0 min **Maximum** 10 hrs 19 min	192.2 211.8	15 hrs 0 min 11 hrs 30 min	205.7 212.0
Green Peter						
Sweet Home	3	C	**Normal High** 0 hr 20 min **Maximum** 0 hrs 20 min	512.8 539.7	1 hr 9 min 1 hr 49 min	586.0 589.2
Waterloo, upstream, river mile 19	5	E	**Normal High** 1 hr 10 min **Maximum** 1 hr 10 min	399.1 427.3	3 hrs 0 min 3 hrs 0 min	465.9 468.9
Lebanon, upstream, river mile 23	7	F	**Normal High** 1 hr 40 min **Maximum** 1 hr 40 min	356.5 385.3	3 hrs 30 min 3 hrs 30 min	413.7 415.6
			Normal High			

Lebanon, river mile 26	8	G	2 hrs 0 min **Maximum** 2 hrs 19 min	332.2 361.5	4 hrs 0 min 3 hrs 49 min	377.7 379.1
River mile 32, Western Veneer Log Pond	13	H	**Normal High** 2 hrs 40 min **Maximum** 3 hrs 30 min	293.1 310.3	5 hrs 0 min 5 hrs 0 min	314.7 315.7
Albany	14					
Albany	14a					
Albany	15					
River mile 38, downstream of Crabtree	18	I	**Normal High** 3 hrs 49 min **Maximum** 5 hrs 39 min	247.2 261.2	7 hrs 19 min 7 hrs 19 min	263.2 263.3
River mile 44, Rio Robles Rd	19	J	**Normal High** 4 hrs 40 min **Maximum** 8 hrs 30 min	211.5 230.5	13 hrs 19 min 11 hrs 0 min	232.5 234.4
Albany	19a					
Albany	19c					
Albany	19d					
Albany	20					
Jefferson, river mile 48	22	K	**Normal High** 5 hrs 49 min **Maximum** 9 hrs 0 min	192.5 209.3	14 hrs 19 min 11 hrs 49 min	211.6 213.5
North Santiam River						
Big Cliff						
Upstream of Jefferson	10	F	**Normal High** 3 hrs 57 min	268.3	5 hrs 0 min	279.5
Albany	12					
Downstream of Jefferson	13	G	**Normal High** 5 hrs 46 min	193.1	7 hrs 19 min	199.6
Detroit						
Gates	4	C	**Normal High** 0 hrs 20 min	861.1	1 hr 0 min	973.7
Upstream of Lyons	6	D	**Normal High** 0 hrs 50 min **Maximum** 0 hrs 13 min	668.9 701.4	1 hr 39 min 1 hr 0 min	769.9 773.3
River mile 35	9	F	**Normal High** 2 hrs 12 min **Maximum** 2 hrs 2 min	377.6 401.7	3 hrs 30 min 2 hrs 39 min	421.2 423.5
River mile 44	13	H	**Normal High** 3 hrs 24 min **Maximum** 3 hrs 32 min	258.6 277.9	5 hrs 39 min 4 hrs 19 min	283.5 285.4
Albany	15					
Albany	16					
Albany	16a					
Albany	16c					
Albany	16d					
Parson, river mile 52.2	17	I	**Normal High** 4 hrs 50 min **Maximum** 4 hrs 39 min	193.1 214.3	7 hrs 39 min 6 hrs 30 min	224.7 226.1

Source: City of Albany



Source: City of Albany

HISTORY OF FLOODS AFFECTING LBCC

There are no documented natural floods that have occurred directly on the LBCC campuses. The main campus has experienced localized urban flooding impacting Parking Lot #4. This flooding is caused by the culvert stream located on campus. The culvert stream was created to divert storm water away from the main campus buildings. During severe storms when the storm water system is blocked or overwhelmed, there is potential for flooding in the parking lot.

The table below is a history of flood events that occurred in or impacted the local area as stated in the Linn County and City of Albany NHMPs. None of the events have impacted LBCC structures.

Date	Location	Characteristics	Flood Type
January 2012	Polk, Marion, Yamhill, Lincoln, Linn, Lane, and Benton Counties	Heavy rain and wind; ice (DR-4055); flooding in the Willamette Valley; 130 homes and seven businesses were damaged in the city of Turner; 29 streets were closed in the city of Salem; the state motor pool lost 150 vehicles and thousands of gallons of fuel; Thomas Creek in the city of Scio overtopped, damaging several buildings.	Riverine
December 2007	Polk County	Major flooding in Suver and other areas in Polk County; total losses equal $1 million for entire county.	Riverine
December 2007	Yamhill County	South Yamhill River flooded near McMinnville, causing damage to roads and bridges, 120 homes.	Riverine
January 2006	Willamette Valley	Heavy rains caused many rivers to crest above flood stage in the Willamette Valley, causing damage to roads and bridges.	Riverine
December 2005	Polk, Marion, Linn, Lane, and Benton County	Heavy rains causing rivers to crest above flood stage in Polk, Marion, Linn, Lane, and Benton Counties.	Riverine
November 1996	Entire state	Record-breaking precipitation; local flooding/landslides. (FEMA-1149-DR-OR).	Rain on snow
February 1996	Entire state	Deep snow pack, warm temperatures, record-breaking rains. Flooding, landslides, power outages. (FEMA-1099-DR-OR).	Rain on snow
February 1987	Western Oregon	Willamette River and tributaries: mudslides, damaged highways and homes.	Rain on snow
February 1986	Entire state	Severe statewide flooding. Raina and melting snow. Numerous homes flooded and highways closed.	Snow melt
December 1978	Western Oregon	Intense heavy rain, snowmelt, saturated ground. One fatality in Region 3 (Benton County).	Rain on snow
January 1974	Western Oregon	Flooding followed heavy, wet snow and freezing rain. Nine counties received Disaster Declaration.	Rain on snow
December 1964 – January 1965	Willamette Basin	Record flooding throughout Willamette Basin. Two intense storms. Near record early season snow depths. Largest flood in Oregon since dam construction on upper Willamette (1940s-50s).	Rain on snow
January 1953	Western Oregon	Widespread flooding in western Oregon accompanied by windstorm.	Rain on snow

December 1937	Western Oregon	Flooding followed heavy rains. Considerable highway flooding; landslides.	Rain on snow
February 1890	Willamette Basin and coastal rivers	Second largest flood in the Willamette Basin. Almost every large bridge was washed downstream.	Rain on snow
December 1861	Willamette basin and coastal rivers	Proceeded by two weeks of heavy rain. Every town on the Willamette flooded or washed away.	Rain on snow; snow melt

Source: Oregon State NHMP; Local NHMPs.

RISK ASSESSMENT

PROBABILITY OF FUTURE OCCURRENCE

The historical incidence of flooding events resulting in substantial losses indicates that significant flooding events are likely within a 10-15 year range—well within the 35-year range used for high likelihood incidents. The committee determined that the probability of flooding is medium, meaning that one event is likely in a 10-35 year period.

VULNERABILITY ASSESSMENT

Given that LBCC locations do not exist in any FEMA identified flood plains, the vulnerability to natural flooding is low to non-existent. The committee rated the college's vulnerability to flood as moderate, meaning that more than 1-10% of the college's population, property, and equipment would be impacted by a flood.

RISK ANALYSIS

The committee determined that the history of flood events is medium. The maximum threat of a flood is also medium, considering the percentage of population and property that could be impacted under a worst-case scenario.[28]

Floods in the past caused few injuries and no deaths. The potential for future injuries or deaths is anticipated to remain similar to historic events. It is estimated that a small percentage of the LBCC population would be physically displaced by a flood, and there would be moderate impact on community social networks.

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Flood	4.5	Medium	4.5	Medium	5.8	Medium	5.3	Medium	126.6
Dam Failure	2.0	Low	5.0	Medium	5.2	Medium	2.5	Medium	98.5

Source: LBCC NHMP Steering Committee, 2017

[28] LBCC NHMP Steering Committee, 2017

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

UTILITY FAILURE

Utility failure can be the result of flooding and intense storm water runoff. Even though LBCC campuses may not be directly impacted by flooding, community infrastructure such as sewer, storm water, and drinking water systems may be vulnerable to flooding. If city utility systems are overwhelmed and/or contaminated by untreated water, these circumstances can affect operations at LBCC and satellite locations.

HAZARDOUS MATERIALS

The primary concern of hazardous materials in terms of flood hazards considers the impact of hazardous materials on drinkable water sources. If high floodwaters leach chemicals into city water resources, LBCC's water supply would also be jeopardized.

EXISTING HAZARD MITIGATION ACTIVITIES

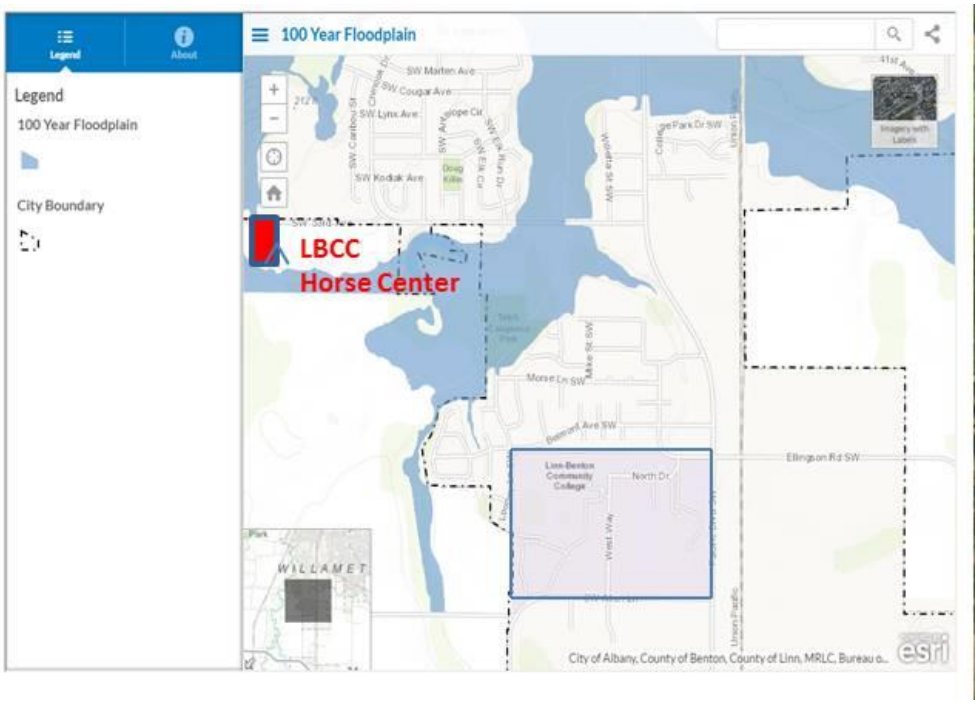
LBCC does not currently conduct any flood hazard mitigation activities.

FLOOD MITIGATION ACTION ITEMS

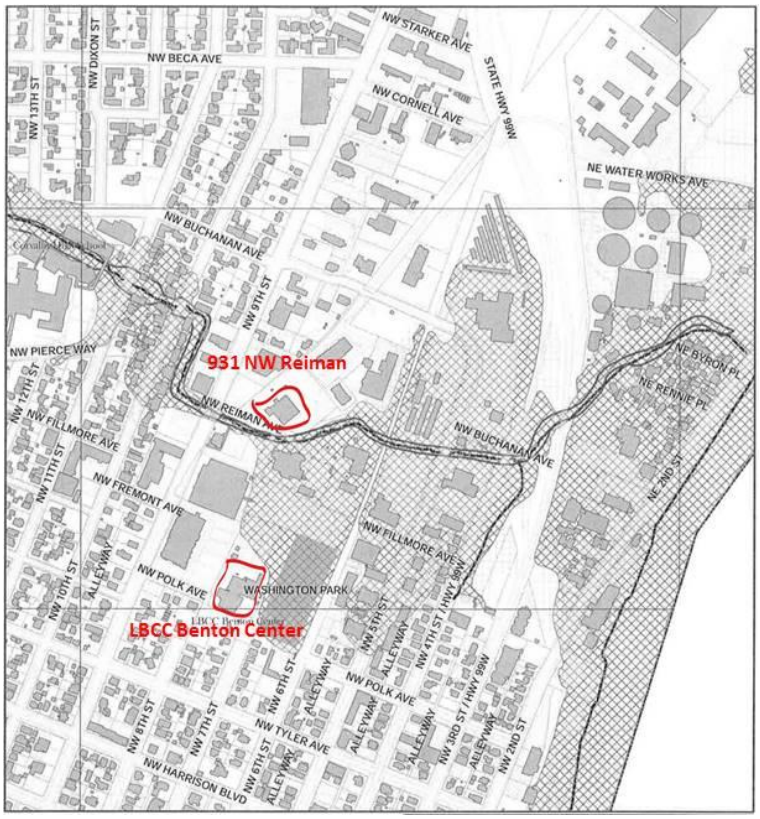
The following actions have been identified by the committee and are recommended for mitigating the potential effects of floods on LBCC campuses:.

- FL#1: Employee outreach and continuity plan associated with transportation issues in a flood event.
    - DF #1: Coordinate with Linn and Benton County Emergency Management to develop an evacuation plan for all LBCC campuses in the event of dam failure.
    - DF #2: Coordinate with Linn, Benton, and Lane County Emergency Management to develop a dam failure notification procedures for all LBCC campuses.

CITY OF ALBANY FLOODPLAIN MAP



CITY OF CORVALLIS FLOODPLAIN MAP (FOR BENTON CENTER PROPERTIES)

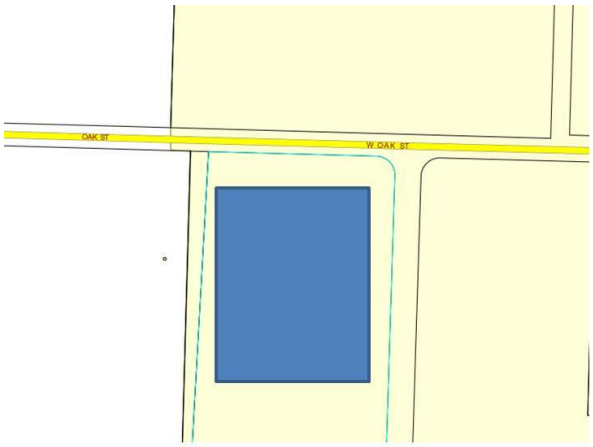


LINN COUNTY FLOODPLAIN MAP (FOR LEBANON CENTERS)

44 Industrial Way – Lebanon Center

Source: Linn County Floodmap Application

300 Mullins Dr., Lebanon – Health Occupations Building



Source: Linn County Floodmap Application

2000 W. Oak, Lebanon – Advance Transportation Technology Center

WILDFIRE

CAUSES AND CHARACTERISTICS OF WILDFIRE

Wildfires occur when natural fuel sources ignite and burn out of control. A wildland fire's main fuel source is natural vegetation. Often referred to as forest or rangeland fires, these fires occur in national forests and parks, private timberland, and on public and private range and agricultural lands. A wildland fire can become an interface fire if it encroaches on developed areas.

INTERFACE FIRES

Interface fires occur where wildland and developed areas come together with both vegetation and structural development combining to provide fuel. The wildland/urban interface (also referred to as the WUI or rural interface in small communities) can be divided into three categories:

- The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas.
- The mixed wildland/urban interface is more typical of the problems in areas of exurban or rural development: isolated homes, subdivisions, resorts, and small communities situated in predominantly in wildland settings.
- The occluded wildland/urban interface where islands of wildland vegetation exist within a largely urbanized area.

LBCC is most concerned with the occluded variety. The main campus is surrounded by agricultural lands to the east and southwest, and the campus itself has wooded areas and extensive grass lawns.

CONDITIONS CONTRIBUTING TO WILDFIRES

Ignition of a wildfire may occur naturally from lightning or from human causes, such as debris burns, arson, careless smoking, and recreational activities, and industrial accident. Once started, four main conditions affect the fire's behavior: fuel, topography, weather, and development.

FUEL

Fuel is the material that feeds a fire and is classified by volume and type. As a western state, Oregon is prone to wildfires due to its prevalent conifer, brush, and rangeland fuel types.

TOPOGRAPHY

Topography influences the movement of air and directs a fire's course. Slope and hillsides are key factors in fire behavior.

WEATHER

Weather is the most variable factor affecting wildfire behavior. High-risk areas in Oregon share a hot, dry season in late summer and early fall with high temperatures and low humidity.

DEVELOPMENT

The increase in residential development in interface areas has resulted in greater wildfire risk. Fire has historically been a natural wildland element and can sweep through vegetation that is adjacent to a combustible home.

HISTORY OF WUI FIRE AT LBCC

There is no history of wildfire impacting any of LBCC's campus locations.

RISK ASSESSMENT

While LBCC does maintain a fire plan, the college has not developed a specific wildfire management plan. LBCC may not need a full-fledged management plan but could consider implementing certain mitigation measures to reduce the risk of off campus wildfires impacting campus infrastructure or facilities. The committee conducted a basic wildfire risk assessment through group expertise and a map of potential hazard areas on campus. A wildfire risk assessment includes the following factors:

RISK:

The potential and frequency for wildfire ignitions (based on past occurrences).

HAZARD:

The conditions that may contribute to wildfire (fuels, slope, aspect, elevation, and weather).

VALUES:

The people, property, natural resources, and other resources that could suffer losses in a wildfire event.

PROTECTION CAPABILITY:

The ability to mitigate losses as well as prepare for, respond to, and suppress wildland and structural fires.

STRUCTURAL VULNERABILITY:

The elements that influence the level of exposure of the hazard to the structure (roof type and building materials, access to the structure, and whether or not there is defensible space or fuels reduction around the structure).

The overall risk for wildfire is low, and the potential vulnerability of structures and property is minimal.

PROBABILITY OF FUTURE OCCURRENCE

The probability of future wildfires affecting LBCC campuses is low. The main threat of wildfire comes from the surrounding agricultural lands and unmanaged, empty grass lots. Since LBCC maintains a well-landscaped property and there are major roads that act as fuel breaks, there is a very low chance of a WUI fire affecting LBCC property, structures, or people on main campus. The Advanced Transportation Technology Center is located adjacent to open fields, and these areas could be a potential exposure to wildfire dangers. However, LBCC does maintain gravel and paved driveways and parking lots around the perimeter of the buildings to act as a fire buffer zone.

Based on LBCC's historical incidence of wildfire events, the committee determined that the probability of wildfire is low, meaning one to no wildfires are likely to occur in a 100-year period.

VULNERABILITY ASSESSMENT

Considering few areas located on the perimeter of the main campus and centers are considered at risk to wildfires, the committee determined that the college has a low vulnerability to wildfire, meaning that under 10% of the college's population, property, and equipment would be impacted.

RISK ANALYSIS

The committee determined that the history of wildfire is low, with less than three events occurring over the last 100 years. The maximum threat of wildfire is also low, considering the percentage of population, property, and equipment that could be impacted under a worst-case scenario.[29]

Wildfires in the past have caused no personal injury or death. However, the potential for injuries or deaths from past events could escalate, resulting in multiple minor injuries or possible major injury. There would be minimal impact on community social networks.[30]

A few facilities throughout the main campus (the Horse Center and the Advanced Transportation Technology Center) could anticipate minimal damage due to wildfires, estimated at a low cost for hazard response, structural repairs, and equipment replacement. In terms of campus operations, it is likely that less than 10% of operations could experience interruption for a period of hours. The operations most impacted are those located within the few wood frame structures.

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Wildfire	2.3	Low	2.8	Low	3.2	Low	2.8	Medium	70.2

Source: LBCC Steering Committee

[29] LBCC. NHMP Steering Committee. 2017.
[30] bid.

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

LBCC's wildfire risk is characterized by a mixture of overgrown grassland, well-landscaped grounds, paved roads, and few urban structures. In the event of a wildfire, vegetation, structures, and other flammables can merge into unwieldy and unpredictable events. Factors germane to the fighting of such fires include access, firebreaks, proximity of water sources, distance from a fire station, and available firefighting personnel and equipment. Structures are typically destroyed or damaged for one or more of the following reasons:

- Combustible roofing material;
- Wood construction;
- Structures with no defensible space;
- Fire department with poor access to structures;
- Limited water supply; and
- Winds over 30 miles per hour.

Of particular concern to LBCC are the few wooden buildings located throughout campus and the wooded areas where the Wellness Trail winds through campus.

The committee identified a few areas vulnerable to WUI fire hazards. The areas with the highest risk are characterized by unmaintained grasslands located near the Advanced Transportation Technology Center and the Horse Center.

EXISTING HAZARD MITIGATION ACTIVITIES

The Grounds & Maintenance Department maintains the grounds around vulnerable structures, keeping grass cut, trees trimmed, and driveway buffers clear, which helps reduce the risk of wildfire.

WILDFIRE MITIGATION ACTION ITEMS

The following action has been identified by the committee and is recommended for mitigating the potential effects of wildfire on the main campus:

- WF#1: LBCC shall, on an ongoing basis, create defensible space around all property and structures vulnerable to wildfire.

WINDSTORM

CAUSES AND CHARACTERISTICS OF WINDSTORMS

Extreme winds occur throughout Oregon. The most persistent high winds take place along the Oregon Coast and in the Columbia River Gorge. West winds generated from the Pacific Ocean are strongest along the coast and slow down inland due to the obstruction of the Coastal Mountain Range.[31] Prevailing winds in Oregon vary with the seasons. In summer, the most common wind directions are from the west or northwest; in winter, they are from the south and east. Local topography, however, plays a major role in affecting wind direction. For example, the north-south orientation of the Willamette Valley channels the wind most of the time, causing predominantly north and south winds.[32]

Although rare, tornadoes can and do occur in Oregon. Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating winds and strong vertical motion, which possess remarkable strength and cause widespread damage. Wind speeds in excess of 300 mph have been observed within tornadoes, and it is suspected that some tornado winds exceed 400 mph. The low pressure at the center of a tornado can destroy buildings and other structures it passes over. Tornadoes are most common in the Midwest and are more infrequent and generally small west of the Rockies. Nonetheless, Oregon and other western states have experienced tornadoes on occasion, many of which have produced significant damage and occasionally injury or death. Oregon's tornadoes can be formed in association with large storms arriving from the west. Most of them, however, are caused by intense local thunderstorms. These storms also produce lightning, hail, and heavy rain and are more common during the warm season from April to October.[33]

HISTORY OF WINDSTORMS AFFECTING LBCC

Windstorms have historically been a threat to Willamette Valley. Windstorm events over the last century are listed in the table below.

Date	Comments
December 2012	A Pacific cold front brought strong southerly winds to the North and Central Oregon Coast. Weather spotter near Lebanon reported peak wind gusts of 62 knots (71mph).
February 2006	A windstorm with gusts up to 77mph caused $227,000 in damages in Linn, Lane, Marion, Benton, Polk, and Yamhill counties.
January 2005	Windstorms caused $6,000 worth of property damage in Linn and Marion Counties. A total of $15,000 in damages was spread out among Linn, Marion, Clackamas, Multnomah, and Washington counties.

[31] US Department of Agriculture. http://www.fsa.usda.gov/or/Notice/Flp104.pdf
[32] Statesman Journal. February 8, 2002.
[33] Taylor, George H., Holly Bohman, and Luke Foster. August 1996. A History of Tornadoes in Oregon. Oregon Climate Service. Corvallis, OR: Oregon State University. http://www.ocs.orst.edu/pub_ftp/reports/book/tornado.html

February 2002	Strongest winds in 40 years in parts of Linn and eastern Lane counties. Wind gusts of 50-70mph caused trees to fall and damage homes, cars, and businesses.
November 1997	Wind speeds of 52mph in Willamette Valley. Trees uprooted. Considerable damage to small airports.
December 1995	Followed path of Columbus Day Storm. Wind speeds of 62mph in Willamette Valley. Damage to trees (saturate soil a factor) and homes. (FEMA-1007-DR-OR).
January 1990	Heavy rain with winds exceeding 75mph; significant damage; one fatality.
November 1981	Highest winds since October 1962. Wind speed of 71mph in Salem. Marinas, airports, and bridges severely damaged.
March 1971	Greatest damage in Willamette Valley. Homes and power lines destroyed by failing trees. Destruction of timber in Lane County.
October 1962	Columbus Day Storm. Oregon's most destructive storm to date. 116mph winds in Willamette Valley. Estimated 84 houses destroyed with 5,000 severely damaged. Total damage estimated at $170 million.
November 1958	Wind speeds of 51mph, with 71mph gusts. Every major highway blocked by fallen trees.
December 1955	Wind speeds of 55-66mph, with 69mph gusts. Considerable damage to buildings and utility lines.
December 1951	Wind speeds of 60mph in Willamette Valley, with 75mph gusts. Damage to building and utility lines.
November 1951	Widespread damage to transmission and utility lines. Wind speeds of 40-60mph, with gusts of 75-80mph.
April 1931	Unofficial wind speeds reported at 78mph. Damage to fruit orchards and timber.

Source: Linn County NHMP

The following table describes known tornadoes occurring throughout the area. Tornadoes impacting the Willamette Valley have resulted collectively in over $1 million in property damage since 1960. Oregon is not among the 39 states with any reported tornado deaths since 1950.

Date	County	Result
April 2015	Lane	Three vehicles damaged at Lane Community College in Eugene.
June 2013	Yamhill	EF-1 tornado touched down in McMinnville. Tree damage and wind-thrown industrial equipment.
December 2010	Marion	EF-2 tornado with five-mile path 150 yards wide caused $1/2 million on damage in Aumsville. Two minor injuries.
June 2009	Linn	Damage to shed near Peoria.
September 2007	Linn	Six farm buildings damaged near Lebanon. 90 to 100 trees damaged.
December 2006	Marion	Damage to barn and RV northeast of Salem.
December 1999	Lane	Roof damage and mill slash burner tipped over in Creswell. One unconfirmed injury.
October 1998	Marion	Observed in Silverton. No damage or injury.
September 1997	Marion	Minor fence and window damage near Turner.
June 1997	Benton	Observed by pilot 15 miles west of Albany. No known damage.

May 1997	Marion	Trees uprooted and barn damage near Keizer.
December 1996	Lane	Damage to a residential area caused by fallen trees.
March 1994	Linn	Damage to a shopping area in Albany.
November 1991	Marion	Barn damaged near Silverton.
May 1990	Linn	Three funnel clouds spotted near Albany; no confirmation of touchdown.
November 1989	Lane	Telephone poles and trees uprooted near Eugene.
May 1984	Lane	Barn and shelter damaged near Junction City.
April 1984	Yamhill	Barn roof destroyed.
August 1978	Yamhill	Minor damage near Albany.
August 1975	Lane	Metal building destroyed near Eugene.
May 1971	Yamhill	House and barn damaged near McMinnville.
March 1960	Marion	Several farms damaged near Aumsville. Trees uprooted.
January 1953	Benton	Observed. No damage.
December 1951	Lane	Barn destroyed.
September 1938	Linn	Observed in Brownsville. No damage.
February 1926	Polk	House and trees damaged.
November 1925	Polk	Buildings, barns, and fruit trees damaged.
January 1887	Lane	Fences damaged, livestock losses, trees uprooted.

Source: Linn County NHMP

RISK ASSESSMENT

HOW ARE HAZARDS IDENTIFIED?

Windstorms throughout the Willamette Valley usually occur from October to March, and their extent is determined by their track, intensity (the air pressure gradient they generate), and local terrain.[34] They are primarily identified by the National Weather Service. The National Weather Service uses weather forecast models to predict oncoming windstorms while monitoring storms with weather stations in protected valley locations throughout Oregon.[35]

PROBABILITY OF FUTURE OCCURRENCE

The hazard history section details 25 severe windstorms and/or tornadoes affecting the Willamette Valley in the last 87 years. While other storms could have been included with more background information available, those included average out to one windstorm or tornado every 3.4 years.

[34] State of Oregon Natural Hazards Mitigation Plan. Oregonshowcase.org, March 2006.
[35] "Some of the Area's Windstorms." National Weather Service, Portland.

The committee determined that based on this information, the probability of a windstorm occurring is high, meaning that LBCC will be affected by multiple and severe windstorms and/or a tornado within 10-35 years.

VULNERABILITY ASSESSMENT

Windstorms can cause power outages, transportation, and economic disruptions. Fallen trees and debris are common and can block roads for long periods as well as bring down power and/or utility lines. All of these factors have the potential to interrupt educational and community services on campus. In addition, tree fall is especially dangerous to pedestrians and bicyclists traveling throughout the LBCC campuses. As noted in the hazard history section above, almost all major windstorms throughout the Willamette Valley have caused some damage to property.

The committee determined that the campus vulnerability to windstorms is high, meaning that more than 10% of the population, property, and equipment would be affected by a windstorm.

RISK ANALYSIS

The committee determined that the history of windstorm events is medium, with at least four events occurring over the last 100 years. The maximum threat of a windstorm is also medium, considering the percentage property that could be impacted under a worst-case scenario.[36]

Windstorms in the past caused multiple minor injuries. However, the potential for injuries or deaths from past events or from similar events in other communities could escalate, resulting in multiple major injuries or possible death.

Windstorms have the potential to inflict power outages; until power can be restored, campus activity and business may experience interruption. In addition, the hundreds of large trees scattered throughout campus pose a threat to buildings, utilities, vehicles, and pedestrians.

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Windstorm	5.2	Medium	5.2	Medium	5.0	Medium	5.8	Medium	127.0

Source: LBCC NHMP Steering Committee, 2017

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

The damaging effects of windstorms may extend for distances of 100 to 300 miles from the center of storm activity. Positive wind pressure is a direct and frontal assault on a structure, pushing walls, doors, and windows inward.

[36] LBCC NHMP Steering Committee. 2017.

Negative pressure also affects the sides and roof; passing currents create lift and suction forces that act to pull building components and surfaces outward. The effects of winds are magnified in the upper levels of multi-story structures. As positive and negative forces impact and remove the building protective envelope (doors, windows, and walls), internal pressures rise and result in roof or leeward building component failures and considerable structural damage. Buildings adjacent to open fields or trees are also more vulnerable to wind storms than more protected structures.

Windstorms can also result in damaged or blocked roads and bridges, downed utility lines, and damaged traffic signals and streetlights, among other impacts that may inhibit campus accessibility. Campus activities can suffer losses from interruptions in electric service and from extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment.

Wind Speed (mph)	Wind Effects
25-31	Large branches will be in motion.
32-38	Whole trees in motion; inconvenience felt walking against the wind.
39-54	Twigs and small branches may break off trees; wind generally impedes progress when walking; high profile vehicles such as truck and motor homes may be difficult to control.
55-74	Potential damage to TV antennae; may push over shallow rooted trees, especially if the soil is saturated.
75-95	Potential for minimal structural damage, particularly to unanchored mobile homes, power lines, and signs, and tree branches may be blown down.
96-110	Moderate structural damage to walls, roofs, and windows; large signs and tree branches blown down; moving vehicles pushed off roads.
111-130	Extensive structural damage to walls, roofs, and windows; trees blown down; mobile homes may be destroyed.
131-155	Extreme damage to structures and roofs; trees uprooted or snapped.
Greater than 155	Catastrophic damage; structures destroyed.

Source: Washington County Office of Consolidated Emergency Management

UTILITY FAILURE

Utility failure can often be the result of severe windstorms. Overhead power lines can be damaged even in relatively minor windstorm events and are vulnerable to flying debris. Utility failure includes the loss or disruption of any primary energy source and/or utility source needed to maintain operations at LBCC and satellite locations. The primary sources of energy used at LBCC include electricity, natural gas, oil, and gas. Other utilities to consider include heating, cooling, water, and sewage. Utility disruptions can have a major impact on LBCC's ability to operate and provide adequate safety to students and employees.

Since LBCC mainly relies on the local civic government and private companies for energy and utilities, failures affecting LBCC may be outside of campus control. The magnitude and severity of a utility failure is dependent on a series of factors, such as time of year, temperature, community priorities, and vulnerable populations.

EXISTING HAZARD MITIGATION ACTIVITIES

LBCC has taken a number of actions to mitigate the potential damage caused by windstorms:

- Identify and catalogue all campus trees that may pose a significant threat to campus critical infrastructure and pedestrian safety in the event of a winter or windstorm.
- Develop a hazardous tree policy for how to manage hazard prone trees in specifically high pedestrian use areas.
- Identify safe pedestrian access routes throughout the main campus that will be put into effect during a severe winter and/or windstorm.
- Make tree hazard and safe pedestrian route maps available from the LBCC Public Safety webpage.

Many of the identified campus action items apply to both windstorms and winter storms even though each type of hazard has different effects and histories.

WINDSTORM MITIGATION ACTION ITEMS

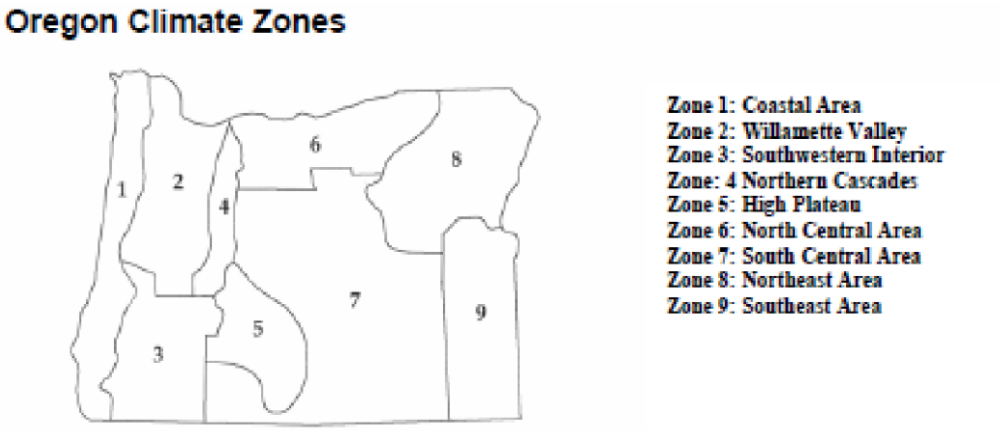
The following actions have been identified by the committee and are recommended for mitigating the potential effects of windstorms throughout LBCC campuses. Please note: the following action items are referring to as "Severe Storm," which could refer to either winter and/or windstorms.

- SW #1: Identify and catalogue all campus trees that may pose a significant threat to campus critical infrastructure and pedestrian safety in the event of a winter or windstorm.
- SW#2: Identify hazardous trees at the centers and map safety issues.

CAUSES AND CHARACTERISTICS OF WINTER STORM

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Linn and Benton Counties typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.[37]

The National Climatic Data Center has established climate zones in the United States for areas that have similar temperature and precipitation characteristics. Oregon's latitude, topography, and proximity to the Pacific Ocean give the state diversified climates. Linn and Benton Counties, home to LBCC facilities, are in Zones 2 and 4, which generally consist of wet winters and dry summers.[38]



Source: Taylor, George H. and Hannan, Chris. The Oregon Weather Book, OSU Press (1999).

While snow is relatively rare in western Oregon, the break in the natural Cascades barrier at the Columbia Gorge provides a low-level passage through the mountains. Cold air, which lies east of the Cascades, often moves westward through the gorge and funnels cold air into the Portland area, which can then can sink southward into the Willamette Valley. If a wet Pacific storm happens to reach the area at the same time that cold air is present, larger than average snow events may result.

Ice storms occasionally occur in northern areas of Oregon, resulting from cold air flowing westward through the Columbia Gorge. Like snow, ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation, including freezing rain, sleet, and hail. Freezing rain can be the most damaging of ice formations. While sleet and hail can create hazards for motorists when it accumulates, freezing rain can cause the most dangerous conditions within a community. Ice buildup can bring down trees, communication towers, and wires, creating hazards for property owners, motorists, and pedestrians alike. The most common

[37] Interagency Hazard Mitigation Team. 2000. State Hazard Mitigation Plan. Salem, OR: Oregon State Police – Office of Emergency Management
[38] National Weather Service, Portland Bureau. March 2001.

freezing rain problems occur near the Columbia Gorge but also pose a hazard to Linn and Benton Counties.

HISTORY OF WINTER STORMS AFFECTING LBCC

Destructive storms, producing heavy snow and ice, have occurred throughout the Willamette Valley. The most significant storms that have affected the City of Albany are listed below, followed by the significant storms for the entire Willamette Valley.

	City of Albany	
Dates	**1-Day Amount**	**Storm Total**
February 7-9, 2014		5-9”
December 2003-January 2004	4”	2-8”
Winter 1998-1999		2-5”
February 1993	6”	10-12”
February 14-16, 1990		6-8”
February 1-8, 1989		6-8”
December 29, 1971	1”	15”
January 25-31, 1969		24-30”
January 9-18, 1950		55”
January 31-February 4, 1937	16”	30”
December 9-11, 1919	10”	26”
January 11-15, 1916		5-8”
January 5-10, 1909	4”	12”
December 20-23, 1892	9”	15”
December 16-18, 1884	16”	19”

Source: City of Albany Natural Hazard Mitigation Plan and Data for City of Albany from Western Regional Climate Center

Date	Comments
December 2008	A prolonged snowstorm hit the region during the 2008-2009 winter season. Portland airport received a record 1.9 inches. A disaster declaration was made on March 2, 2009 for this winter storm and its associated landslides and mudslides.
December 2003 – January 2004	The storm resulted from the collision of a mass of moisture from the Pacific with an arctic cold front. Climatologists considered this the worse storm to hit the west side of Oregon’s Cascade Range since 1992. This was a typical storm for the Cascade region but relatively rare on the valley floor where impacts were severe. Wet snow blanketed highways into the valley, causing power lines and trees to topple. Oregon 34 east of Philomath was closed for 30 hours while crews removed trees for two days.
Winter 1989	Series of storms. One of the snowiest winters in Oregon history.
February 1989	The February 1989 storm dropped seven inches of snow on the region and saw temperatures as low as zero degrees Fahrenheit with a wind-chill factor dipping to 75

	degrees below zero. The storm led to accidents on Interstate 5 that closed the highway between Salem and Albany.
December 1985	Heavy snowfall throughout the Willamette Valley.
February 1985	Western valleys received between 2-4 inches of snow; massive power failures.
January 1980	A series of storms bringing snow, ice, wind, and freezing rain. Six fatalities.
March 1960	3-12 inches of snowfall, depending on location. This storm was responsible for two fatalities in Oregon and 100 storm-related accidents. In addition, most schools were closed for several days.
January 1957	The cold weather in January 1957 was the result of an arctic air mass that moved into Eastern Oregon and spread west toward the coast. The cold temperatures brought multiple inches of snow to the Willamette Valley, and temperatures were in the mid-teens. The cold temperature also caused the Bonneville Power Authority to cut interruptible power to the region's industrial customers because ice in the dam slowed water flow and limited the ability to generate power.
January 1950	The entire month of January 1950 was cold and frequent snowstorms occurred statewide, including snowfall, precipitation, and freezing rain. Many highway closures. Considerable property damage.
January 1937	The winter storms of January 1937 broke an 18-year record for snowfall. Many major roads were closed and residents of Detroit and Mill City were stranded for five days as heavy snow and a landslide blocked a connecting highway.
December 1924	Temperature stayed near or below the freezing mark for 11 days. Most streams and rivers were frozen and blocked with ice, including the Willamette River. In addition to the cold weather, four inches of snow fell over much of the Willamette Valley.
December 1919	The December 1919 snowstorm was recorded as the third heaviest snowfall-producing storm in Oregon. The Columbia River froze over, closing the river to navigation from the confluence with the Willamette River upstream. The snowstorm affected nearly every part of the state with heavy snow falling over a widespread area. Corvallis received 22 inches of snow and set an all-time low temperature record of 14 degree Fahrenheit.
January 1916	This winter storm affected the entire state, with heavy snow accumulation in the Cascades. Every reporting station in western Oregon, except the southwestern interior and the coastal areas, recorded storm totals of at least five inches, and most locations had eight inches or more.

Source: Oregon State NHMP, Region 3 Profile and Natural Hazard Assessment

RISK ASSESSMENT

HOW ARE HAZARDS IDENTIFIED?

All of the LBCC campuses are vulnerable to winter storms. When these winter storms occur, the effects are not localized; they typically extend region-wide. The magnitude or severity of winter storms is determined by a number of meteorological factors, such as the amount and extent of snow or ice, air temperature, wind speed, and event duration.

Precipitation, an additional element of winter storms, is measured by gauging stations. The Portland Bureau of the National Weather Service monitors the stations and provides public warnings on storm, snow, and ice events as appropriate.

PROBABILITY OF FUTURE OCCURRENCE

The Willamette Valley has experienced 15 severe winter storms in the last 100 years, in the form of snow, ice, or severe cold. This averages out to one severe winter storm every seven years. The committee determined that the probability of a severe winter storm affecting LBCC is high, meaning that LBCC will likely experience multiple, severe winter storms within 10-35 years.

VULNERABILITY ASSESSMENT

Severe winter storms can cause power outages, create transportation and economic disruptions, and pose a high risk for injuries and loss of life. Linn and Benton Counties have suffered severe winter storms in the past that brought economic hardship and affected the life and safety of community residents, including the students, staff, and faculty of LBCC.

The committee determined that the vulnerability of a severe winter storm to LBCC campuses is high, meaning more than 10% of the population, facilities, equipment, and campus operations would be impacted by a severe winter storm.

RISK ANALYSIS

The committee determined that the history of winter storm events is high, with at least four events occurring over the last 100 years. The maximum threat of a winter storm is also medium, considering the percentage of population and property that could be impacted under a worst-case scenario.[39]

Winter storms in the past caused multiple minor or major injuries. The potential for future injuries is anticipated to remain similar to historic events. There would be moderate impact on LBCC social networks due to poor driving conditions.

Several facilities throughout the main campus anticipate mild damage due to winter storms. In terms of campus activity, it is likely that LBCC could experience campus operations interruption for a period of days until driving conditions improve, resulting in temporary school closure. Winter storms will likely have the greatest impacts on the transportation system, as snow and ice can cause dangerous driving conditions. Lastly, winter storms could likely have extensive impacts on vehicles, pedestrians, and trees. Hundreds of trees cover the main campus. During winter storms, these trees can pose a threat through falling branches, ice, and snow. In addition, icy sidewalks can create pedestrian hazards as sidewalks are the major method of access to campus buildings beyond the parking lot.

[39] LBCC NHMP Steering Committee.,2012.

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Windstorm	8.3	High	7.0	High	5.7	Medium	7.2	Medium	159.0

Source: Source: LBCC NHMP Steering Committee, 2017

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

Winter storms bring snow, ice, and high winds and can cause significant impacts on life and property. Ice, wind, and snow can affect the stability of trees, power, and telephone lines. Downed trees and limbs can become major hazards for cars, utilities, pedestrians, and campus property. Subfreezing temperatures can also lead to breaks in uninsulated water lines, leaving campuses without adequate supply. Such damage in turn can become major obstacles to providing critical emergency response, police, fire, and other disaster recovery services to LBCC facilities.

Severe winter weather also can cause the temporary closure of key roads and highways, restricting access and making for hazardous commutes. All of these effects, if lasting more than several days, can create significant economic impacts for LBCC and the surrounding region.

UTILITY FAILURE

Utility failure can often be the result of severe winter storms. Failure includes the loss or disruption of any primary energy source and/or utility source needed to maintain operations at LBCC and satellite locations. The primary sources of energy used at LBCC include electricity, natural gas, oil, and gas. Other utilities to consider include heating, cooling, water, and sewage. Utility disruptions can have a major impact on LBCC's ability to operate and provide adequate safety to students and employees.

Since LBCC mainly relies on the local civic government and private companies for energy and utilities, failures affecting LBCC may be outside of campus control. The magnitude and severity of a utility failure is dependent on a series of factors, such as time of year, temperature, community priorities, and vulnerable populations.

EXISTING HAZARD MITIGATION ACTIVITIES

LBCC has taken a number of actions to mitigate the potential damage caused by windstorms.

- Identify and catalogue all campus trees that may pose a significant threat to campus critical infrastructure and pedestrian safety in the event of a winter or windstorm.
- Develop a hazardous tree policy for how to manage hazard prone trees in specifically high pedestrian use areas.

- Identify safe pedestrian access routes throughout the main campus that will be put into effect during a severe winter and/or windstorm.
- Make tree hazard and safe pedestrian route maps available from the LBCC Public Safety website.

Many of the identified campus action items apply to both windstorms and winter storms even though each type of hazard has different effects and histories.

WINTER STORM MITIGATION ACTION ITEMS

Actions identified by the committee to further mitigation of the potential effects of winter storms on LBCC campus and satellite locations are listed under "Severe Storm," which could refer to either winter and/or windstorm.

VOLCANOES

CAUSES AND CHARACTERISTICS OF VOLCANIC ERUPTION

The Pacific Northwest lies within the "ring of fire," an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth's tectonic plates. The Earth's outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth's mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates, and volcanic eruptions occur when the hotter, molten materials (or magma) rise to the surface. In Oregon, volcanic activity can be found along the Cascade Range, which was formed by the Juan de Fuca plate sinking beneath the North American plate.[40]

The primary threat to lives and property from active volcanoes is from violent eruptions that unleash tremendous blast forces, generate mud and debris flows, and produce flying debris and ash clouds. The immediate danger area in a volcanic eruption generally lies within a 20-mile radius of the blast site. The location of LBCC and its satellites means volcanic eruptions only pose one real threat: ash fall. As a result, only ash fall will be discussed in terms of volcanic hazards.

ASH FALL

One of the most serious hazards from an eruption is the rock and dust-sized ash particles—called tephra—blown into the air. The tephra can travel enormous distances and are a serious by-product of eruptions. Within a few miles of the vent, the main tephra hazards include high temperatures as well as the risk of being buried and being hit by falling fragments. Within twelve miles, tephra may set fire to forests and flammable structures.

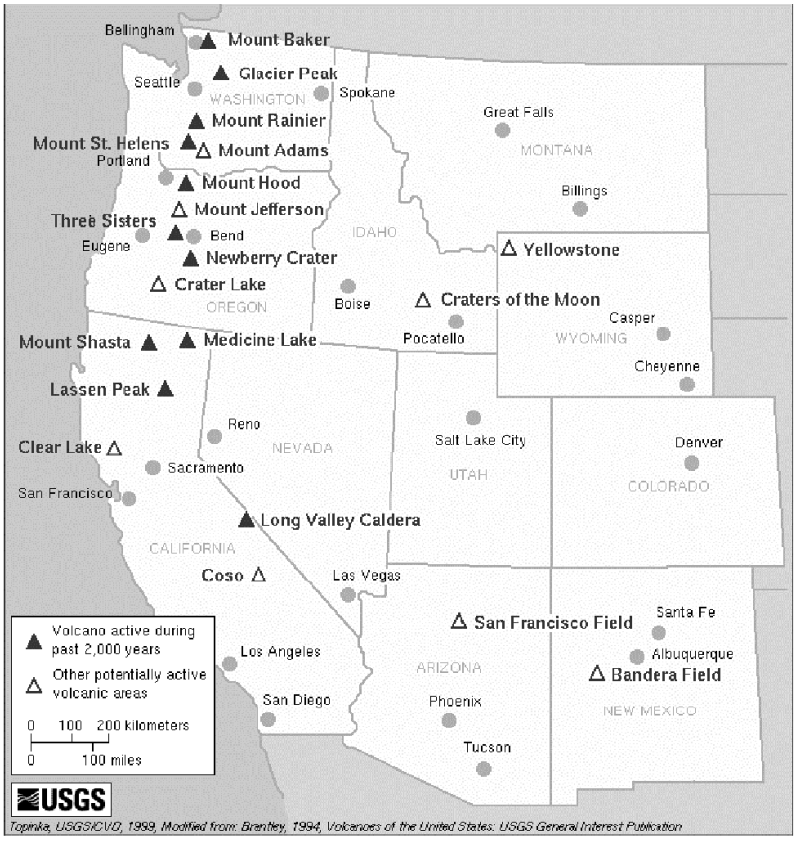
During an eruption, the ash fall deposition is controlled by the prevailing wind direction.[41] The predominant wind pattern over the Cascades is westerly, and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes.[42]

HISTORY OF VOLCANIC ERUPTION IN LINN AND BENTON COUNTIES

There are five active volcanoes that could potentially impact LBCC and the broader region. These include Mount Jefferson, Three Sisters and Broken Top, Mount Hood, Mount St. Helens, and Mount Rainier. However, only one of these volcanoes, Mount St. Helens, has impacted the area near LBCC within the past 30 years. The closest volcano, Mount Jefferson, has the potential to impact the broader region directly, but it has not been active for at least the past 15,000 years.[43]

[40] Oregon State Natural Hazard Mitigation Plan. 2009." Volcanic Hazards Chapter," accessed February 12, 2010
[41] Ibid.
[42] Ibid.
[43] Marion County. Natural Hazard Mitigation Plan. 2011.

Distances from Albany	
Volcano	**Distance (miles)**
Mount St. Helens	102
Mount Hood	82
Three Sisters	70



Source: USGS. http://www.volcano.si.edu/reports/usgs/maps.cfm#usa, accessed February 11, 2010

Volcano	Comments
Mount St. Helens	Mount St. Helens, located in southwestern Washington, it is 50,000 years old. Over the past 521 years, it has produced four major explosive eruptions and dozens of smaller eruptions. On May 18th, 1980, Mount St. Helens exploded violently after two months of intense earthquake activity and intermittent, relatively weak eruptions, causing the worst volcanic disaster in the recorded history of the United States. Mount St. Helens continued to be active; on March 8th, 2005, a plume of ash and steam spewed nearly seven miles high into the air. Ten small earthquake were measured in the area leading up to the eruption. The largest appeared to be a magnitude 2.5, according to the USGS.
Mount Jefferson	Mount Jefferson has erupted repeatedly for hundreds of thousands of years, with its last eruptive episode during the last major glaciations, which culminated about 15,000 years ago. Geologic evidence shows that Mount Jefferson is capable of large explosive eruptions.

Three Sisters and Broken Top	The Three Sisters are located in Eastern Oregon. Recently, volcanic activity has been found on the South Sister. The surface moved towards the satellite (mostly upward) by as much as ten centimeters (about four inches) sometime between August 1996 and October 2000. There is no imminent danger of a volcanic eruption or other hazardous activity. The potential exists, however, that further activity could increase danger.
Mount Hood	Mount Hood is located about 140 miles northeast of Albany, Oregon. It has been recurrently active over the past 50,000 years. It has had two significant eruptive periods in geologically recent times, one about 1,500 years ago and another about 200 years ago. Mount Hood has shown no recent signs of volcanic activity.
Mount Rainier	Mount Rainier is located approximately 200 miles north of Albany, Oregon. Mount Rainier is an active volcano that first erupted about half a million years ago. Mount Rainier is known to have erupted as recently as in the 1840s, and large eruptions took place as recently as about 1,000 and 2,300 years ago. The primary hazard posed to LBCC and satellite locations is ash fallout from Mount Rainier.

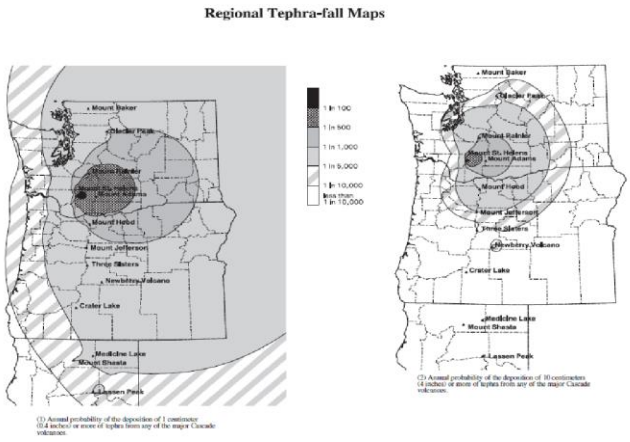
Source: Marion County Natural Hazard Mitigation Plan. 2011.

RISK ASSESSMENT

HOW ARE HAZARDS IDENTIFIED?

The location of the volcanic hazard for LBCC is depicted in the United States Geologic Survey (USGS) Cascades Volcano Observatory (CVO) volcanic hazard zonation reports for Mount Jefferson, produced in 2000. The reports include a description of potential hazards that may occur to immediate communities. The extent of damage from these hazards depends on the distance from the volcano, vent location, and type of hazardous events that occur during an eruption.

Scientists also use wind direction to predict areas that might be affected by volcanic ash; during an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. Regional tephra fall shows the annual probability of ten centimeters or more of ash accumulation from Pacific Northwest volcanoes. The images below depicts the potential and geographical extent of volcanic ash fall in excess of ten centimeters from a large eruption of Mount St. Helens.



Source: USGS "Volcano Hazards in the Mount Jefferson Region, Oregon"

PROBABILITY OF FUTURE OCCURRENCE

Because geologic history is fragmentary for these volcanoes, the probability of future explosive eruptions is difficult to estimate. Only two explosive episodes have occurred at the South Sister since the ending of the ice age (about 12,000 years ago). Given the fragmentary record, the annual probability of the South and Middle Sister entering a new period of eruptive activity has been estimated from one in several thousand to 1 in 10,000.[44]

Similar difficulties complicate predictions of future eruptions at Mount Jefferson. There have been four eruptive episodes since the end of the ice age (within the last 20,000 years). Such a frequency suggests an annual probability of about 1 in 4,000 to 1 in 3,000.[45]

Given the low annual probability of a volcanic eruption, the City of Salem steering committee rated the probability of volcanic eruption as low, meaning that one incident is likely in 75 to 100 years. This rating is not consistent with the 2008 City of Salem Hazard Analysis.

VULNERABILITY ASSESSMENT

LBCC's proximity to a number of Cascade Range volcanoes places the school and region at risk from ash fallout originating from such an event. The greatest vulnerability the campuses face from ash fall is the threat imposed on the ventilation systems and possible health repercussions (with an emphasis on respiratory issues) to people located on campus.

The committee rated the school's vulnerability to volcanic eruption as low, meaning less than 1% of the population or regional assets would be affected by a volcano.

RISK ANALYSIS

The committee determined that the history of volcanic events is low, with less than a couple events occurring over the last 100 years. The maximum threat of a volcanic eruption is moderate, considering the percentage of population and equipment that could be impacted under a worst-case scenario.[46]

Due to the relative age of the school compared to the thousands of years of volcanic history in the region, LBCC has yet to experience the effects of a volcanic eruption. However, the school is still at risk to ash fall. The potential for future injuries or deaths is anticipated to remain fairly low. It is estimated that less than 1% of LBCC's population and equipment would be affected by a volcanic eruption, considering the primary volcanic hazard that could impact the college is ash fallout, and there would be moderate impact on community social networks.[47]

[44] United States Geologic Survey Open File Report 99-437, p.8.
[45] United States Geologic Survey Open File Report 99-24, p.11.
[46] NHMP Steering Committee. 2012.
[47] Ibid.

Several buildings throughout the main and satellite campuses anticipate minimal damage due to a volcanic eruption. In terms of LBCC operations, it is likely the college and surrounding area would experience operational interruption for a period of a few days to a week. Ash fall from volcanic eruptions has the potential to impact a wide region with impacts to road surface conditions and ventilation systems that could affect LBCC faculty, staff, and students.

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Volcanic Eruption	1.8	Low	3.0	Low	4.3	Medium	1.3	Low	70.0

Source: LBCC Steering Committee

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

LBCC could be affected by volcanic activity from Mount St. Helens, Mount Hood, or Mount Jefferson. If any of these volcanoes erupted, there would be a possibility of ash that could affect air and water quality. The indirect effects of volcanoes within the region must be considered as well.

EXISTING HAZARD MITIGATION ACTIVITIES

LBCC has purchased air intake filters that are ready for installation in the case of a volcanic eruption to prevent the intake of ash.

CAUSES AND CHARACTERISTICS OF CLIMATE CHANGE

Changes to climate have made an impact on some natural hazards. The state of Oregon, as well as the City of Albany, have thus recognized climate change as a hazard in their NHMPs.

The overall climate in the Pacific Northwest is largely determined by atmospheric conditions in the Pacific Ocean, which result in El Niño and La Niña. However, human actions are causing temperature change that ultimately affects climate, changing the seasonal timing, creating earlier snow melt from the mountains, and increasing peak stream flows.

Several hazards identified in LBCC's NHMP—winter storms, windstorms, fire, and floods—are identified in the State of Oregon's NHMP and the Oregon Climate Adaptation Framework as having an underlying climate component. Much of the material on climate change highlighted in the State of Oregon NHMP is derived from two reports from the Oregon Climate Change Research Institute: the 2010 Oregon Climate Assessment Report and the 2013 Northwest Climate Assessment Report.

CLIMATE CHANGE PROJECTIONS

Seasonal projections of future temperature and precipitation show temperature increases in the Pacific Northwest directly related to the increase in global greenhouse emissions. By mid-century, the models show an annual temperature increase of 2.0-8.5° F. The change in seasonal temperatures are projected to result in less snowpack in Oregon, meaning lower water levels for lakes, rivers, and agricultural needs as well as the supply of drinking water. Increased summer temperatures could result in increased wildfires and poor air quality.

Projected Change in Average Temperatures (Max, Mean, and Min), from last Half of 20th to Mid-21st Centuries

Time Period	Annual		Winter (Jan, Feb, Mar)		Spring (Apr, May, Jun)		Summer (Jul, Aug, Sep)		Fall (Oct, Nov, Dec)	
Representative concentration pathway scenario	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
Maximum change	3.7°F	4.7°F	4.0°F	5.1°F	4.1°F	4.6°F	4.1°F	5.2°F	3.2°F	4.6°F
Mean change	2.4°F	3.2°F	2.5°F	3.2°F	2.4°F	3.0°F	2.6°F	3.6°F	2.2°F	3.1°F
Minimum change	1.1°F	1.7°F	0.9°F	1.3°F	0.5°F	1.0°F	1.3°F	1.9°F	0.8°F	1.6°F

Note: Max, mean, and min values represent the maximum model projection, the multi-model mean, and the minimum model projection.
Source: Dalton et al. (2013)

EXTREME PRECIPITATION

The North American Regional Climate Change Assessment Program (NARCCAP) indicates that there will be increases in the number of days in the Pacific Northwest when rainfall will exceed one, two, three, and four inches. Extreme rainfall events could result in increased flooding and the magnitude of floods. For LBCC, increased flooding could disrupt employee work commutes as well as the supply of food, utility function, and other essential materials and services.

Projected Change in Average Precipitation (Max, Mean, Min) for Two Scenarios, from Last Half of 20th to Mid-21st Centuries										
Time Period	**Annual**		**Winter (Jan, Feb, Mar)**		**Spring (Apr, May, Jun)**		**Summer (Jul, Aug, Sep)**		**Fall (Oct, Nov, Dec)**	
Representative concentration pathway scenario	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
Maximum change	10.1%	13.4%	16.3%	19.8%	18.8%	26.6%	18%	12.4%	13.1%	12.3%
Mean change	2.8%	3.2%	5.4%	7.2%	4.3%	6.5%	-5.6%	-7.5%	3.2%	1.5%
Minimum change	-4.3%	-4.7%	-5.6%	-10.6%	-6.8%	-10.6%	-33.6%	-27.8%	-8.5%	-11%

Note: Max, mean, and min values represent the maximum model projection, the multi-model mean, and the minimum model projection.
Source: Dalton et al. (2013)

	NARCCAP Mean Change %	**NARCCAP Standard Deviation %**
Change in the number of days with precipitation over one inch	+13%	7%
Change in the number of days with precipitation over *two inches*	+15%	14%
Change in the number of days with precipitation over *three inches*	+22%	22%
Change in the number of days with precipitation over *four inches*	+29%	40%

Note: NARCCAP is a multi-institution regional modeling effort with a coordinated approach similar to CMIP NARCCAP.
Source: Dalton et al. (2013)

EFFECT OF PROJECTED CLIMATE CONDITIONS ON NATURAL HAZARDS

Like Oregon, LBCC needs to begin addressing the effects of climate change in planning for natural hazards. The Oregon NHMP includes a table showing the relationship between future climate risks and potential hazards. Windstorms, winter storms, wildfires, and flood have a climate component.

Relationship between Adaptation Framework *Risks* and *Hazards* in the Oregon NHMP

Table 2-6. Relationship Between Adaptation Framework *Risks* and *Hazards* in the Oregon NHMP

	Oregon NHMP Hazards								
Adaptation framework climate *risks*	Coastal Erosion	Droughts	Dust Storms	Wildfire	Floods/ CMZ	Landslides	Wind-storms	Winter Storms	Heat Wave*
Increased temperatures	x	X	x	X					X
Changes in hydrology		X	x		X	X			
Increased wildfires		x	x	X	x	x			
Increase in ocean nitrogen events and changes in ocean chemistry	X				x			X	
Increased drought		X		X					
Increased coastal erosion	X					x			
Changes in habitat									
Increase in invasive species and pests		x		X					
Loss of wetland ecosystems and services		X	X		X				
Increased frequency of extreme precipitation events and flooding					X	X		x	
Increased landslides						X			

*Heat waves are not identified as a natural hazard in the current natural hazards mitigation plan.

What is contained in Table 2-6: The leftmost column contains the climate risks in the Oregon Climate Change Adaptation Framework. Column headings show natural hazards identified in the Oregon Natural Hazards Mitigation Plan (NHMP).

How to read this table: Cells with an x or X show which *climate risks* will affect the frequency, intensity, magnitude, or duration of which *natural hazards*. A big *X* shows a primary relationship between the risk and the hazard. A small x shows a secondary relationship. The green cells in the body of the table show where an Adaptation Framework risk and a natural hazard in the Oregon NHMP are essentially the same thing.

Note that the first two risks – *increased temperatures* and *changes in hydrology* – are *the primary climate drivers* for natural hazards. The other climate risks represent known environmental or ecosystem responses to one or both of the primary drivers. Note also that a clear link has not been established between climate change and the frequency or intensity of wind storms.

Coastal Erosion and Coastal Flooding

Regions affected: 1

Oregon's ocean shoreline is constantly subject to the dynamic and powerful forces of the Pacific Ocean, and it changes at timescales that vary from days to decades. Variable and changing ocean conditions continuously reshape the ocean shoreline, particularly where the shore is composed primarily of sand. Sand levels on Oregon's beaches generally experience an annual cycle of erosion through winters and rebuilding in summer months. Over any extended time period, sandy beaches and shores will build out and retreat several times, due in part to the effects of winds,

City of Albany Natural Hazard Mitigation Plan — Climate Change: Section 13 - 7

Source: Oregon State NHMP

RISK ASSESSMENT

PROBABILITY ASSESSMENT

Using the modeling evidence provided by the NARCCAP and information from the Oregon Climate Change Research Institute and the 2010 Oregon Climate Assessment Report, the committee determined that the probability of climate change affecting natural hazards to which LBCC is subject is medium, meaning that at least one event is likely in 36-75 years.

VULNERABILITY ASSESSMENT

Likewise, the committee rated the college's vulnerability to the effects of climate change as medium, meaning that more than 1-10% of the college's population, property, and equipment would be impacted by an event related to climate change.

RISK ANALYSIS

The committee determined that the history of climate change is medium. The maximum threat is also medium, considering the percentage of population and property that could be impacted under a worst-case scenario.[48]

Hazard	History	Rating	Vulnerability	Rating	Maximum Threat	Rating	Probability	Rating	Total Threat Score
Climate Change	4.0	Medium	4.8	Medium	5.0	Medium	6.3	Medium	126.1

Source: LBCC Steering Committee

COMMUNITY HAZARD ISSUES

WHAT IS SUSCEPTIBLE TO DAMAGE DURING A HAZARD EVENT?

UTILITY FAILURE

Utility failure can be the result of flooding, intense storm water runoff, windstorms, and winter storms. Even though campus may or may not be directly impacted by a related event, community infrastructure, such as sewer, drinking water, electrical utilities, internet access, and other city systems, may be vulnerable, which would impact LBCC.

TRANSPORTATION INTERRUPTIONS

A primary concern of extreme climate-related hazard events is the impact on the area's transportation infrastructure. Flooding, windstorms, and wildfires could impact

[48] LBCC. NHMP Steering Committee. 2012

transportation routes to LBCC facilities and thus impact the ability of employees to commute to work and needed materials, supplies, and services to reach LBCC facilities.

PROPERTY

Extreme weather events could create property damage at LBCC facilities due to flooding, high winds accompanying the extreme weather, and/or wildfire.

EXISTING HAZARD MITIGATION ACTIVITIES

LBCC does not currently conduct any climate change hazard mitigation activities.

CLIMATE CHANGE MITIGATION ACTION ITEMS

The committee recommends the following mitigation action to reduce the institution's environmental footprint and contribute to the reduction of global greenhouse emissions:

- CC #1 – Plan more green energy options in new construction (i.e. solar panels to generate electricity, etc.).
- CC #2 – Purchase institutional vehicles powered by more energy efficient and/or non-fossil fuels.

VOLUME III: APPENDICES

Action Item	Priority	Proposed Action Title	Coordinating Organization	Internal Partners	Timeline	Estimated Cost	Alignment with Plan Goals			
							Protect Lives	Structural Mitigation	Coordination	Awareness
Multi-Hazard (MH) Action Items										
MH #1	High	Provide an all-hazard campus outreach	Safety and Loss Prevention, Building Emergency Coordinators	HR, Student Services, Academic Affairs, Information Services	Ongoing	Low	X		X	X
MH #2	High	Develop "safe rooms" at each new LBCC facility for on-campus sheltering during and after extreme weather and other natural hazard events	Safety and Loss Prevention	Facilities	Ongoing	Low	X			X
MH #3	Med	Develop additional reserves of food and water stores for emergency response on campus properties	Finance and Operations	Facilities, Safety and Loss Prevention	Ongoing	Moderate	X		X	
MH #4	Low	Encourage faculty to develop online course shells to enable offering classes online during a hazardous event precluding travel to campus	Academic Affairs		Ongoing	Moderate	X		X	
Dam Failure (DF) Action Items										
DF #1	Med	Coordinate with Lane County Emergency Management to receive a dam failure notification	Safety and Loss Prevention		ST	Unknown	X		X	
DF #2	High	Educate LBCC Community about response timelines associated with potential dam failure	Safety and Loss Prevention	All department supervisors	ST	Low	X		X	X
Flood Hazard (FH) Action Items										
FH #1	Med	Employee outreach and continuity plan associated with transportation issues in a flood event	All department	Safety and Loss Prevention	ST	Low	X		X	X
Earthquake Hazard (EH) Action Items										

EH #1	Med	Conduct a Tier III seismic assessment on Red Cedar Hall	Facilities	Finance and Operations, Grants Administration	LT	Moderate	X	X		X
EH #2	Med	Conduct a Tier II seismic assessment on the Service Center	Facilities	Finance and Operations, Grants Administration	LT	Moderate	X	X		X
EH #3	Med	Conduct a Tier III seismic assessment on the Calapooia Center	Facilities	Finance and Operations, Grants Administration	LT	Moderate	X	X		X
EH #4	Med	Conduct a Tier II seismic assessment on the Activity Center	Facilities	Finance and Operations, Grants Administration	Ongoing	Low	X			X
Severe Weather (SW) Action Items										
SW #1	High	Identify safe pedestrian access routes for new buildings in the event of severe winter weather	Safety and Loss Prevention	Facilities, Ground	Ongoing	Low	X			X
SW #2	Med	Identify hazardous trees at the center and map safety issues	Facilities, Grounds	Center directors, Safety and Loss Prevention	ST	Low	X	X		
Utility Failure (UF) Action Items										
UF #1	Med	Identify funding to purchase additional generators to support campus operations in the event of utility failure	Facilities, Grant Administration	Finance and Operations, Safety and Loss Prevention, Information Services	ST/LT	Moderate-High		X	X	
Volcanic Eruption (VE) Action Items										
VE		[Mitigated 2012 NHMP]								
Wildfire (WF) Action Items										
WF #1	Med	Create defensible space around all property and structures vulnerable to wildfires	Facilities and Grounds	Safety and Loss Prevention	Ongoing	Low-Moderate	X	X		
Climate Change (CC) Action Items										
CC #1	Med	Plan more green energy options in new construction (i.e. solar panels or other sources to generate electricity)	Facilities, Finance and Operations	Construction Advisory Committee	Ongoing	Moderate				X
CC #2	Med	Purchase institutional vehicles powered by more energy efficient and/or non-fossil fuels	Purchasing, Finance and Operations	Driver's Education, Facilities, Public Safety, ATTC	Ongoing	Moderate				X

APPENDIX A: ACTION ITEM FORMS

MULTI-HAZARDS ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
Develop an all-hazards campus outreach strategy.	*Goal 3: Coordination* *Goal 4: Awareness*

Alignment with Existing Plans/Policies:
LBCC Emergency Response Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02 ; LBCC Continuity of Operations Plan
Rationale for Proposed Action Item:
An informed campus community will be better able to prepare for, respond to, mitigate and recover from disasters.
Ideas for Implementation:
• Provide informational materials at the annual campus welcome day • Provide periodic briefings to the college council • Post educational materials on the campus website • Send out information emails on campus "roadrunner-mail" and campus bulletins • Post information on campus social media resources (e.g. Facebook, Twitter, campus blog, etc.) • Ask faculty to include a brief mitigation statement in course syllabi • Encourage and provide customized, department-specific scenario training

Coordinating Organization:	Safety and Loss Prevention Office, College Advancement	
Internal Partners:	**External Partners:**	
Student Services, Academic Affairs, Information Services, Division Deans	Red Cross, Linn and Benton County Emergency Management, Albany Emergency Management, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Low	• Short Term (0-2 years) • Long Term (2-4+ years) X Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	• Ongoing from last NHMP	

MULTI-HAZARDS ACTION #2

Proposed Action Item:	**Alignment with Plan Goals:**
Identify "safe rooms" at each LBCC campus location that can be used for on-campus sheltering locations during and after extreme weather and other natural hazard events.	*Goal 1: Protect Lives* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
LBCC Emergency Operations Plan; Shelter in Place Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02	
Rationale for Proposed Action Item:	
LBCC maintains a shelter-in-place plan as part of its broader campus Emergency Response Plan. The shelter-in-place plan specifically addresses hazardous material releases into the atmosphere. The shelter-in-place plan does not account for or address the potential need for campus populations to shelter within campus buildings in response to natural hazard events such as severe storm. The identification of "safe rooms" or other protected areas on campus where students, faculty and staff can seek refuge during hazard events is needed in order to reduce potential injuries and deaths resulting from hazards.	
Ideas for Implementation:	
• Develop an all-building, all-hazard sheltering and refuge plan. • Identify specific rooms and areas on campus that can provide protection during severe storms and other hazard events. • Review FEMA P-320 – Taking Shelter From the Storm: Construction Plans and Specifications. • Update shelter plan to include new facilities resulting from 2015 bond sale construction projects.	

Coordinating Organization:	Safety and Loss Prevention Office	
Internal Partners:	**External Partners:**	
Facilities	Red Cross, Linn and Benton County Emergency Management, Albany Emergency Management, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Unknown	X Short Term (0-2 years) • Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	• Ongoing from last NHMP	

MULTI-HAZARDS ACTION #3

Proposed Action Item:	**Alignment with Plan Goals:**
Develop additional reserves of food and water stores for emergency response on campus properties.	*Goal 1: Protect Lives;* *Goal 3: Coordination*
Alignment with Existing Plans/Policies:	
LBCC Emergency Operations Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02	
Rationale for Proposed Action Item:	
In the event of a major disaster LBCC could become a staging area to aid affected people on campus and/or for larger community disaster relief efforts. With that expectation, LBCC should be prepared to provide basic emergency supplies for immediate victim needs (until further emergency response arrives) as well as to supply ongoing administrative and relief efforts happening on campus whether through the LBCC critical response team or other outside agencies using the facilities.	
Ideas for Implementation:	
• Identify appropriate levels of food and water to be stocked • Identify possible funding sources and seek approval through established budget channels • Determine most appropriate storage sites, factoring in availability, structure security, and accessibility after the disaster.	

Coordinating Organization:	Finance and Operations	
Internal Partners:	**External Partners:**	
Safety and Loss Prevention	Red Cross	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
One-time general fund use, Auxiliary fund reserves	Moderate	X Short Term (0-2 years) • Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	• New	

MULTI-HAZARDS ACTION #4

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage faculty to develop online course shells to enable offering classes online during a hazardous event precluding travel to campus.	*Goal 1: Protect Lives;* *Goal 3: Coordination*

Alignment with Existing Plans/Policies:
BP 4010: Instructional and Curriculum Responsibilities

Rationale for Proposed Action Item:
Assuming faculty and students are unable to reach campus, pre-existing Moodle course shells will allow faculty and students to easily communicate at least some course learning to continue in the absence of brick-and-mortar setting.

Ideas for Implementation:
• Hold clarifying conversations with faculty to better define the opportunities for continued operation provided by our LMS platform (Moodle).

Coordinating Organization:	Academic Affairs	
Internal Partners:	**External Partners:**	
IT	none	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
General Fund	Moderate	• Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	• New	

DAM FAILURE ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
Coordinate with Lane County Emergency Management to develop a dam failure notification procedures for LBCC employees living in the county.	*Goal 1: Protect Lives* *Goal 3: Coordination*

Alignment with Existing Plans/Policies:

LBCC Emergency Response Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02

Rationale for Proposed Action Item:

There are many dams in the region surrounding LBCC campuses. Catastrophic dam failure would cause widespread flooding and transportation (commute) interruption for employees living in Lane County. In the event of dam failure there is no developed notification procedure for who, when and how the LBCC employees in Lane County will be notified by Lane County authorities.

As identified by the Army Corps of Engineers: Foster, Green Peter, Hills Creek, Cougar, Dexter, Fall Creek and Look Out Point Reservoirs have the potential for floodwaters to inundate various campus facilities.

Ideas for Implementation:

- Work with city and county emergency management in regard to a notification procedure – who, when, and how - that would alert LBCC employees residing in Lane County.
- Make employees aware of notification protocols and encourage subscribing to technology that would alert them to dam failure and flooding concerns.

Coordinating Organization:	Safety and Loss Prevention	
Internal Partners:	**External Partners:**	
LBCC Safety Committee	Lane County Sheriff's Offices, Army Corps of Engineers	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	Unknown	Short Term (0-2 years)
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	New	

DAM FAILURE ACTION #2

Proposed Action Item:	**Alignment with Plan Goals:**
Educate LBCC Community about response timelines associated with potential dam failure at Foster and Green Peter Dams.	*Goal 1: Protect Lives* *Goal 4: Awareness*

Alignment with Existing Plans/Policies:
LBCC Emergency Response Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02

Rationale for Proposed Action Item:
There are many dams in the region surrounding LBCC campuses. Catastrophic dam failure would cause widespread flooding, damage to campus facilities, transportation interruptions, and pose a threat to the life safety of students, staff and faculty. In the event of dam failure there is no developed dam failure evacuation plan for LBCC East Linn Campuses and staff and students living in the path of water from the Green Peter Dam. As identified by the Army Corps of Engineers: Foster and Green Peter have the potential for floodwaters to inundate various campus facilities and homes of LBCC staff living in these communities. Timelines for evacuation are limited in some associated areas. Employees need to be made aware and encouraged to plan for immediate and/or short-notice evacuation.

Ideas for Implementation:
• Work with county emergency management, and Army Corps of Engineer's mapping to develop plans and preparation for evacuation procedures – when to evacuate, transportation routes, and determining a safe time to return to campus facilities.

Coordinating Organization:	Safety and Loss Prevention, Facilities	
Internal Partners:	**External Partners:**	
LBCC Safety Committee, Facilities, East Linn Center Regional Director, Dean of Health Occupations	County Emergency Management, County Transit, Army Corps, State Water Services Division	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Unknown	Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	Ongoing from last NHMP	

FLOOD ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
Employee outreach and continuity plan associated with transportation issues in a flood event.	*Goal 1: Protect lives* *Goal 3: Coordination* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
LBCC Emergency Response Plan; Risk Management: AR 5035.05; Health and Safety AR 5095-02	
Rationale for Proposed Action Item:	
Informed employees will be better able to prepare for, respond to, mitigate, and recover from transportation issues in a flood event. Creating and communicating a continuity plan to employees is needed to ensure the safety of our employees traveling to/from work, mitigate the effects of potential school and road closures, and aid in the timely recovery after such an event.	
Ideas for Implementation:	
• Identify best practices for a continuity plan associated with transportation issues in a flood event. • Develop informational materials regarding options and action appropriate for employees during a flood event. • Distribute/disseminate information through existing employee outreach channels.	

Coordinating Organization:	Safety and Loss Prevention Office	
Internal Partners:	**External Partners:**	
All Departments		
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Low	X Short Term (0-2 years) • Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	New	

EARTHQUAKE ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
Conduct a structural Tier III seismic assessment on Red Cedar Hall	*Goal 1: Protect Lives* *Goal 2: Structural Mitigation* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
Capital Improvement Plan; LBCC Emergency Operations Plan; Earthquake Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02	
Rationale for Proposed Action Item:	
Red Cedar Hall was identified by the 2017 NHMP steering committee as having priority for seismic retrofit as Public Safety, testing, and the Center For Accessibility Resources are essential for the continuity of campus operations. • Based on the 2005 DOGAMI Rapid Visual Assessment Red Cedar Hall (previously known as the Health Occupations building) has a very high collapse potential in the event of an earthquake, with an estimated 100% collapse of the structure. • As a result of this assessment LBCC has developed priorities for building seismic retrofits and is submitting grant applications for seismic upgrades as they become available.	
Ideas for Implementation:	
• Hire an engineering firm to complete the Tier III seismic assessment • Include retrofit in Capital Planning • Apply for local, state and federal seismic grants	

Coordinating Organization:	Facilities, Finance and Operations	
Internal Partners:	**External Partners:**	
Grants Administration	OEM Seismic Grants Specialist, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal; Bond	Moderate	• Short Term (0-2 years) X Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	New	

EARTHQUAKE ACTION #2

Proposed Action Item:	**Alignment with Plan Goals:**
Conduct a structural Tier II seismic assessment on the Service Center building.	*Goal 1: Protect Lives* *Goal 2: Structural Mitigation* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
Capital Improvement Plan; LBCC Emergency Operations Plan; Earthquake Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02	
Rationale for Proposed Action Item:	
The Service Center was identified by the 2012 NHMP steering committee as having priority for seismic retrofit as the building is the institution's physical plan and is part of critical infrastructure. • Based on the 2005 DOGAMI Rapid Visual Assessment Red Cedar Hall has a very high collapse potential in the event of an earthquake, with an estimated 100% collapse of the structure. • As a result of this assessment LBCC has developed priorities for building seismic retrofits and is submitting grant applications for seismic upgrades as they become available.	
Ideas for Implementation:	
• Hire an engineering firm to complete the Tier II seismic assessment • Include retrofit in Capital Planning • Apply for local, state and federal seismic grants	

Coordinating Organization:	Facilities, Finance and Operations	
Internal Partners:	**External Partners:**	
Grants Administration	OEM Seismic Grants Specialist, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal; Bond	Moderate	• Short Term (0-2 years) X Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	Incomplete from 2012-207 Natural Hazard Mitigation Plan	

EARTHQUAKE ACTION #3

Proposed Action Item:	**Alignment with Plan Goals:**
Conduct a structural Tier III seismic assessment on the Calapooia Center building.	*Goal 1: Protect Lives* *Goal 2: Structural Mitigation* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
Capital Improvement Plan; LBCC Emergency Operations Plan; Earthquake Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02	
Rationale for Proposed Action Item:	
The Service Center was identified by the 2012 NHMP steering committee as having priority for seismic retrofit as the building houses Information Services, Human Resources, the institution's Food Services and Culinary program, the Conference Center, and the Business Office and is thus part of critical infrastructure and a community resource. • Based on the 2005 DOGAMI Rapid Visual Assessment the Calapooia Center (previously known as the College Center) has a very high collapse potential in the event of an earthquake, with an estimated 100% collapse of the structure. As a result of this assessment LBCC has developed priorities for building seismic retrofits and is submitting grant applications for seismic upgrades as they become available.	
Ideas for Implementation:	
• Hire an engineering firm to complete the Tier III seismic assessment • Include retrofit in Capital Planning • Apply for local, state and federal seismic grants	

Coordinating Organization:	Facilities, Finance and Operations	
Internal Partners:	**External Partners:**	
Grants Administration	OEM Seismic Grants Specialist, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal; Bond	Moderate	• Short Term (0-2 years) X Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	Incomplete from 2012-207 Natural Hazard Mitigation Plan	

EARTHQUAKE ACTION #4

Proposed Action Item:	**Alignment with Plan Goals:**
Conduct a structural Tier II seismic assessment on the Activity Center building.	*Goal 1: Protect Lives* *Goal 2: Structural Mitigation* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
Capital Improvement Plan; LBCC Emergency Operations Plan; Earthquake Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02	
Rationale for Proposed Action Item:	
The Activity Center was identified by the 2017 NHMP steering committee as having priority for seismic retrofit as the building provides a shelter location for the Red Cross in the case of a community emergency as well as the LBCC community, provides classroom and lab spaces for human performance classes, and serves as the indoor sports and physical training facility for the college. • Based on the 2005 DOGAMI Rapid Visual Assessment the Activity Center has a high collapse potential in the event of an earthquake, with an estimated collapse of greater than 10%. As a result of this assessment LBCC has developed priorities for building seismic retrofits and is submitting grant applications for seismic upgrades as they become available.	
Ideas for Implementation:	
• Hire an engineering firm to complete the Tier II seismic assessment • Include retrofit in Capital Planning • Apply for local, state and federal seismic grants	

Coordinating Organization:	Facilities, Finance and Operations	
Internal Partners:	**External Partners:**	
Grants Administration	OEM Seismic Grants Specialist, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal; Bond	Moderate	• Short Term (0-2 years) X Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	New	

SEVERE WEATHER #1

Proposed Action Item:	**Alignment with Plan Goals:**
Severe Weather #1 ~ Safe pedestrian access routes for new buildings in the event of severe winter weather.	*Goal 1: Protect lives* *Goal 3: Coordination* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
Aligns with continuity of operations plan, promoting access in the event of disruptions (multi-hazard, earthquake, severe weather, other).	
Rationale for Proposed Action Item:	
While the College aspires to promote safe access during disruptions including severe weather events, we have not explicitly identified safe, alternative routes to new buildings in the event they are necessary. There is the potential for regular routes to be interrupted while regular operations are still possible, so long we can assure students and employees of safe access.	
Ideas for Implementation:	
• Consider worst case scenarios (high water accumulations, downed trees or power lines, etc.) and routes most likely to be blocked. • Map out alternative routes selected to permit access when primary routes are inaccessible. • Add new routes to the emergency safety route maps on the Public Safety web page	

Coordinating Organization:	Safety & Loss Prevention, Facilities	
Internal Partners:	**External Partners:**	
HOC Staff Benton Center Staff (with remodel of Reiman property)	Emergency planning units within local units of government, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Low	* Short Term (0-2 years) * Long Term (2-4+ years) * Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	* New *Ongoing from last NHMP	

SEVERE WEATHER #2

Proposed Action Item:	**Alignment with Plan Goals:**
Severe Weather #2 ~ Identify hazardous trees at the LBCC Centers and map safety issues.	*Goal 1: Protect lives* *Goal 3: Coordination* *Goal 4: Awareness*
Alignment with Existing Plans/Policies:	
Aligns with continuity of operations plan, promoting access in the event of disruptions (multi-hazard, earthquake, severe weather, other).	
Rationale for Proposed Action Item:	
Most all college properties were designed to include required arboreal plans, but in some cases the flora have matured and their current size/profile cause them to be vulnerable to wind storms and other severe winter events. In the summer of 2016, one such tree in the parking lot of the Benton Center had become weakened over time, and strong winds caused it to split and fall onto the paved area. Fortunately there was no damage to persons or property, but the College should consider a more proactive approach.	
Ideas for Implementation:	
• Engage the services of municipal/urban foresters to assess the risk of the current inventory of trees, both on College property and on adjacent properties. • Identify trees considered to be at-risk for downing under the right conditions. • Consider scheduling removal and replacement of same.	

Coordinating Organization:	Safety & Loss Prevention, Facilities	
Internal Partners:	**External Partners:**	
, Center Staff	City parks personnel (Albany, Corvallis, Lebanon)	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Low	* Short Term (0-2 years) * Long Term (2-4+ years) * Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	* New *Ongoing from last NHMP	

UTILITY FAILURE ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
Identify funding to purchase additional generators to support campus operations in the event of utility failure	*Goal 2: Structural Mitigation* *Goal 3: Coordination*
Alignment with Existing Plans/Policies:	
Capital Improvement Plan; LBCC Emergency Operations Plan; Utility Failure Plan; Risk Management: AR 5035-05; Health and Safety: AR 5095-02; Continuation of Operations Plan	
Rationale for Proposed Action Item:	
Campus currently has three small generators. Additional generators are needed to ensure that information technology and other vital services have access to power in the event of an electrical utility failure.	
Ideas for Implementation:	
• Include installation of an emergency generator for the Calapooia Center in future budgets • Find resources for renting large, portable generators and install electrical connections on building to connect the generators as needed – create MOUs for use • Include the purchase of additional smaller, portable generators in future budgets	

Coordinating Organization:	Facilities, Information Services, Grant Administration	
Internal Partners:	**External Partners:**	
Finance and Administration; Safety and Loss Prevention		
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Moderate-High	X Short Term (0-2 years) X Long Term (2-4+ years) • Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	• Incomplete from last NHMP	

WILDFIRE ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
LBCC shall create defensible space around all property and structures vulnerable to wildfire.	*Goal 1: Protect Lives*

Alignment with Existing Plans/Policies:
LBCC Emergency Operations Plan; Fire Plan; Evacuation Plan; Risk Management: AR 5035-05; Health and Safety: AR 6010-02

Rationale for Proposed Action Item:
The property surrounding LBCC's main campus consists of agricultural fields. Occasionally the fields catch fire and are in danger of jumping onto LBCC property if not controlled in time. Any fire affecting the property has the potential to cause major structural damage and safety issues for the people at LBCC. Additional forest and agricultural lands abut several of the satellite campus locations, most notably the Horse Center. Off-site wildfires have the potential to cause major structural damage and safety issues for the people at LBCC. LBCC has control over landscaping and grounds maintenance at all of the locations where wildfire may be a concern.

Ideas for Implementation:
• Determine the best management practices for hazardous fuel treatments • Implement hazardous fuel treatments that best conform to the surrounding landscape • The Horse Center and the Advanced Transportation Technology Center are identified as priority structures that need improved defensible space

Coordinating Organization:	Facilities	
Internal Partners:	**External Partners:**	
Safety and Loss Prevention; Grounds Department		
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal	Low - Moderate	• Short Term (0-2 years) • Long Term (2-4+ years) X Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	On-going	

CLIMATE CHANGE ACTION #1

Proposed Action Item:	**Alignment with Plan Goals:**
LBCC shall plan more green energy options in new construction – i.e. solar panels or other sources to generate electricity.	*Goal 1: Awareness*

Alignment with Existing Plans/Policies:
Capital Improvement Plan; See mitigation activities related to severe weather, flooding, utility failure, and wildfire – Section III. Appendix A

Rationale for Proposed Action Item:
Seasonal projections of future temperature and precipitation show temperature increases in the Pacific Northwest directly related to the increase in global greenhouse emissions. The relationship between climate change from greenhouse emissions and potential connected natural hazards has been established. Thus, the LBCC steering committee is recommending mitigation action to reduce the institution's environmental footprint and contribute to the reduction of global greenhouse emissions.

Ideas for Implementation:
• During the course of facility construction or remodel, encourage the use of green energy sources – solar power, wind power, etc. • Encourage modifications that will conserve energy – lower energy lighting sources, improvements in HVAC systems, better insulation of buildings.

Coordinating Organization:	Facilities, Finance & Operations	
Internal Partners:	**External Partners:**	
Construction Advisory Committee, LBCC Administration	Project architects	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal, Grants	Moderate-High	• Short Term (0-2 years) X Long Term (2-4+ years) X Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	On-going	

CLIMATE CHANGE ACTION #2

Proposed Action Item:	**Alignment with Plan Goals:**
LBCC shall encourage the purchase of institutional vehicles powered by more energy efficient and/or non-fossil fuel.	*Goal 1: Awareness*

Alignment with Existing Plans/Policies:
Administrative Rule AR 5035-04, Purchasing - General; See mitigation activities related to severe weather, flooding, utility failure, and wildfire – Section III. Appendix A

Rationale for Proposed Action Item:
Seasonal projections of future temperature and precipitation show temperature increases in the Pacific Northwest directly related to the increase in global greenhouse emissions. The relationship between climate change from greenhouse emissions and potential connected natural hazards has been established. Thus, the LBCC steering committee is recommending mitigation action to reduce the institution's environmental footprint and contribute to the reduction of global greenhouse emissions.

Ideas for Implementation:
• Departments that purchase vehicles for institutional use should be encouraged to purchase the most energy efficient vehicles possible to reduce the amount of fossil fuels burned. • Departments purchasing vehicles for institutional use should be encouraged to purchase vehicles powered by other than fossil fuels.

Coordinating Organization:	Purchasing, Finance & Operations	
Internal Partners:	**External Partners:**	
All departments purchasing vehicles of LBCC use: Driver's Education, Facilities, Public Safety, Advance Transportation Technology Programs		
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Internal, Grants	Moderate	• Short Term (0-2 years) • Long Term (2-4+ yrs) X Ongoing
Form Submitted by:	Mitigation Steering Committee	
Action Item Status:	On-going	

APPENDIX B: PLANNING AND PUBLIC PROCESS

INCLUDES:

- LBCC 2017 NHMP Update – Work Plan
- 2017 NHMP Campus Participation Process
    - July 27, 2016 Plan Update Process Kick Off, Meeting #1 Materials
    - November 28, 2016 Plan Development Meeting #2 Materials
    - December 12, 2016 Plan Development Meeting #3 Materials
    - February 10, 2017 Plan Development Meeting #4 Materials
    - May 05, 2017 Plan Development Meeting #5 Materials
    - July 17, 2017 Plan Development Meeting #6 Materials
    - August 7, 2017 Plan Development Meeting #7 Materials
    - September 15, 2017 Plan Development Meeting #7 Materials
- 2012-2017 Plan Maintenance Process
    - 2012-2017 Action Item Timeline and Status
    - August 13, 2013 NHMP Action Meeting Minutes
    - February 12, 2014 NHMP Action Meeting Minutes
    - May 28, 2014 NHMP Action Meeting Minutes
    - November 25, 2014 NHMP Action Meeting Minutes
    - May 27, 2015 NHMP Action Meeting Minutes
    - November 24, 2015 NHMP Action Meeting Minutes
    - June 7, 2016 NHMP Action Meeting Minutes

LBCC 2017 NHMP UPDATE – WORK PLAN

ISSUE SUMMARY

An NHMP forms the foundation for a campus's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and their property from hazards, ultimately establishing a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

The planning process is as important as the plan itself. Consensus built through the inclusion of diverse stakeholders throughout LBCC will improve the plan and the plan implementation process.

LINN-BENTON COMMUNITY COLLEGE NHMP

LBCC has initiated and maintained the NHMP planning process in order to take advantage of grant funding and technical support currently available. Upon NHMP adoption by the FEMA, LBCC will continue to be eligible to pursue mitigation grant funding from the Pre-Disaster Mitigation and Hazard Mitigation Grant Programs.

PHASE 1 – PROJECT INITIATION

- Review work plan.
- Distribute planning resources and reference materials.
- Convene the NHMP steering committee and hold a kick-off meeting on July 27th, 2016, which will cover the college's responsibilities and describe opportunities for stakeholder involvement.
- Develop a campus profile for LBCC at the October 25th, 2016 meeting.
- Develop and implement a public outreach strategy.

PHASE 2 – RISK ASSESSMENT

- Identify information for the following natural hazards: flood, earthquake, winter and windstorms (severe weather), wildfire, dam failure, utility failure, and climate change.
- Identify the causes, characteristics, location, extent, previous occurrences, probability, vulnerability, and campus-related impacts (or potential impacts) for each hazard.
- Present and review the local risk assessment to the committee at the December 12th, 2016 meeting.

PHASE 3 – MITIGATION STRATEGY

- Create action items for the NHMP that address each hazard and meet college needs and document the current status of each action item.
- Review and provide edits on the proposed action items at the April 19th, 2017 meeting.
- Develop plan mission, goals, and action items to ensure they accurately reflect campus mitigation needs.

- Establish a plan for the implementation and maintenance process.

PHASE 4: FINAL PLAN REVIEW

- The Institutional Research Office will prepare and present a draft plan to the committee and the public for review.
- The committee will present a final plan to Oregon Emergency Management and FEMA for review and pre-approval.
- Once the FEMA plan review is complete and accepted, the local adoption process will occur with the LBCC Board of Education.
- The first implementation meeting, subsequent to plan approval, is planned for February 8th, 2018.

STEERING COMMITTEE INVOLVEMENT

A fully representative steering committee, including representation from the various departments that are responsible for maintaining the continuity of campus operations, was convened to both update and implement the plan. Involvement will include telephone conversations, e-mail exchanges, and/or face-to-face meetings.

PROJECT OUTCOME

The immediate measure of success for this project will be approval by FEMA and the adoption of the updated plan. In the long-term, the ongoing process of engaging diverse stakeholders throughout planning efforts and the eventual implementation of the plan's actions will be the true indicator of success resulting from this project.

2017 CAMPUS AND COMMUNITY PARTICIPATION

LBCC is committed to involving faculty, staff, and students in the development of this NHMP. The primary mechanism was through an engaged and representative steering committee. Members of the committee represented faculty, staff, managers, and administrators, and members of the committee committed to reaching out directly to their various constituencies to gather information and input. The following LBCC staff and stakeholders served on the NHMP steering committee:

Dave Henderson	Vice President, Finance & Operations
Jess Jacobs	Director, Accounting & Budget
Dale Stowell	Executive Director, College Advancement
Scott Krambuhl	Director, Facilities
Sally Widenmann	Dean of Instruction
Marcene Olson	Director, Safety & Loss Prevention
Jeff Davis	Regional Director, Benton Center
Vern Smith	Network Administrator
Bev Dunigan	Assistant Director, East Linn Centers
Justene Malosh	Research Analyst, Institutional Research
Julie Hessel	Program Assistant, Center for Accessibility Resources
Lara Miller	Catalog, Curriculum, & Scheduling Manager
Nicole Ballinger	Grant Development Manager
Duane Jensen	Lead Maintenance Specialist

Source: Linn-Benton Community College

Beginning October 1st, 2017, the updated plan draft was posted to the LBCC website for comment. A radio and newspaper announcement was used to invite comments from the public. Any comments received will be incorporated into the final plan draft prior to submittal to FEMA. The draft will go to the board as information and comment in October and for later for approval after FEMA approves the plan.

Additional information regarding ongoing strategies to engage the campus community can be found in Section 4: Implementation and Maintenance.

PLAN DEVELOPMENT MEETING MATERIALS

JULY 27, 2016 PLAN UPDATE PROCESS KICK OFF, MEETING #1 MATERIALS

NHMP Review Mtg. Date:	***Topic:***	
July 27, 1:30-2:30pm, Boardrm.	Update Checklist, Introduction Section, & Changes to City of Albany NHMP	Vol. 1, Sec. I– LBCC NHMP City of Albany NHMP update
Oct. 25, 3:30-4:30pm, Boardrm.	Campus Profile	Appendix D – LBCC NHMP
Dec. 12, 10-11am, Boardrm.	Risk Assessment & Hazard Identification	Vol. 1, Sec. 2 - NHMP
Feb. 10, 2:30-3:30pm, Boardrm.	Hazard Annexes	Volume II - NHMP Check against City of Albany update
April 19, 11am-12pm, Boardrm.	Mitigation Strategies & Action Items	Vol. 1, Sec. 3 & Appendix A – LBCC NHMP Chart completed/deleted Action Items from original plan.
June 19, 2-3pm, Boardrm.	Resource Appendices	Mitigation Resources Chart & Appendix C & E – LBCC NHMP
Aug. 7, 2-3pm, Boardrm.	Final Plan Prep & Implementation Strategies	Vol. 1, Sec. 4 & Appendix B – LBCC NHMP

July 27 Meeting, 1:30pm:

- Committee members provided introductions
- For members new to the steering and update committees, the purpose and initial process for creating the NHMP was discussed.
- Update checklist was presented.
- A brief overview of the changes seen in the City of Albany 2015 NHMP update was reviewed.
- Section 1 of the LBCC NHMP was presented. The committee decided to use Google docs to share the sections being reviewed and provide input. The due date for review and input on this section is October 1st.
- The next meeting is scheduled for 10/25/16, 3:30pm, in the Boardroom. The section being presented is the campus profile, Appendix D. This section will be provided as a Google doc for review prior to the meeting.
- Meeting adjourned at 2:20pm

Linn-Benton
COMMUNITY COLLEGE

Natural Hazard Mitigation Steering Committee

7/27/16

Print Name:	Sign Name:	Dept.
Sally Widenmann	Sally Widenmann	Academic Affairs
Bev Dunigan	Bev Dunigan	Lebanon Ctr
Vern Smith	Vern Smith	Information Services
Duane Jensen	Duane Jensen	Facilities
Lara Miller	Lara Miller	Curriculum + Scheduling
Justine Malosh	Justine Malosh	Institutional Research
Nicole Ballinger	Nicole Ballinger	Advancement
Jess Jacobs	Jess Jacobs	Business Office
Scott Krambuhl	Scott Krambuhl	Facilities
Dale Stovall	Dale Stovall	Advancement
Julie Hessel	Julie Hessel	Center for Accessibility Resources
Inadira López de Search	Inadira López de Search	Benton Center
Jeff Davis	Jeff L. Davis	Benton Center.

NOVEMBER 28, 2016 PLAN DEVELOPMENT MEETING #2 MATERIALS

Today we reviewed needed updates for the Campus Profile section. All updates for this section (with the exception of the building values which will be pending an appraisal being conducted) are due prior to our meeting on December 12th. Jess has volunteered to update Tables D.1-D.4. Nicole has volunteered to update the text associated with those sections. I will be contacting the University of Oregon to see if they can update the employee travel impact maps that they created for our initial NHMP. Julie will be updating the D.1 and D.5 figures/tables. Dale has volunteered to follow up on updated needed to the "Economic Generation" sections.

Below, in the indented section, is the message that I've sent out to some specific folks with other input needed for the campus profile.

The next meeting will cover the "Risk Assessment" area. Please review this section on Google docs prior to the meeting.

Also, it will be helpful to review the City of Albany NHMP update summary (which can be seen here) to see if any hazard updates for Albany might apply to LBCC as well.

Email to Individuals Providing Follow-up Information: Campus Profile:

Today we held the rescheduled meeting from October (that had to be moved due to the early closure day for water pipe rupture). The topic was the Campus Profile section - found in Google docs.

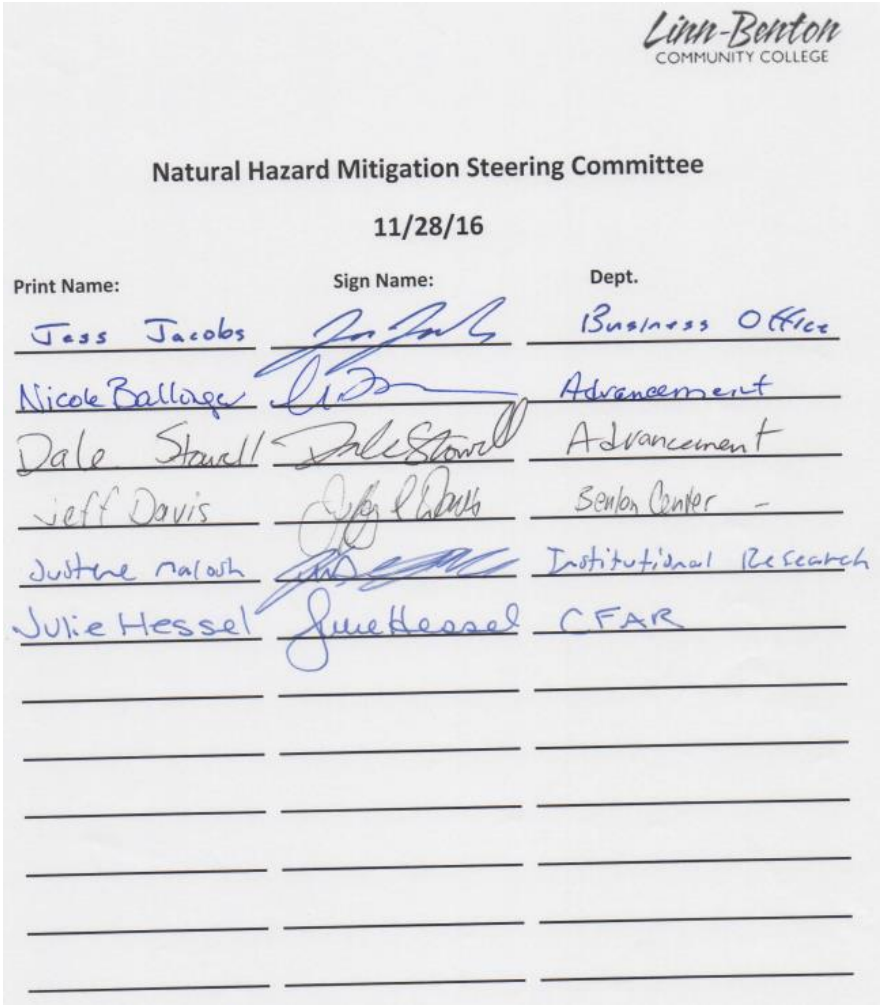
Various areas of the section needing updating were discussed and assignments dispersed. It was agreed that all updates would be in Google by the time of our next meeting - December 12th.

Please review this section in Google docs. However, there are some specifics that we need your help on as follows:

- Scott Krambuhl and Lara - Could you please provide classroom occupancy information to Justene - see page D-4, "Occupancy"
- Scott Krambuhl - Please look at the "Infrastructure" section on Page D-20-21 and indicate any updates needed in the Google doc.
- Sally - Could you please provide Justene with office occupancy for each of the buildings? Don't forget about the centers (Benton, Lebanon, & ATTC). See pages D-5 amd D-6. The table on D-6 does not include the centers and new buildings but should.
- Amy, Todd, and Chad - We need some information from you regarding culinary arts events and conference services facilities rentals. Could you please look back through your 2015-2016 events and give Julie Hessel (who is updating the table in the document) a listing of your big culinary events and the attendance at each as well as the facilities rentals to outside groups/events and the attendance (as indicated in the contract/invoice with the group). For the outside event/group rentals, we'd just need the total number of participants for these events throughout the 2015-2016 year - see Table D.5 on page D-7 of the document to see the type of reporting we're looking for.
- Randy - Could you please review the numbers for various athletic events in the D.5, page D-7 chart for accuracy of numbers reported? What's in the chart looks understated. Again, these numbers should go to Julie Hessel for the table/updates.

- Bruce Clemetsen - Could you please have your folks review the Table D.5, page D-7, for correct numbers for the Career Fair and Youth Job Fair. The numbers need to go to Julie Hessel for the table updates.
- Gayle - Please review the attendance numbers for the Russell Tripp Performance attendance in figure D.1, page D-7. Send updated counts to Julie Hessel.
- Dave Henderson - Please review page D-10-11 for updates under your responsibilities section. Don't forget to check the links referenced at the bottom of each page for accuracy.
- Bruce Clemetsen - Please review page D-11-12 for updates under your responsibilities section.Don't forget to check the links referenced at the bottom of each page for accuracy.
- Scott Rolen - Please review page D-12 for updates under the Human Resources section.Don't forget to check the links referenced at the bottom of each page for accuracy.
- Vern/Russ/Michael - Please review the "Communications and Data Systems" section on page D-22 for any needed updates.

We are having our property insurer arrange for updated appraisals so the sections on building values will be updated once that information is received (probably sometime during spring term or the end of winter term).



Linn-Benton
COMMUNITY COLLEGE

Natural Hazard Mitigation Steering Committee

11/28/16

Print Name:	Sign Name:	Dept.
Jess Jacobs		Business Office
Nicole Ballager		Advancement
Dale Stovall		Advancement
Jeff Davis		Senior Center
Justine Malosh		Institutional Research
Julie Hessel		CFAR

DECEMBER 12, 2016 PLAN DEVELOPMENT MEETING #3 MATERIALS

Today we reviewed progress on Campus Profile updates for the. Items still pending update information on this section include:

- Economic Impacts – Jess and Dave are going to look for the more current study files that Dale was searching for. They will coordinate efforts to locate the information. Dale will make the updates to this section.
- Building values – Appraisals are scheduled January 25-27. Once the information is received back, the values tables will be updates and the new construction information added. Scott and Marcene will work to ensure this information is updated.
- Commute shed maps –Marcene has been in contact with the University of Oregon. An online meeting is planned to work with Ken Kato, Director of Campus GID & Mapping from U of O to see if they can update the employee travel impact maps that they created for our initial NHMP.
- Occupancy table – Information needs to be updated to include occupancy available in classrooms, all buildings, as well as office space. Sally's office will get the occupancy available for classrooms in all buildings/all centers. The table will then be passed to Lean in IT to update the office capacity (office assignment numbers) for each building.
    - Bev will get information for the leased space occupancy at the Lebanon Center as well as the average client traffic to add to the chart.
- Guests/Events on campus – Julie will do an outreach to conference services for their information as well as to the pipeline piece. Julie will complete the update of the D.1 and D.5 figures/tables with all information when received.
- Scott Krambuhl - Please look at the "Infrastructure" section on Page D-20-21 and indicate any updates needed in the Google doc.

The next section was reviewed for process to collect the information on risk assessment. The questions for the assessment ratings were reviewed for clarity of understanding. Marcene will send out a Google Doc with the questions so each person can do their rating for each hazard on each question. The ratings will be compiled in the risk assessment table to calculate the risk priorities according to hazard. I've attached some resources from the Albany NHMP, the State of OR NHMP, and OR Region 3 plan that you can review prior to doing your hazard assessment survey/ratings in Google.

All hazard analysis ratings are due for input to the Google doc from each updated committee member by January 23rd. The form is here.

The next meeting is February 10th, 2:30-3:30pm. We will look at the Hazard Annexes – Volume 2 of the NHMP which is posted and accessible in Google Drive at:

- Earthquake Annex
- Flood Annex
- Volcanic Annex
- Wildfire Annex
- Wind Storm Annex
- Winter Storm Annex

Also, it will be helpful to review the City of Albany NHMP update summary (which can be seen here) to see if any hazard updates for Albany might apply to LBCC as well.

2017 Natural Hazard Mitigation Plan Update

Natural Hazard Mitigation Update Committee Meeting

Date: _12/12/16_____

Name:	Signature:	Department:
Bev Dunigan		Leb. Ctr.
Dale Stowell		Advancement
Dave Henderson		Finance + Operations
Duane Jensen		
Jeff Davis		
Jess Jacobs		Business Office
Julie Hessel		CFAR
Justene Malosh		Institutional Research
Lara Miller		Ac. Affairs
Lynne Cox		
Marcene Olson		Safety + Loss Prevention
Nicole Ballinger		Advancement
Sally Widenmann		Academic Affairs
Scott Krambuhl		FACILITIES
Vern Smith		IS

FEBRUARY 10, 2017 PLAN DEVELOPMENT MEETING #4 MATERIALS

Today we reviewed the risk assessment and hazard identification section. Committee members were asked to review local hazard history and complete a Google survey to indicate their hazard analysis ratings. Ratings were averaged from responses and the new hazard priority table created. The new ratings placed earthquake, winter storm, wind storm, flood, and climate change as the top priorities respectively.

We reviewed the hazard annexes and some of the areas where updates are needed. Volume 2 of the NHMP which is posted and accessible in Google Drive at:

- Earthquake Annex
- Flood Annex
- Volcanic Annex
- Wildfire Annex
- Wind Storm Annex
- Winter Storm Annex

Updates of history/occurrences of natural hazard events from the City of Albany's recent NHMP update will be forwarded to Julie for entry into the annexes posted in Google for group review. Each member of the update committee needs to review the annexes and make or suggest any updates necessary.

Marcene is working on getting the most current flood plain maps for Corvallis, Albany, and Lebanon added to the flood annex. It was mentioned that concerns around wildfire at the ATTC Center should be added due to its location at the edge of town, surrounded by fields. The ATTC did not exist when the initial NHMP was done.

Items still pending update information on the campus profile section include:

Economic Impacts – Jess and Dave were unable to locate the past survey information. Justene indicated that a new survey is underway and the results will be available for input to the NHMP by fall. Dale will make the updates to this section in conjunction with Justene once the information is available.

- Building values – Appraisals were completed and the report from the appraiser is in progress. Once the information is received back, the values tables will be updates and the new construction information added. Scott and Marcene will work to ensure this information is updated.
- Commute shed maps –Marcene I still attempting to make contact with Ken Kato at the University of Oregon to update the employee travel impact maps that they created for our initial NHMP.
- Occupancy table – Sally's office is going to update information to include occupancy available in classrooms, all buildings, as well as office space.
    - Bev will get information for the leased space occupancy at the Lebanon Center and add average client traffic to add to the chart.
- Scott Krambuhl - Please look at the "Infrastructure" section on Page D-20-21 and indicate any updates needed in the Google doc.

The next meeting is April 19, 11am-12pm in the Boardroom. We will review work done on the Hazard Annexes and look ahead to mitigation strategies and action items - Vol. 1, Sec. 3 & Appendix

A – LBCC NHMP. Watch for these sections to be added and shared from Google prior to the next meeting.

2017 Natural Hazard Mitigation Plan Update

Natural Hazard Mitigation Update Committee Meeting

Date: _2/10/17_____

Name:	Signature:	Department:
Bev Dunigan		
Dale Stowell	Dale Stowell	Advancement
Dave Henderson		F + O
Duane Jensen		
Jeff Davis		Benton Ctr.
Jess Jacobs		Business Office
Julie Hessel	Julie Hessel	CFAR
Justene Malosh		Institutional R
Lara Miller		Ac Affairs
Lynne Cox		
Marcene Olson		Safety + Loss Prev.
Nicole Ballinger		Advancement
Sally Widenmann		Academic Affairs
Scott Krambuhl	Scott Krambuhl	FACILITIES
Vern Smith		

MAY 05, 2017 PLAN DEVELOPMENT MEETING #5 MATERIALS

Today we reviewed the Volume II Hazard Annexes. Most of the updates are complete for this section except for the future mitigation actions (to be determined at the July 17th meeting). Committee members were asked to review l the past action item list (see page 89-90 of the final NHMP document from 2012) and make suggestions about what we should have on the action item chart going forward – complete/deleted items, keep on-going items, add new items. I provided a Google shared link to a blank Action Item template. What we put on this chart informs updates in a number of our sections - Appendix A and each of the hazard sections.
Items still pending update information on the campus profile section include:

- Economic Impacts – Jess and Dave were unable to locate the past survey information. Justene indicated that a new survey is underway and the results will be available for input to the NHMP by fall. Dale will make the updates to this section in conjunction with Justene once the information is available.
- We are still needing the values of the AC mural and the history walk on the south side of campus to add to our cultural assets section.
- Commute shed maps –Marcene is still attempting to make contact with Ken Kato at the University of Oregon to update the employee travel impact maps that they created for our initial NHMP; however, this looks like it may have to be done by our own IR department.
- Occupancy table – Sally's office is going to update information to include occupancy available in office space by building.
    - Bev, did you get information for the leased space occupancy at the Lebanon Center and add average client traffic to add to the chart?
- Scott Krambuhl - Please look at the "Infrastructure" section on Page D-20-21 and indicate any updates needed in the Google doc.

The next meeting is July 17th, 3pm, in the Boardroom. We will review work done on the Appendix A – LBCC NHMP and the action items. Sections for the August 7th meeting will be introduced - Vol. 1, Sec. 4 & Appendix B – LBCC NHMP – at this time as well. Part of the final section will include how we present the NHMP plan/updates to our community. Think about how we can effectively do this and have it documented in our update for presentation to FEMA.

2017 Natural Hazard Mitigation Plan Update

Natural Hazard Mitigation Update Committee Meeting

Date: _5/5/17_____

Name:	Signature:	Department:
Bev Dunigan		
Dale Stowell		
Dave Henderson		
Duane Jensen		
Jeff Davis		
Jess Jacobs		
Julie Hessel		
Justene Malosh		Institutional Research
Lara Miller		AA
Lynne Cox		
Marcene Olson		Safety + Loss Prevention
Nicole Ballinger		
Sally Widenmann		Acad. Aff
Scott Krambuhl		FACILITIES
Vern Smith		

JULY 17, 2017 PLAN DEVELOPMENT MEETING #6 MATERIALS

Today we reviewed the Mitigation Resources section and discussed the Action Item matrix. Marcene will move the completed actions from the initial NHMP to a separate table, leave the ongoing or items pending completion, and add any new items mentioned today. We will discuss at the August meeting any other items to be included. What we put on this chart informs updates in a number of our sections - Appendix A and each of the hazard sections.

We discussed briefly the plan implementation process. The first of October, Dale plans to post the draft NHMP plan to the LBCC web forum for comment and provide a radio and newspaper announcement. Comments will be closed by 10/15. The draft will at some point need to go to the board for approval and then the draft proceeds to Oregon Emergency Management for review and forwarding to FEMA by the end of November.

Items still pending update information on the campus profile section include:

- Economic Impacts –Dale will make the updates to this section in conjunction with Justene once the information is available.
- Jess to provide the values of the AC mural and the history walk on the south side of campus to add to our cultural assets section.
- Commute shed maps –The CAD department at the City of Albany is planning to create the employee travel shed map updates. Justene is providing the employee address files.
- Occupancy table – Lara is updating information to include occupancy available in office space by building – to include the centers and new buildings.
    - Bev, did you get information for the leased space occupancy at the Lebanon Center and add average client traffic to add to the chart?
- Scott Krambuhl – Updates pending

The next meeting is August 7, 2017, 2pm, in the Boardroom. We will review the action item chart and the updates needed for the Executive Summary, Volume I, Section B.

2017 Natural Hazard Mitigation Plan Update

Natural Hazard Mitigation Update Committee Meeting

Date: _7/17/17_____

Name:	Signature:	Department:
Bev Dunigan		
Dale Stowell	X	Advancement
Dave Henderson		Fin + Ops
Duane Jensen		
Jeff Davis		Benton
Jess Jacobs		Bus. Off.
Julie Hessel		
Justene Malosh		IR
Lara Miller		AcAfs
~~Lynne Cox~~		
Marcene Olson		
Nicole Ballinger		
Sally Widenmann		Academic Aff
Scott Krambuhl		Facilities
Vern Smith		

AUGUST 7, 2017 PLAN DEVELOPMENT MEETING #7 MATERIALS

Today we the Action Item table and completed it for the update plan period. Appendix A Action Item Forms were discussed and assigned to committee personnel:

- Multi Hazards (MH) Items – MH 1, 2, 3 – Jess
- Multi Hazards (MH) Items – MH 4 – Sally
- Dam Failure (DF) Items – DF 1, 2 – Nicole
- Flood Hazard (FH) Items – FH 1, Julie
- Utility Failure (UF) Items – UF 1 – Julie
- Severe Weather (SW) Items – SW 1, 2 – Jeff
- Wildfire (WF) Items – WF 1 – Marcene
- Earthquake Hazards (EH) EH 1, 2, 3, 4, 5 – Marcene

Dale has the information on economic impact and will be updating that section. The values of the mural and the history walk have been provided by Jess and will be incorporated in the cultural assets section of the campus profile. Marcene will finish the Climate Change Annex and Justene and Marcene will work on completing the Executive Summary section.

The minutes and agenda from the NHMP update meetings will be forwarded to Justene to include in Appendix B, Planning Process.

The plan for the implementation process still remains as, Dale posting the draft NHMP plan to the LBCC web forum the first of October for comment and will provide a radio and newspaper announcement. Comments will be closed by 10/15. The draft will go to the board as information and comment in October and for approval after FEMA approves the plan.

Items still pending update information on the campus profile section include:

- Commute shed maps –The CAD department at the City of Albany is planning to create the employee travel shed map updates. Justene is providing the employee address files.
- Occupancy table – Lara is updating information to include occupancy available in office space by building – to include the centers and new buildings.
    - Bev, did you get information for the leased space occupancy at the Lebanon Center and add average client traffic to add to the chart?
- Scott Krambuhl – Updates pending

The next meeting is September 15 , 2017, 2pm, in the Boardroom. We will review the draft plan before sending on to Oregon Emergency Management.

2017 Natural Hazard Mitigation Plan Update

Natural Hazard Mitigation Update Committee Meeting

Date: _08/07/17_____

Name:	Signature:	Department:
Bev Dunigan		
Dale Stowell		
Dave Henderson		F+O
Duane Jensen		
Jeff Davis		Benton Co. / Benton CWI
Jess Jacobs		Business Office
Julie Hessel		CFAR
Justene Malosh		Institutional Research
Lara Miller		
Lynne Cox		
Marcene Olson		Safety & Loss Prev.
Nicole Ballinger		Advancement
Sally Widenmann		Sally Widenmann
Scott Krambuhl		
Vern Smith		

SEPTEMBER 15, 2017 PLAN DEVELOPMENT MEETING #7 MATERIAL

The draft 2017 Updated NHMP was reviewed today. Justene has made the plan available in Google docs in our NHMP folder for review by all committee members. Please write click on the doc and download it as a PDF to your computer so you see the full version without all the formatting stripped out.
Especially review the following:

- Executive summary showing the overview of changes from the 2012 plan
- Any updates you know that were submitted in Google docs to ensure they've been captured, added, and/or updated
- Climate Change hazard annex
- Campus profile appendix

It appears that we are still waiting on the update for economic impact. Marcene will contact Dale. Please provide any new updates to Justene via an email directly to her by the close of business on Wednesday, September 20th. She will need to put the information into the PDF draft. Do not try to put any new updates in the Google docs.
The plan for the implementation process still remains as, Dale posting the draft NHMP plan to the LBCC web forum the first of October for comment and will provide a radio and newspaper announcement. Comments will be closed by 10/15. The draft will go to the board as information and comment in October. After that, it moves on to OR Emergency Management and then from there to FEMA for review and approval. The document should come back to the board in January for adoption. after FEMA has approved the plan.

Natural Hazard Mitigation Update Committee Meeting

Date: _9/15/17_____

Name:	Signature:	Department:
Bev Dunigan		
Dale Stowell		
Dave Henderson	Dave Henderson was present	VP Finance + Ops
Duane Jensen		
Jeff Davis		Benton Ctr
Jess Jacobs		Business Office
Julie Hessel		
Justene Malosh		IR
Lara Miller		AA
Lynne Cox		
Marcene Olson		Safety + Loss Prevention
Nicole Ballinger		
Sally Widenmann		
Scott Krambuhl		FACILITIES
Vern Smith		

2012-2017 PLAN MAINTENANCE PROCESS

2012-2017 ACTION ITEM TIMELINE AND STATUS

Priority	Est. Cost	Proposed Action	Responsible Areas To Complete Action	Proposed Timeline	Notes	
High	Low	Develop an all-hazards campus outreach strategy	Safety & Loss Prevention, College Advancement, Student Affairs, Safety Committee (take back to departments)	Winter term 2014 initiation	Outreach to do department meeting presentations (15 min. Road Show); work with College Advancement to publicize efforts. Encourage BECs during BEC Training to make departments aware of NHMP as part of emergency planning continuum.	Ongoing – 5 presentations done or scheduled through June 2015
High	Low	Prioritize the use of seismically sound buildings for classroom use	Academic Scheduling, Academic Affairs	Winter 2014		Ongoing – new scheduling team to evaluate
High	Low	Implement non-structural activities (identify & rectify problems) to secure hazardous objects & materials throughout campus	Tier I & II safety auditors, Facilities, Safety & Loss Prevention. Areas with HazMat	Ongoing – each term; Winter 2014 Emphasize in Tier I & II audits to review and list any items needing EQ mitigation.	Submit work orders to facilities. Look at longer term plan to secure sprinkler pipes, ceiling lights, and ceiling tiles in areas that will not be remodeled in next 5 years. For any planned remodels, plan mitigation into the work.	Ongoing with quarterly safety audits (including reminders of such)
High	Low	Identify and catalog campus trees that pose a threat to campus critical infrastructure & pedestrian safety in a winter or windstorm	Facilities - Grounds	Spring 2014	Work to start by grounds in Fall 2013. Duane will map on CAD.	Done, Map posted on Emergency Maps web page
High	Low	Develop a hazardous tree policy to manage hazard prone trees in high pedestrian areas	Ground	Spring 2014	Work to start by grounds in Fall 2013. Grounds/Facilities will work on standard protocols/processes to deal with trees. Duane will map on CAD.	Hazardous tree management plan done by grounds. Done & posted
High	Low	Identify safe pedestrian routes throughout campus during severe winter/wind events	Safety & Loss Prevention, Facilities (CAD mapping)	Fall Term 2013	SLP to identify paths, facilities to confirm, Duane to do path/traffic mapping on CAD – green route, yellow, route, red route	Done. Map & information posted to website.
High	Low	Develop a prioritization strategy for seismic retrofit of buildings	Facilities, Finance & Ops, Academic Affairs		1st level assessments done. 2nd level assessments done on buildings being submitted for seismic grant requests – Takena, Red Cedar, IA, Willamette Hall, Calapooia. Done in conjunction with remodel plans and submission of seismic upgrade grants.	Takena seismic grant received. Applying for additional seismic grants for 2016 awarding period.
Medium	Low	Identify "safe rooms" at each campus to be used for sheltering during extreme weather events	Safety & Loss Prevention	December 2013	Scott, Duane, Marcene do walk through mid-Oct. to locate rooms. Duane to map. See: http://www.linnbenton.edu/files/dmfile/CampusSafetySet06-04-142.pdf	Done. Identified in map on Public Safety website with green hash marks. -
Medium	Unknown	Coordinate with Linn Cty & City of Albany Public Works to mediate storm water drainage obstructions (PL #4)	Facilities	Fall 2013	Scott to talk with Public Works about annual inspection.	Scott discussed with city. They do not do inspections.
Medium	Unknown	Assess potential for flooding at ATTC	Safety & Loss Prevention	Dec. 2013		Done - Flood maps do not indicate flood zone or pass through flooding
Medium	Moderate	Identify funding to purchase additional generators to support campus operations	Institutional Research (grants), Finance & Ops, budget	?	Partial estimate by EC to provide emergency power to IS is $60,000.	?Funding source not identified
Medium	Low-Mod.	Install air intake covers to prevent the intake of ash in the event of volcanic activity	Facilities	Fall 2013	Facilities to purchase roll of filter materials for use in covering intake filters in the case of volcanic eruption	filters located and purchased. Ready to install as needed.
Medium	Low-Mod	Create defensible space around the horse center	Grounds/facilities	?	Will contact AFD for suggestions on developing this space	Consulted with AFD. They recommend maintaining a green, irrigated space behind the buildings and up to the tree area to the south of the center.
Low	Moderate	Conduct Seismic assessment/retrofit comparisons on SC, CC, Tk	Finance & Ops; Facilities	Winter 2014 to get estimates for a Structural Engineer to assess & recommend options	See information above of seismic priority development. Level one assessment done. Level 2 done on Takena, RCH, & IA with grant app.	Takena seismic grant received. Work to be done 2016. Applications being submitted for 2016 awarding – Remaining bldgs. For Level 2 assessemtns
Low	Unknown	Coordinate with Linn & Benton Cty. Emerg. Mgmt. to develop evac plan for all campuses in event of dam failure.	Safety & Loss Prevention	Spring 2014	Marcene to review county plans & write a suggested plan. Include evac notification procedures. (Linn Benton Alert – publicize sign up to system)	Done 1/28/15 with information known. Counties do not have a full evacuation plan.

AUGUST 13, 2013 NHMP ACTION MEETING MINUTES

Natural Hazard Mitigation Plan Steering Committee Meeting Minutes/Follow-up

Marcene Olson <olsonm@linnbenton.edu> 4:40 PM (4 minutes ago)

to Betty, Dale, Duane, Jim, Lynne, Scott

Greetings All!

Below is a link to view the final NHMP as reviewd and approved by FEMA.

https://docs.google.com/file/d/0BzdCtwPun5VqS3JWeUtaWmJiZUU/edit?usp=sharing

A few of us from the steering committee were able to meet this week to initiate some prioritization and timelines for the action items in our plan. We need to meet twice a year to review progress on action items and change priorities as necessary.

Some items identified in the plan as a high priority and low cost were considered items we can initiate this year. Attached is a table of the action items and some initial timelines on a few of the items. Others are pending conversations with action implementors and stakeholders.

Please let me know if you have questions, suggestions, concerns.

Thanks,
Marcene

ActionItemPriorities_Timelines.docx
17K View Download

FEBRUARY 12, 2014 NHMP ACTION MEETING MINUTES

Focus Items

1. Action Item List Status
   - Items Completed – safe pedestrian route maps for inclement weather; determination was made that ATTC is not in a floodway; facilities has identified filters for air intakes in the instance of volcanic activity but the filters still need to be purchased
   - Items Pending – action item list updated with status of items and resent to committee members. Since Scott was not able to attend, information is pending on whether a discussion was completed with Albany Public Works regarding inspecting storm drains in the area. Also, an estimate needs to be obtained on getting a structural engineer to do seismic upgrade assessments and rough estimates on building retrofits for planning purposes.
   - Timeline for future action items- due to Linn and Benton Counties' current work starting on area evacuation plans, the LB work toward a mass evacuation plan is being delayed until at least Fall 2014.
2. Issues/Obstacles/Concerns for Completing Action Items

Follow-up Items

1. Potential projects subject to NHMP - ? re-purposing of IA, IC, possibly Takena. New construction, of course.
2. Updated action item list to be sent to committee members.
3. _____
4. _____

Next Meeting

May 28, 2014 – 2:30pm, Mt. Jefferson

MAY 28, 2014 NHMP ACTION MEETING MINUTES

Attendees: Betty Nielsen, Marcene Olson, Scott Krambuhl, Dave Henderson

The action item list was reviewed. Items completed include:

- Safe pedestrian route designations and mapping
- Identification of winter storm safe rooms. Indications on mapping yet to be completed.
- It was determined that ATTC is not in a flood plain mapping.
- Filter materials have been located that can be used in the HVAC system in the aftermath of a volcanic eruption. Still to be purchased.

Items to be addressed before next meeting:

- All-hazards campus outreach - Marcene will ask divisions to invite her to a departmental or division meeting to talk about the NHMP.
- Implement non-structural seismic activities – Mindy to request in all term safety audits that seismic mitigation needs be identified and submitted on work orders.
- Ground to identify and catalog campus trees.
- Grounds/facilities to identify a hazardous tree policy to manage potential tree hazards.
- Do the mapping of the winter storm safe rooms identified.
- Scott to talk with the City of Albany about annual inspection of the storm drain by PL4.
- Betty to talk with the grant writer about grant opportunities for a generator that would support main administrative and food services functions in the Calapooia Center during an emergency.
- Purchase the HVAC filter materials to be installed in the case of volcanic eruption
- Marcene to consult with AFD regarding a defensible space around the horse center in the case of wildland fire.
- Have an engineer assess main campus buildings for structural seismic upgrade needs, options available, and rough cost estimates.
- Marcene to connect with Linn and Benton counties/local cities to provide input to full campus evacuation planning in large scale emergencies.

Next meeting, November 26th, 2014.

NOVEMBER 25, 2014 NHMP ACTION MEETING MINUTES

Attendees: Son Le Hughes, Marcene Olson, Scott Krambuhl, Dave Henderson, Duane Jensen, Dale Stowell

The action item list was reviewed. Items completed include:

- Mapping of winter storm safe rooms has been completed and is available under Emergency Maps at the Public Safety web site.
- All-hazards campus outreach: Marcene has conducted presentations at 3 department/division staff meetings. This offer to provide presentations will continue.
- Grounds/facilities has created a hazardous tree management plan. Mapping of hazardous trees will be added to the safe pedestrian route map posted at the Public Safety web page. There was a short discussion about how we might sign safe routes for easy identification by pedestrians.
- Filter materials have been purchased to be used in the HVAC system in the aftermath of a volcanic eruption.
- An engineer was hired to do a seismic assessment (level I survey) of the buildings on main campus and a priority for seismic work was determined as a result. The engineer provided a level II assessment on the priority buildings and a rough estimate of cost for seismic work. Grants were applied for to conduct mitigation work on 3 buildings – Red Cedar Hall, Takena Hall, and IA.
- Scott talked with the city about an annual inspection of the storm drain by PL 4. The city indicated that it does not do annual inspections. However, work has recently been done on the storm sewer attached to PL4 to mitigate any flooding activity.

Items to be addressed before next meeting:

- Complete the campus tree inventory.
- Implement non-structural seismic activities – Mindy to request in all term safety audits that seismic mitigation needs be identified and submitted on work orders.
- Have the engineer do a level II survey of the remaining seismically vulnerable buildings and provide a high level estimate of costs to do the mitigation work so the figures are ready and available for any future grant opportunities or remodel work that could incorporate the necessary mitigation.
- Dale to talk with foundation board member about LBCC's needs for a generator that would support main administrative and food services functions in the Calapooia Center during an emergency.
- Marcene to complete work on LBCC's evacuation plan for large scale emergencies integrating with the current plans of the cities of Albany, Corvallis, and Lebanon.

New projects subject to NHMP:

- Remodels planned with the bond measure will need to incorporate seismic upgrades wherever work is done at a full structure level.
- Landscaping plans on all new construction will need to be reviewed to ensure they coincide with the tree management plan.
- Safe rooms will need to be identified with all new structure and added to the web maps.

Next meeting, May 27th, 2015.

MAY 27, 2015 NHMP ACTION MEETING MINUTES

Focus Items

1. Action Item List Status
   - Items Completed –
   - Items Pending –
   - Timeline for future action items-
2. Current Status of Seismic Retrofits
3. Potential Needs/Concerns with New Construction Projects Related to NHMP
4. Timeline for 2017 NHMP Updates and Submission

Minutes:

Present: Duane Jensen, Scott Krambuhl, Marcene Olson

1. Most action items are complete. The hazardous trees need to be indicated on the CAD mapping and the mapping uploaded to the NHMP web site area. Duane will send the CAD document to Marcene for posting to the web.
2. Scott reports that seismic level I assessments were done on all buildings. Level 2 assessments were done by the engineer in regard to the seismic grant request last year for Takena Hall, RCH, & IA. A priority listing for seismic upgrades was done. Scott will send the list to Marcene. Next year we will look at having the Level 2 assessment done on the next 3 buildings on the priority list.
3. Seismic retrofits will, hopefully, be done as remodels and repurposing projects are done. IA and IC might be potentials for upgrades during the remodel process. As far as concerns for natural hazard mitigation on new projects:
   a. Part of the parking structure at the BC will be in the flood plain.
   b. ATTC might be subject to wildland fire hazards. However, the driveway and asphalt buffer and metal buildings should provide the needed safety zone to prevent damages.
4. Next May Marcene will provide a timeline with meeting dates and section topics to start work on the NHMP updates due to FEMA by November of 2017. Marcene will check with the Center for Disaster Resiliency to see if they will be able to provide help and/or guidance with the update process. They may be willing to contract some time to assist.
5. Next meetings:
   a. November 24, 2015 – 10am, Mt. Jefferson
   b. May 26, 2016 – 2:30pm, Mt. Jefferson

NOVEMBER 24, 2015 NHMP ACTION MEETING MINUTES

Focus Items

1. Action Item List Status
   - Items Completed –
   - Items Pending –
   - Timeline for future action items-
2. Current Status of Seismic Retrofits
3. Potential Needs/Concerns with New Construction Projects Related to NHMP
4. Timeline for 2017 NHMP Updates and Submission

Minutes:

Present: Duane Jensen, Scott Krambuhl, Dave Henderson, Dale Stowell, Lynne Cox, & Marcene Olson

1. Most action items are complete. A list of buildings needing seismic securing of sprinkler system, ceiling light fixtures, and ceiling tile frames is going to be compiled and prioritized by Scott for future deferred maintenance projects or in conjunction with lighting upgrade projects and planned construction/remodel projects. Dale is going to ask a representative of Pacific Power if there are any programs currently that could assist LBCC in developing generator/back-up power for critical areas/systems on campus during an extended power outage. Scott indicated that we need to hire an electrical engineer to do a study for determining our power needs during a power outage, what would need to be done to supply those needs and meet our priorities, and an estimate of what it would cost. Scott estimates that such a student would cost $10,000-12,000.
2. Takena Hall was awarded a seismic upgrade grant and will have work done this upcoming summer. Scott reports that seismic level 2 assessments are now being done by the engineer in regard to the seismic grant request for Willamette Hall and the Calapooia Center along with updates for Red Cedar Hall and IA. These four buildings will be submitted by December 31st for the current round of seismic upgrade grants.
3. Seismic retrofits will be done as remodels and repurposing projects are done. IA might be a potential for upgrades during the remodel process.
4. Jess Jacobs, Andrew Feldman, Sally Windeman, Michael Quiner, Russ Rinker, Tracy Dusseau, Scott Rolen, Toni Morrison, and Bev Dunnigan have been recommended and invited to join the NHMP steering committee starting with the May meeting. Marcene will provide a timeline with meeting dates and section topics to start work on the NHMP updates due to FEMA by November of 2017. Marcene will check with the Center for Disaster Resiliency to see if they will be able to provide help and/or guidance with the update process. They may be willing to contract some time to assist.
5. Next meetings:
   a. May 26, 2016 – 2:30pm, Mt. Jefferson

JUNE 7, 2016 NHMP ACTION MEETING MINUTES

Focus Items

1. Need for 2017 NHMP Update.
    a. How will we approach the update? Should we write ourselves or contract with U of O's Center for Disaster Resiliency?
        i. It was decided that we should write the updates ourselves using representation from across campus.
2. Timeline for update process
    a. It was decided that meetings should occur every other month in the 2016-2017 academic year
        i. A topic/section review schedule will be sent out to all committee members along with meeting dates/locations and the City of Albany 2015 NHMP Update.
3. Update committee membership
    a. It was decided that additional members were needed on the steering committee on an ongoing basis to include – Vern Smith from IT and the new grants person, Nicole Ballinger
    b. Additional input is needed from some areas on the update writing committee:
        i. Possibly Justene Malosh from Institutional Research for data updates needed as well as compilation of the updates into a single document. Dave is going to talk with Justin about Justene being included.
        ii. Academic perspective – possibly Sally Widenmann
        iii. Course scheduling – will invite Lara Miller
        iv. Workforce Development – to represent LBCC's value to the economic vitality of the representative communities. Will as Gary Price/Jason Kovac for a representative.
        v. Center for Accessibility Resources – will ask Carol Raymundo and/or Lynne Cox for a representative
        vi. HR representative?
        vii. Center representatives – Bev Dunigan and Lin Olson's replacement?

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 FEMA 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, and Federal Emergency Management Agency Publication 331. 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, FEMA, 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.

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 and avoiding future damages. 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, potentially 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 that 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: they may be mandated by a regulation or standard, or they may be economically justified on their 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 that 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 the community. 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.)

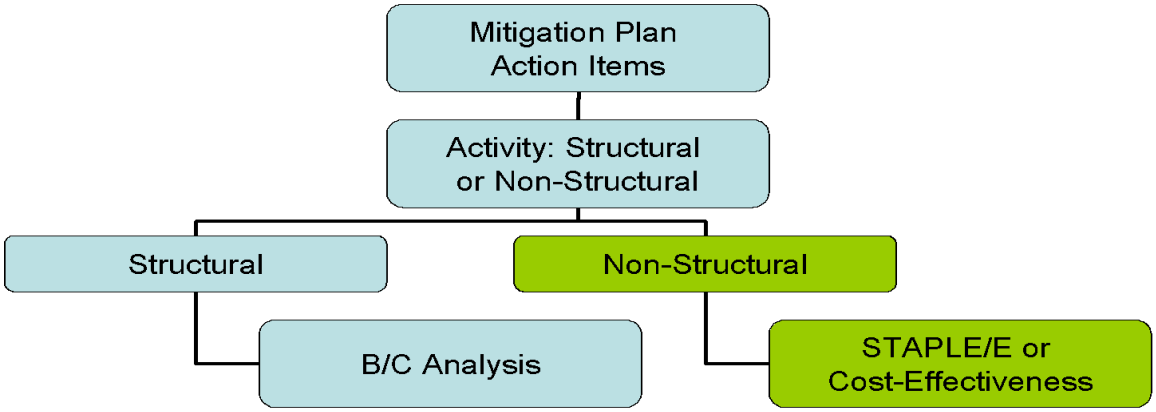
Environmental: Watershed councils, environmental groups, land use planners, and natural resource managers can help answer these questions.

- 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.



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.

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

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APPENDIX D: CAMPUS PROFILE

INTRODUCTION

The purpose of this section is to provide the context in which current and future emergency management activities are, and will be, implemented. It presents information about the community college population, departments, economic generation, built environment, and essential facilities.

LBCC, located in Albany, Oregon, functions like a small community. The college is a workplace facility for faculty and staff, a place of learning for students, and a cultural center for Albany, Corvallis, Lebanon, and Sweet Home. LBCC offers transfer degrees, applied degrees, and a wide variety of certificate programs. The community college is a crucial economic component within the state and the Willamette Valley. College activities encourage new business, assist existing business, and create long-term economic growth. Through education, training, and skill building, community colleges provide a pathway to a four-year degree, enhance occupational capacity, and provide customized training to local business and industry.[49] Keeping the business functions of the community college running is vital to both the college and the surrounding communities.

Moreover, LBCC is a significant resource for the Albany area during a disaster event. The college may be called upon by the city or county to provide shelter, resources, or other functions for the community at large. Every threat presents a unique set of issues to the college. Thus, the focus of this section is to detail the geographic, human, economic, and built aspects of the campus and examine them in relation to hazard mitigation as well as explore various aspects of the college that make it unique.

CAMPUS POPULATION AND OCCUPANCY

Preparedness, response, recovery, and mitigation/prevention activities must take into account the size and distribution of the campus community and its dynamic blend of students, faculty, staff, and visitors. Effective preparedness, risk reduction, response, and recovery must be tailored and context-specific because there is no one-size-fits-all strategy. As a teaching institution, LBCC has the opportunity to educate students about personal responsibility for hazard risk reduction while working with campus administration and departments to implement emergency management activities.

To appropriately plan mitigation strategies, it is essential that LBCC recognize the campus assets of greatest vulnerability. Therefore, it is important to know what areas of campus are most populated during hours of operation. Identifying buildings and facilities that have the greatest occupancy, and whether those occupants are students or employees, supports effective and targeted emergency management activities.

[49] CCbenefits. Fact Sheet: The Economic Impact of Linn Benton Community College -- July 2017.

DEMOGRAPHICS

During the 2015-2016 school year, the college enrolled 19,484 students (4,334 full-time, 7,521 part-time, and 7,629 non-credit). The college also offered both credit and non-credit classes in community centers in Corvallis, Lebanon, and Sweet Home. It is imperative to consider the campus population in the outlying centers in preparing for hazards. LBCC records indicate that 5,687 students attended the Benton Center, 1,474, attended the Lebanon Center, and 372 students attended the Sweet Home Center in 2015-16.

The majority of students (72%) reside in Linn and Benton Counties, while 23% are from other Oregon counties and 3% are from out-of-state. LBCC has a significant international student population that accounts for 3% of the student body. Students from within the district may be more aware of the potential hazards and threats that can affect the campus. Additionally, these students may have a local support system and be less dependent on the campus in the event of an emergency. It is important to note that students can secure in-district enrollment after 90 days of classes at LBCC. Thus, some students who register as in-district may not have as effective support structures if they are relatively new to the area.

Enrollment by Residence			
Attendance	**2013-14**	**2014-15**	**2015-16**
In-District	15,966	14,805	13,884
Benton County	7,285	6,780	6,375
Linn County	8,681	8,025	7,509
Out-of-District	4,453	5,191	5,600
Other Oregon Counties	3,537	4,158	4,520
Out-of-State	476	556	600
International	440	477	480
Total	20,419	19,996	19,484

Source: Linn-Benton Community College. Fast Facts. 2016

Most LBCC students are between the ages of 18 and 65. This age group is likely to have better access to resources and possess a heightened ability to react to hazardous situations than those who are younger or older. However, there remains a population of students under 18 who may have less access to resources and be heavily reliant on parents and/or guardians who may, in turn, be reliant on LBCC for information related to their children's safety on campus. The population over 65 compose a very small portion of the LBCC community; however, they may be more vulnerable and less able to react to emergencies due to health, mobility, and transportation limitations.

Enrollment by Age (Fall Term Only)			
Age	**2013-14**	**2014-15**	**2015-16**

Under 18	520	391	631
18 – 25	4,470	4,498	4,698
26 – 45	2,834	2,414	2,379
Over 45	2,628	2,172	1,990
Total	10,452	9,475	9,698

Source: Linn-Benton Community College. Fast Facts. 2016

The on-campus Kidco Head Start, located in the Periwinkle Child Development Center, offers childcare and pre-school education to the employee and student populations at LBCC. The center offers care to children from birth to age five. The center is open Monday through Friday from 7:30 a.m. to 5:15 p.m and has 19 staff whose hours vary depending on job description. The center is closed to children during the summer but will typically have two to five staff members on site during this time. Even though these children are not enrolled students, they reside on campus during normal business hours and require special consideration in mitigation and planning for their safety.

LBCC has certain English proficiency requirements in order to enroll at the college. Thus, most students have the capacity to understand emergency response plans, recognize hazardous areas, and react to emergency directions. However, some student populations may possess limited English comprehension. Furthermore, some students are second-generation Americans, and their parents may have limited English-speaking abilities.

Enrollment by Ethnicity			
Ethnicity	**2013-14**	**2014-15**	**2015-16**
Asian	593	567	568
Black	148	144	161
Native American	237	195	181
Pacific Islander	57	51	52
Hispanic	1,380	1,438	1,516
Caucasian	17,585	17,161	16,489
Two or more races	419	440	517
Total	20,419	19,996	19,484

Source: Linn-Benton Community College. Fast Facts. 2016

OCCUPANCY

Classroom occupancy is most common during weekday mornings and afternoons. The buildings with the highest student maximum capacity are Industrial A (488 persons), North Santiam Hall (412 persons), and White Oak Hall (339 persons) on the main campus.[50] While maximum capacity does not indicate the actual number of students occupying the facility, it

[50] LBCC. Fall 2012 Building Usage Report. Accessed June 26, 2012.

provides the maximum allowed occupancy. During weekday mornings, there is the potential for up to 1,510 students within these facilities at any given time.

During the summer class session (June through September), attendance is significantly lower than compared to the rest of the year. While building maximum capacity remains the same, there are far fewer students on campus occupying these facilities.

FACULTY AND STAFF

DEMOGRAPHICS

The college employs approximately 1,084 personnel, of which 48% are faculty. The ratio of staff, including both full- and part-time, to students across the various satellite campuses is approximately 1 to 22. Full-time faculty and staff make up 37% of all employees.

Employees by Group Classification			
Employee Group	**2013-14**	**2014-15**	**2015-16**
Full-Time Faculty	136	140	135
Part-Time Faculty	336	330	346
Total Faculty	472	470	481
Full-Time Classified	196	200	192
Part-Time Classified	176	181	192
Total Classified	372	381	384
Professional Staff	51	59	65
Total Professional Staff	51	59	65
Total Employed	895	910	930

Source: Linn-Benton Community College. Fast Facts. 2016

OCCUPANCY

Along with the student population, LBCC's faculty and staff are a critical component of the campus community. Employees are dispersed throughout almost every building on campus. Calapooia Center, Takena Hall, and Willamette Hall each contain more than 50 staff offices per building, which suggests that these three buildings contain the largest numbers of employees during the workday. Occupancy estimates, however, do not take into account the movement of employees across campus during the day. This is especially important when considering employees that are not based in an office or those that may be highly mobile (e.g. IT technicians, maintenance workers, custodial staff, etc). Staff and faculty mobility between satellite campuses is also an important planning consideration; depending on class and teaching schedules, faculty may be at any given campus throughout the year.

Building Name	Number of Staff Offices
Calapooia Center	72

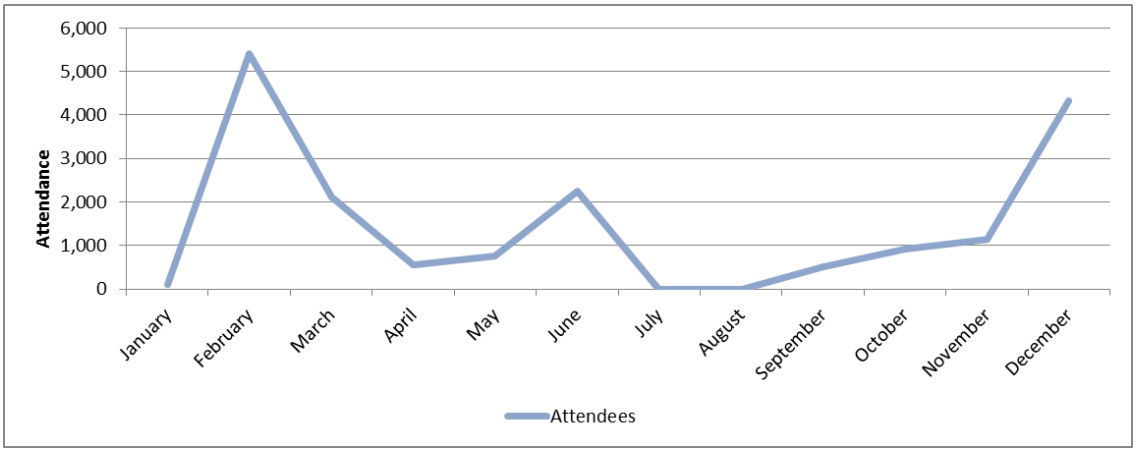
Takena	62
Willamette Hall	53
Healthcare Occupation Center	50
White Oak Hall	35
Luckiamute	31
Industrial A	26
McKenzie Hall	23
South Santiam Hall	23
Service Center*	21
Red Cedar Hall	18
North Santiam Hall	17
Activity Center	12
Forum	8
Madrone Hall	8
Industrial B	5
Industrial C	5

*Most offices are for custodial staff who are typically elsewhere when on campus.
Source: Linn-Benton Community College.

VISITORS

Visitors are a significant component of the LBCC campus. There are various activities and events that attract groups of visitors to the college, including sporting events. The main campus in Albany also hosts several cultural activities that draw the public to campus facilities. The college has three art gallery spaces. The Russell Tripp Performance Center, located in Takena Hall, hosts roughly 10 theater, music, and dance performances throughout the year.

The satellite centers in Corvallis, Lebanon, and Sweet Home also provide community education opportunities and host various events throughout the year that attract local community members.



Source: LBCC

Event (Multiple)	Attendees	Time of Year	Location
Women's Volleyball	250	Sept-Nov	Activity Center
Men's Basketball	200	Jan-Mar	Activity Center
Women's Basketball	200	Jan-Mar	Activity Center
Men's Baseball	70-90	Mar-May	Baseball Diamond
Community Soccer Club	75-90	Aug-Nov	Northwest Field
Community Baseball	50	Jun-Jul	Baseball Diamond
Pop Warner Football	30	Sept-Nov	Outside Field
Karate For Kids Tournament	200-250	Varies	Activity Center
Theater	75-300	Sept-Jun	Russell Tripp Theater
Musicals	250	Sept-Jun	Russell Tripp Theater
Community Events	150	Varies	Varies
Conference Services (Outside events)	6,900	Varies	Varies
Culinary Arts Events	6,900	Varies	Varies
Pipeline Outreach		Varies	Varies
Department of Human Services	135	Daily	Lebanon Center
Oregon Employment Department	45	Daily	Lebanon Center
Event (Single)			
Family Connections Fundraiser	600-800	Spring	Activity Center
Advising Center Career Fair	600	April	Activity Center
High School Youth Job Fair	1600	Dec	Activity Center

Source: LBCC

OVERNIGHT POPULATION

LBCC does not own or operate student housing; however, LBCC students dually enrolled with Oregon State University can opt to live in Oregon State University campus housing. Although the college does not have direct responsibility for students living in non-university owned housing, it should consider the impact of an emergency on these people and develop tailored emergency management plans to accommodate a potential influx of students relying on campus resources.

ECONOMIC GENERATION

Colleges serve as a tremendous economic asset but also represent significant vulnerabilities. A 2017 report titled *The Economic Impact of Linn-Benton Community College* found that "LBCC and its students added $395.3 million in income to the [local] economy, approximately equal to 4.6% of the region's total gross regional product."[51] Colleges support economic resilience as enrolled students often see increased earnings, benefiting taxpayers through an enlarged economy and lower social costs. The community can benefit from increased job and investment opportunities, higher business revenues, greater availability of public funds, and an eased tax burden.[52]

[51] Robinson and Christopherson, CCbenefits, The Economic Contribution of Linn Benton Community College 2017.
[52] Robinson and Christopherson, CCbenefits. Economic Contribution of Community Colleges in Oregon. 2006.

COLLEGE REVENUE

Operating revenues generated by tuition and fees, bookstore sales, food sales, student financial aid, and grants accumulated to almost $36.2 million in 2015-2016. Operating revenues fund instruction costs, student services, plant operations, and various student scholarships and grants. LBCC generates business income from the campus, community centers, and the Horse Center. LBCC generated approximately $34.2 million in other revenues in 2016. Altogether, with tuition, fees, business revenue, and other sources of revenue, LBCC generated over $70.4 million in 2016.

LOCAL BUSINESS DEVELOPMENT IMPACT

LBCC meets the needs of business and industry through information sharing, referrals, and services. The Business and Employer Services Department provides training for employees of local companies in a broad array of subjects, fields, and job contexts. During 2010-2011, LBCC established 43 employer contracts, enabling 1,906 individual employees to participate in trainings and classes hosted by LBCC. LBCC also provides opportunities for students to gain on-the-job experience through cooperative work experience.

If a large-scale disaster hit this major economic learning center, the entire community would likely suffer. As noted in the FEMA report *Building a Disaster-Resistant University Guide*, "disasters regularly force universities and colleges to suspend their primary activity—the teaching of students. Such closures disrupt the continuity of instruction and limit the ability of the institution to deliver services that students [and the broader community] expect."[53] In addition to disrupting teaching, one of the economic cornerstones of Linn and Benton Counties could be compromised. LBCC has proactively addressed this issue through the development of a college-specific Continuation of Operations Plan (COOP). The primary goal of the COOP is to provide a plan of action that, in the event of an emergency, specifies the key resources and staff as well as processes and procedures for re-establishing departmental services. By adhering to this plan, LBCC can handle the emergency procedures in the aftermath of a disaster in a professional, orderly, and expedient manner, which will minimize the negative effects and expedite restoration of college functions.

INSTITUTION ORGANIZATIONAL STRUCTURE

Most departments and units involved in emergency management activities on campus support infrastructure, operations, and the general goal of keeping LBCC running safely and efficiently. The majority of these units report to the Vice President for Finance and Operations. This section provides brief descriptions about the departments that are most likely to be involved in emergency management functions. Full organization charts can be found here.

RESPONSIBILITIES OF THE VICE PRESIDENT FOR FINANCE AND OPERATIONS

ACCOUNTING & BUDGET

[53] Federal Emergency Management Agency. Building a Disaster-Resistant University Guide. 2003

The Accounting and Budget Department is responsible for the general accounting and budget services, management of fiscal resources, and timely financial services. The accounting section covers services such as audits, fiscal affairs, bond fund accounting, cash management, and fixed asset accounting. The budget section is tasked with producing the annual budget and the financial report. In the event of an emergency, this department is essential in understanding the movement of funds for mitigation and recovery efforts. Opportunities for campus-funded mitigation projects often originate from or require close coordination with the Accounting and Budget Department.

FACILITIES

The Facilities Department strives to maintain the physical surroundings of the college and provide quality service to ensure educational success for staff, students, and the public. It maintains the infrastructure of the college, including power, water, and sewer as well as structural and non-structural aspects of all buildings on campus. This infrastructure is critical to the continuity of college services. Ensuring that the various components of campus infrastructure are reinforced and supported during emergencies is an important role. Under the campus incident command structure, the Facilities Department is responsible for conducting damage assessment of critical utilities following hazard events. In the event that critical utility infrastructure is compromised, it will lead the recovery or identification of alternative critical utility sources. It also maintains the campus grounds and plays a crucial role in debris management in the event of a wind storm or earthquake.

INFORMATION SERVICES

Information Services provides faculty and staff with support for a wide variety of technologies. It is responsible for establishing and maintaining the communication and data lines for the college. Phone and network lines are important services that allow people to communicate and share information. In the event of an emergency, these services will be necessary in a response effort and are critical with regards to resuming normal operations.

INSTITUTIONAL RESEARCH

The Institutional Research Department is responsible for collecting, analyzing, archiving, and disseminating data to help facilitate effective campus planning and decision-making. It can offer valuable insight into how to integrate hazard management principles into the existing strategic framework of the college.

SAFETY AND LOSS PREVENTION

The Safety and Loss Prevention Department organizes and oversees the insurance, risk management, and compliance administrative functions within the college and serves as the central safety and loss management resource for campus. It develops and implements programmatic standards and operational procedures, identifies and evaluates exposure to loss, and analyzes loss trends. It plays an important role in recovering from incidents and is responsible for regularly training and preparing for various emergencies.

In addition, it houses the Public Safety Office. The Public Safety Office provides a safe and secure environment where members of the campus community study, work, and play. It fosters a safe environment supportive of the college's mission and values and seeks to establish relationships between the college community members and the cities in which they reside. The Public Safety Office plays a significant plan implementation role. Through personnel expertise and experiences, it can provide valuable insight into potential vulnerabilities and weaknesses during an emergency.

RESPONSIBILITIES OF THE VICE PRESIDENT FOR STUDENT SERVICES

ADMISSIONS/FINANCIAL AID

The Admissions Office provides services for students. Specific duties includes—but are not limited to—tuition payments, student loans, financial aid, programs of study, schedule of classes, and class registration. It largely focuses on function recovery after an incident, which requires effective preparation in advance.

STUDENT HEALTH SERVICES

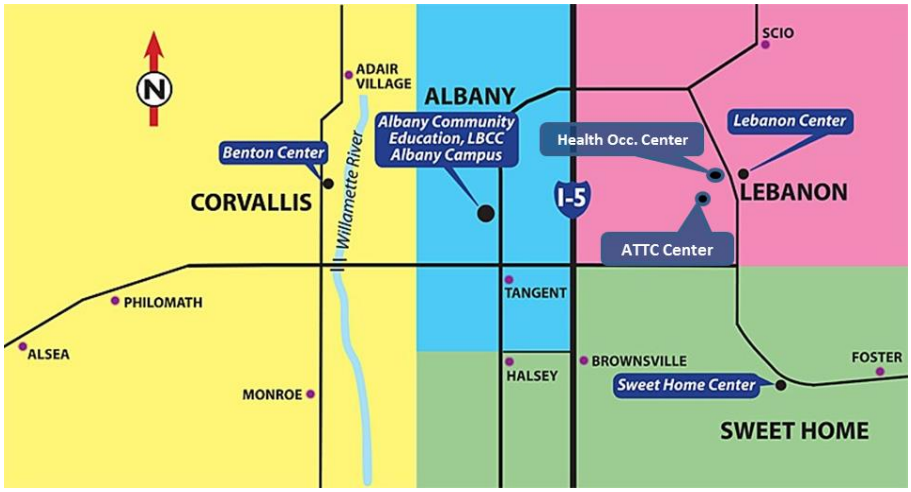
Under the Degree Partnership Program, students of LBCC have access to Oregon State University fee-based services, including the Student Health Center and University Counseling and Psychological Services. In addition, on-campus first aid for minor injuries is available through the Public Safety Office. Because campus health facilities are considered critical in the event of an emergency, LBCC's plan to address life-threatening emergencies in the event of a major disaster involves increasing capacity and capabilities through collaboration and coordination with off-campus first responder and emergency management resources.

HUMAN RESOURCES

The Human Resources Department provides general business services for faculty and staff. It communicates a variety of employee information, including classification, compensation, payroll and benefits administration, performance coaching/management, recruitment and selection, contract/policy interpretation, and complaint resolution. It largely focused on function recovery after an incident, which requires effective preparation in advance.

BUILT ENVIRONMENT

LBCC was established in 1966 and has grown into a 104-acre main campus located in Albany with satellite enters locations in Corvallis, Lebanon, and Sweet Home. The Albany campus houses a learning resource center, bookstore, 500-seat theater, library, conference facility, and student lounge/recreation rooms. Dining facilities include a cafeteria, a café, and a restaurant. Additional buildings include the Periwinkle Child Development Center, the Luckiamute Center, the Activities Center, and a greenhouse. The Horse Center is also located a short 1.5 miles from the main campus.



Source: Linn-Benton Community College. Community Learning. Accessed April 19, 2017.

The risk to buildings can come from natural hazards, technological hazards, or human-caused hazards. Retrofitting buildings to be resilient against such hazards is often costly and time consuming. In order to prioritize which buildings should receive attention, a variety of characteristics must be considered: contents, structural materials, teaching and functions, historic significance, and the value of the building structure.

ESTIMATED BUILDING REPLACEMENT COST

The tables below summarize estimated total building replacement costs for each building. The replacement estimates were calculated during a full campus appraisal performed in the winter of 2017 by an external consultant and are based on current values. According to the appraisal, the most expensive buildings to replace include Industrial A, Takena Hall, Health Occupations Center, Calapooia Center, Willamette Hall, and the Lebanon Center. All of these facilities, except for the Lebanon Center and the Health Occupations Center, are located on the Albany campus. Overall, 14 individual campus buildings would cost more than $5 million to rebuild today. Total replacement of all LBCC facilities would likely exceed $201 million. Note: the Sweet Home Center is located within the Sweet Home High School, which is owned by the Sweet Home School District, and because of its classification as an educational facility, it is the only LBCC facility with a listed appraisal value of $0.

FIXED ASSETS VALUE

The tables below also present the value of selected fixed assets located within buildings across the LBCC campuses. This value includes major assets and equipment, including scientific instruments, library collections, network technology, and furnishings. The buildings with the most significant fixed assets are those with library collections, mechanical teaching equipment, and merchandise.

PRIMARY BUILDING STRUCTURE TYPE

The materials and structural systems used for building construction are very important because they help determine how buildings will perform under stress, particularly during an earthquake. The buildings on the LBCC campus use a variety of structural materials, including wood, steel,

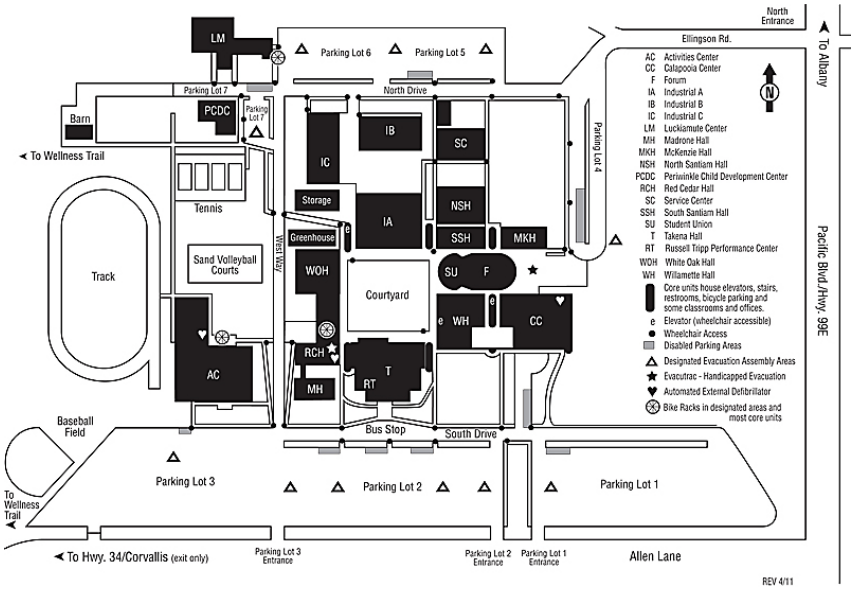
concrete, and reinforced and unreinforced masonry. Notably, a single building may contain more than one structural material, particularly if the building has been expanded over time.

Buildings with reinforced concrete frames are the dominant structural type on the main campus, representing about 65% of all buildings; many of these concrete structures were built between 1972 and 1978. Significantly, several buildings have received seismic retrofits since their construction; however, many LBCC buildings remain vulnerable to seismic hazards. Luckiamute and the Periwinkle Child Development Center are standard wood-frame buildings. Wood-frame structures are also common across the satellite centers. LBCC's wood frame buildings are typically smaller, secondary structures. The primary exception being the Horse Center, which is comprised of several large wood-frame buildings; fire is a significant hazard concern at this location.

Roughly half of the Benton Center and all of the Lebanon Downtown Center utilize the only unreinforced masonry structural systems in LBCC's facility inventory. The original classrooms located in the Benton Center were built in 1926 of joisted masonry; LBCC completed a major reinforced concrete addition to the building in 2004. Thus, significant portions of the Benton Center remain vulnerable to seismic hazards.

ALBANY CAMPUS

The LBCC main campus is located in Albany and houses the primary administrative and academic centers and services. The main campus consists of 23 buildings and structures. The total estimated building replacement cost for all of the structures on the main campus is over $143 million dollars.



Source: LBCC Campus Safety Maps, April 2011.

Building Name	Year	Gross Square Footage	Structural Value	Content Value	Total Value	Structure Class
McKenzie Hall	1973	15,338	$4,105,040	$790,781	$4,895,821	Reinforced concrete/fire resistive

McKenzie Hall Core	1973	4,269	$779,500	$16,988	$796,488	Reinforced concrete/fire resistive
Calapooia Center	1973	54,124	$15,407,726	$3,689,004	$19,096,730	Reinforced concrete/fire resistive
Calapooia Center Core	1973	7,112	$1,348,546	$95,556	$1,444,102	Reinforced concrete/fire resistive
Forum	1973	29,329	$7,872,433	$1,512,125	$9,384,558	Reinforced concrete/fire resistive
South Santiam Hall	1973	15,351	$4,409,363	$791,418	$5,200,781	Reinforced concrete/fire resistive
North Santiam Hall	2005	23,705	$5,370,214	$503,369	$5,873,583	Reinforced concrete/fire resistive
Industrial A	1972	60,042	$15,643,757	$5,208,388	$20,852,145	Reinforced concrete/fire resistive
Industrial A Core	1972	6,014	$1,093,578	$127,939	$1,221,517	Reinforced concrete/fire resistive
Degreasing/Steam Cleaning Building	1972	480	$39,315	$2,114	$41,429	Reinforced concrete/fire resistive
Industrial B	1975	17,655	$4,947,220	$2,342,191	$7,289,411	Reinforced concrete/fire resistive
Industrial C	1977	24,829	$6,800,684	$273,000	$9,047,084	Reinforced concrete/fire resistive
Willamette Hall	1973	38,048	$12,445,823	$4,322,117	$16,767,940	Reinforced concrete/fire resistive
Willamette Hall Core	1973	6,046	$1,099,397	$311,726	$1,411,123	Reinforced concrete/fire resistive
Red Cedar Hall	1972	15,376	$4,115,210	$769,759	$4,884,969	Reinforced concrete/fire resistive
Red Cedar Hall Core	1972	5,972	$1,085,941	$26,543	$1,112,484	Reinforced concrete/fire resistive
Madrone Hall	2008	28,234	$10,198,739	$2,517,377	$12,716,116	Fire-proofed steel/modified fire resistive
White Oak Hall	1972	40,285	$11,555,738	$2,279,761	$13,835,449	Reinforced concrete/fire resistive
White Oak Hall Core	1972	6,027	$1,095,942	$84,939	$1,180,881	Reinforced concrete/fire resistive
Takena Hall	1978	57,466	$17,871,328	$2,888,773	$20,760,101	Reinforced concrete/fire resistive
Takena Hall Core	1978	0	$0	$0	$0	Reinforced concrete/fire resistive
Service Center	1972	13,128	$2,996,124	$483,515	$3,479,639	Reinforced concrete/fire resistive
Service Center Annex	1990	2,190	$129,117	$64,554	$193,671	Pre-engineered steel/non-combustible
Activities Center	1974	46,674	$8,727,093	$1,196,046	$9,923,139	Steel/masonry non-combustible

Periwinkle Child Development Center	1988	7,852	$1,179,840	$404,840	$1,584,680	Wood frame/combustible
Luckiamute Center	2004	14,062	$2,090,584	$725,060	$2,815,644	Wood frame/combustible
Gas Bottle Storage	1972	480	$39,315	$7,114	$46,429	Reinforced concrete/fire resistive
Maintenance Equipment Storage	1979	2,450	$87,493	$95,556	$183,049	Pre-engineered steel/non-combustible
Grounds Shop Barn	1977	3,610	$176,489	$124,223	$300,712	Wood frame/combustible
Greenhouse	1998	2,886	$116,335	$31,857	$148,192	Pre-engineered steel/non-combustible
Storage Building	1998	6,165	$363,290	$298,454	$661,744	Pre-engineered steel/non-combustible
Ballfield Dugout, Dugout Storage, Irrigation Pump House		2,041	$96,290	$17,625	$113,915	Wood frame/combustible structures
Total			$143,502,990	$32,002,714	$175,505,703	

Source: Linn-Benton Community College - 2017 Statement of Values.

BENTON CENTER

The Benton Center is located in Corvallis in the former Washington Elementary School. The elementary school underwent $5 million in renovations in 2003 and 2004 to accommodate the growing services of the center.

Building Name	Year	Gross Square Footage	Structural Value	Content Value	Total Value	Structure Class
Benton Center		45,381	$10,552,023	$1,174,857	$11,726,880	
Original Building	1926	22,902				Joisted masonry
Additions	2004	22,4794				Reinforced concrete
Kiln	2004					Pre-engineered steel/non-combustible
Benton Center North (Reiman Building)*	2018	22,600	$8,000,000		$8,000,000	Concrete tilt-up/reinforced steel
Total			$18,552,023	$1,174,857	$19,726,880	

*estimated values for upcoming remodel.
Source: Linn-Benton Community College - 2017 Statement of Values

LEBANON CENTER

The Lebanon Center is located in Lebanon and housed in the East Linn Workforce Development Center that began construction in 2000. The 44,000-square-foot facility also accommodates offices

for the Oregon Employment Department and DHS Community Human Services. The Lebanon Center serves Lebanon and neighboring rural towns of Crabtree, Sodaville, Lacomb and Scio.

Building Name	Year	Gross Square Footage	Structural Value	Content Value	Total Value	Structure Class
Lebanon Downtown Center	1930	10,403	$1,104,561	$21,235	$1,125,796	Joisted masonry
Lebanon Center	2002	45,716	$13,553,863	$1,382,381	$14,936,244	Fire-proofed steel/modified fire resistive
Lebanon Center Annex	2002	2,405	$517,195	$49,689	$566,884	Wood frame/combustible
Lebanon Center Elkins Flour Mill	1871	4,356	$785,446		$785,446	Wood frame/combustible
Advanced Transportation Technology – Auto Tech	2007	35,000	$4,507,819	$2,602,296	$7,110,115	Pre-engineered steel/non-combustible
Advanced Transportation Technology – HE & Innovation	2015	37,000	$6,493,060	$2,246,400	$8,739,460	Pre-engineered steel/non-combustible
Healthcare Occupations Center	2017	44,451	$17,168,853	$2,433,700	$19,602,553	Masonry construction/wood roof
Total			$44,130,797	$9,213,482	$53,344,279	

Source: Linn-Benton Community College. 2017 Statement of Values.

SWEET HOME CENTER

In 2003, construction began on a 5,000-square-foot renovation of Sweet Home High School to establish the East Linn Extended Learning Center. This renovation accommodates the Sweet Home Center. The Sweet Home Center offers a variety of classes for Sweet Home and Brownsville.

Building Name	Year	Gross Square Footage	Structural Value	Content Value	Total Value	Structure Class
Sweet Home Center	2004	5,005	$0	$75,050	$75,050	Steel/masonry non-combustible

Source: Linn-Benton Community College. 2017 Statement of Values.

HORSE CENTER

The Horse Center is located approximately 1.5 miles from the main campus on 53rd Avenue in Albany. The center is equipped with 30 box stalls, an indoor arena, two hot water wash racks, year-round turn out, a modern breeding facility, and access to acres of trails.

Building Name	Year	Gross Square Footage	Structural Value	Content Value	Total Value	Structure Class
Paddock Barn Stalls – Arena Building	1976	15,450	$868,696	$31,852	$900,548	Wood frame/combustible
Paddock – Boarded Horses – Tack Building	1976	3,412	$166,821	$25,588	$192,409	Wood frame/combustible
Paddock –Storage – Hay Shed	2003	864	$31,366	$0	$31,366	Wood frame/combustible
Paddock – Storage – Manure Shed	2003	832	$30,077	$0	$30,077	Wood frame/combustible
Portable - Classrooms	2003	896	$110,534	$18,368	$128,902	Wood frame/combustible
Caretaker Residence	2014	1,152	$48,601	$0	$48,601	Wood frame/combustible
Total			$1,256,096	$75,808	$1,331,904	

Source: Linn-Benton Community College. 2017 Statement of Values.

HIGH-RISK BUILDINGS

LBCC operates many buildings that may present greater risk to the safety of students and staff as well as economic loss. To determine buildings of high risk, building age (before 1980), structure/content value (over $10 million), maximum capacity (over 200 people), and hazardous material proximity are evaluated. The following table shows buildings that meet high levels of risk in at least three categories of evaluation.

Building Name	Year	Total Value	Capacity	Hazmat
Industrial A	1972	$20,852,145	562	1st floor
Calapooia Center	1973	$19,096,730	837	
Takena Hall	1978	$20,760,101	248	
Willamette Hall	1973	$16,767,940	228	
Activities Center	1974	$9,923,139	210	
Madrone Hall	2008	$12,716,116	328	All floors
Industrial C	1975	$9,047,084	268	1st floor

Source: LBCC 2017 Statement of Values

HAZARDOUS MATERIALS

Hazardous materials can present a significant risk to safety, especially during an earthquake, fire, or other building-damaging event. On campus, hazardous materials exist in a variety of forms, such as laboratory chemicals, cleaning supplies, fuels, and pressurized gases. Chemicals and materials for education purposes are stored in some main campus buildings, including the Service Center,

Industrial A and C, and Madrone Hall. In addition, the Grounds Shop Barn and the Maintenance Equipment Storage buildings store hazardous materials; however, these buildings are unoccupied.

Campus Public Safety and the Safety & Loss Prevention Department maintain chemical inventories throughout the entire LBCC campuses. The inventories are available to emergency officials upon request.[54] In the event of a hazardous materials incident, spill kits are located in several locations across campus to safely manage hazardous materials.

HISTORIC RESOURCES

Historic resources and cultural assets on campus are valuable to the college, and yet, because of their age and/or construction, they can be at significant risk for damage.

HISTORIC BUILDINGS AND SITE

One historic building is the historic Elkins Grist Mill, located near the Lebanon Center. LBCC acquired the Mill in 1994 and assumed responsibility for restoring the exterior of the mill, which was completed in 2003. Built between 1871 and 1878 by millwright Thomas J. Hannah, the Elkins Grist Mill is one of the oldest industrial buildings remaining in the Willamette Valley. The mill was operated by William and Joseph Elkins, who promoted many projects that led to the development of the Lebanon area, including the Willamette Valley and Cascade Mountain Wagon Road, the canal system, and the railroad.

The three-story mill building is constructed of heavy timber framing with a steeply pitched gable roof. The building is clad with shiplap siding and corner boards, with vertical siding below the water table. One unique feature is its mortise and tenon construction, in which hand-hewn timbers were fit together without nails.

A 2,500-square-foot annex was constructed next to the mill and contains two meeting rooms, kitchen, bathrooms, and small reception area for old mill visitors. The annex is designed to be architecturally compatible with the adjacent mill. Educational displays associated with the historic mill structure are displayed in the foyer.

CULTURAL ASSETS

LBCC operates three art galleries that provide a backdrop for cultural activities. The South Santiam Hall Gallery hosts monthly exhibits of student work, theme shows, and invited local artists. The North Santiam Hall Galleries host extended exhibits by notable local and regional artists. In addition, the Calapooia Gallery is a small exhibit space in the foyer where emerging artists, including advanced students and recent graduates, are invited to exhibit.

The college library system provides an invaluable cultural component to campus. There is one library on campus that provides access to print materials, online magazines, and journals and allows users to search other higher education libraries.

[54] Linn-Benton Community College. LBCC Emergency Response Plan. 2016.

Some other unique cultural assets include:

- The Benton Center hosts the NW Ceramic Art Collection, a curated and rotating collection consisting of three showcases and contents located throughout the building. Exhibited pieces highlight the work of faculty, students, community members, and guest artists.
- In 2016, LBCC commissioned a sports mural on the east exterior wall of the Activities Center that features past LBCC athletes and is valued at $16,500.
- A geologic timeline walk was installed on the south side of Madrone Hall and the Activities Center in 2015. The 230-meter timeline represents 4.6 billion years of earth history. The timeline serves as an outdoor lab for science classes as well as an educational display for students and the public

INFRASTRUCTURE

Infrastructure is another feature essential to the development of an effective emergency management strategy. Infrastructure refers to the basic services and installations needed for the functioning of a community, such as transportation networks, communications systems, sewer service, and water and electricity distribution lines.

HEATING AND COOLING

Heating is supplied by the central plant to most buildings on campus through roof-installed piping (underground piping supplies heating to the Activities Center). Cooling is also provided to most of main campus centrally. However, some buildings and facilities, including Madrone Hall, North Santiam Hall, portions of South Santiam Hall, the Activities Center, various computer and data rooms, and the satellite centers have individual roof-mounted cooling units.

Madrone Hall is a science education building on the main campus. Madrone Hall was designed and constructed with the integration of a photovoltaic array directly in the building's structure in order to increase campus usage of clean energy. The building contains two separate arrays.

Source: Energy Design

ELECTRICITY

All of the buildings on the main campus and satellite locations rely on electricity for day-to-day functions. In the event that electrical services are limited or discontinued, college functions would be impaired. Pacific Power provides power at most LBCC locations (Consumers Power provides service to the Advanced Transportation Technology Center).

Electrical power on the main campus is looped as a 22,000-volt primary with secondary step down transformers in the core areas (areas between buildings). LBCC also maintains four portable generators—one in the Grounds Barn, one in the Hazardous Materials Shed just north of the Service Center for emergency use, and two in the Storage Building in the case of a power failure. Notably, campus maintains a dedicated 60-kw emergency generator to run the smoke evacuation system in the Campus Store. In addition, emergency battery powered egress lighting is installed at all campus locations. The Lebanon Center is equipped with 480-voltage service, and a large UPS supplies lighting and emergency egress in the event of a power failure. Similarly, the Benton Center has 208 power supplied with battery powered egress lighting.

WATER

Labs and workshops on campus depend on water for teaching. Domestic water (cold and hot) and fire sprinklers are fed primarily from the street into the buildings from the perimeter of campus. Sewer and storm water infrastructure collects runoff via the surrounding street network. Water service at each LBCC location is provided by the respective municipal water provider. If the water system is disrupted or compromised either on or off campus, LBCC functions may be impacted. A lack of domestic water may hinder emergency efforts and could lead to breach of public safety including:

- Possible loss of potable water,

- Possible loss of heat,
- Possible failure of sanitary sewer, and
- Possible loss of fire control systems

COMMUNICATIONS AND DATA SYSTEMS

Communications and data systems include internet, data servers, and telephone capabilities. These systems link the college to itself and to the rest of the community. The Calapooia Center houses the primary information technology resources, including the servers. The Business Office, the Administrative Offices, and Human Resources have information technology hubs (i.e. dead heads) in each building core. Dead heads are also found in some of the newer constructed buildings, such as Madrone and White Oak Hall.

Servers located in the Calapooia Center house information on students, faculty, and staff. The communication systems include phone and email. These will be crucial in coordinating resources to respond to a major event.

SPECIFIC BUILDINGS WITH CAMPUS—ESSENTIAL RESOURCES AND SERVICES

The following buildings house resources and services that directly impact the public health, safety, and basic functions of the college. Each of these buildings plays a significant role in reducing risk and recovering from hazard impacts.

CALAPOOIA CENTER

The Calapooia Center is the central administrative building on campus. The building houses the Administrative Offices, the Business Office, Human Resources, and Information Services. This building is essential because the continuity of campus management, financial services, and student and employee data are critical to college operations.

The Calapooia Center also has food services and the Culinary Arts program, including the cafeteria and kitchen. It provides the critical service of feeding students and potentially community members in the event of an emergency.

RED CEDAR HALL

Red Cedar Hall houses diverse departments and educational functions that serve students: the Center for Accessibility Resources, Student Assessment, and the First Aid Room. However, in terms of hazard mitigation, the most essential resource is the Department of Safety and Loss Prevention (which includes the Public Safety Office). This department functions to improve risk reduction, especially concerning situations that may pose hazards to students, staff, and faculty.

TAKENA HALL

Sensitive information, such as financial aid documents, transcripts, personal counseling records, and admissions applications, is contained in Takena Hall. The priority of mitigation

planning is to reduce the impacts of hazards on the release of personal and sensitive information. Similar preparedness should be implemented for the preservation of such information so that LBCC may quickly resume normal teaching functions following a disaster. A seismic upgrade of Takena Hall was completed in the summer of 2017.

SERVICE CENTER

All central HVAC controls are located in the Service Center. The main 22,000-volt electrical disconnects are located in the service yard as well as a propane tank (roughly 100 feet away from the building).

APPENDIX E: GRANT 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. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

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.

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.

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.

OTHER FEDERAL PROGRAMS

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY15 Hazard Mitigation Assistance Unified Guidance.

Oregon Emergency Management grant guidance on Federal Hazard Mitigation Assistance can be found on the Oregon Hazard Mitigation Assistance website.

STATE PROGRAMS

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

The Community Development Block Grant Program (CDBG) promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities. Relevant eligible activities include acquisition of property for public purposes, construction/reconstruction of public infrastructure, and community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months that pose immediate threats to health and welfare.

OREGON WATERSHED ENHANCEMENT BOARD

While the Oregon Watershed Enhancement Board (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, and educators 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.

BUSINESS OREGON INFRASTRUCTURE FINANCE AUTHORITY SEISMIC REHABILITATION GRANT PROGRAM

The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities. Public K-12 school districts, community colleges, and education service districts are eligible for the grant program. For emergency services facilities, the emphasis is on first responder buildings. This includes hospital buildings with acute inpatient care facilities, fire stations, police stations, sheriff's offices, 9-1-1 centers, and Emergency Operations Centers (EOCs).

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), FEMA, and the National Institute for Standards and Technology (NIST). The agencies focus on research in the science of earthquakes, earthquake performance of structures, societal impacts, and emergency response and recovery.
- Decision, Risk, and Management Science Program, National Science Foundation. Supports scientific research directed at increasing the understanding and effectiveness of decision-making. 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; and management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk nature.

HAZARD ID AND MAPPING

- National Flood Insurance Program: Flood Mapping; FEMA. Flood insurance rate maps and flood plain management maps for all NFIP communities.
- National Digital Orthophoto Program, DOI – USGS. Develops topographic quadrangles for use in mapping of flood and other hazards.
- Mapping Standards Support, DOI-USGS. Expertise in mapping and digital data standards to support the National Flood Insurance Program.
- Soil Survey, USDA-NRCS. Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation, or related purposes.

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.
- 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.
- 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.
- Assistance to Firefighters Grant Program, FEMA. Awards grants 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).

- Emergency Watershed Protection Program, USDA-NRCS. Provides technical and financial assistance to support 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.
- Rural Development Assistance – Utilities, USDA. Offers direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.
- Rural Development Assistance – Housing, USDA. Offers grants, loans, and technical assistance for rehabilitation and health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.
- Public Assistance Grant Program, FEMA. Provides assistance to state, tribal, local governments, and certain types of private nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies.
- National Flood Insurance Program, FEMA. Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements.
- HOME Investments Partnerships Program, HUD. Offers grants to states, local governments, and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons.
- Disaster Recovery Initiative, HUD. Offers grants to fund gaps in available recovery assistance after disasters (including mitigation).
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs.
- Partners for Fish and Wildlife, DOI – FWS. Gives financial and technical assistance to private landowners to pursue restoration projects affecting wetlands and riparian habitats.
- North American Wetland Conservation Fund, DOI-FWS. Offers cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats.
- 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.
- Wetlands Reserve program, USDA-NRCS. Offers financial and technical assistance to protect and restore wetlands through easements and restoration agreements.
- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Provides 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.

APPENDIX F: LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the local mitigation plan meets the regulation in 44 CFR §201.6 and offers states and FEMA mitigation planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each element of the plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA mitigation planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Linn-Benton Community College	**Title of Plan:** LBCC Natural Hazards Mitigation Plan	**Date of Plan:** November 2017
Local Point of Contact: Marcene Olson		
Title: Director, Safety & Loss Prevention		
Agency: Linn-Benton Community College		
Phone Number: 541-917-4940	**E-Mail:** olsonm@linnbenton.edu	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region (insert #)		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been "met" or "not met." The "Required Revisions" summary at the bottom of each element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval.

Required revisions must be explained for each plan sub-element that is "not met." Sub- elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.) where applicable. Requirements for each element and sub-element are described in detail in this Plan Review Guide in Section 4, Regulation Checklist.

1. Regulation Checklist **Regulation (44 CFR 201.6 Local Mitigation Plans)**	**Location in Plan** **(section and/or page number)**	**Met**	**Not Met**
Element A. Planning Process			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Appendix B: Planning Process		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Appendix B: Planning Process/ Campus Participation Process Section		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Appendix B: Planning Process/ Campus Participation Process		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Vol. I Section 4: Plan Maintenance; Section 2: Risk Assessment - Hazard Identification		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Vol. 1 Section 4:Impelemtnation & Maintenance; Appendix A: Action Items Forms		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Vol. 1 Section 4: Implementation & Maintenance		
Element A: Required Revisions			
Element B: Hazard Identification and Risk Assessment			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Vol. I Section 2: Risk Assessment		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Volume II Hazard Annexes - Severe Weather, Earthquake, Flood, Volcanic Eruption, Wildfire, Climate Change, Dam Failure		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Volume II Hazard Annexes - Severe Weather,		

	Earthquake, Flood, Volcanic Eruption, Wildfire, Climate Change, Dam Failure		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Volume II: Flood Annex		
Element B: Required Revisions			
Element C. Mitigation Strategy			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Vol. 1 Section 1: Introduction; Section 4: Implementation & Planning		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	NA; Vol. II Flood Annex		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Volume I: Mitigation Strategies; Vol II Hazard Annexes		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Volume I: Mitigation Strategies; Vol II Hazard Annexes; Appendix A Action Item Forms		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Volume I: Mitigation Strategies; Appendix A Action Item Matrix		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Vol. I Section 4: Plan Implementation; Appendix A Action Item Matrix and Action Item Forms/Worksheets		
Element C: Required Revisions			
Element D. Plan Review, Evaluation, and Implementation (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Volume I Executive Summary		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Volume I Executive Summary - Summary of Changes		

D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Vol I Section 3: Mitigation Strategies		
Element D: Required Revisions:			
Element E. Plan Adoption			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Pending final LBCC Board of Education approval after FEMA review; See Vol. I Executive Summary		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	NA		
Element E: Required Revisions			
Element F. Additional State Requirements (Optional for State Reviewers Only; Not To Be Completed by FEMA)			
F1.			
F2.			
Element F: Required Revisions			