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Medford Pre-Disaster Mitigation Plan

This Pre-Disaster Mitigation Plan looks at the natural hazards facing the City of Medford and defines the vulnerability of people and property to those hazards. The Plan then identifies a set of actions or mitigation measures that may be taken pro-actively to reduce the impact of natural disasters on the people and resources of the community. Follow the link below to download the full document with tables, figures, and appendices, but without maps.

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[Economic Assets](#)

[Critical Facilities](#)

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[Vulnerable Critical Facilities](#)

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Map12Landslide Hazard.pdf
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City of Medford Pre-Disaster Mitigation Plan

**Draft Submitted to the
Federal Emergency Management Administration
August 2004**

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INTRODUCTION

Disaster mitigation is any action taken to eliminate or reduce the vulnerability of people and property to disasters. This Pre-Disaster Mitigation Plan looks at the hazards facing the City of Medford and defines the vulnerability of people and property to those hazards. The Plan then identifies a set of actions or mitigation measures that may be taken pro-actively to reduce the impact of natural disasters on the people and resources of the community.

The plan's overarching mission and purpose is to protect people, property and the environment from the impact of natural disasters. Project staff identified four goals whose achievement would fulfill this mission: Prevention; Enhancing Emergency Services; Promoting Public Awareness; and Forming Private-Public Sector Partnerships for Mitigation.

The City of Medford does not experience serious natural disasters on a regular basis, but it has a long history of severe, albeit short-lived, winter storms and floods. With residential development spreading to the eastern hillsides, wildfire threatens the urban fringes each summer. In the 1990s, significant information first became available about the impact that a large earthquake off the coast could have on the City. The State has provided new information on the potential for landslides within city limits and the Urban Growth Boundary, requiring further examination.

This Plan considers these and other less imminent hazards, identifies existing mitigation efforts, and defines additional measures that may be taken to minimize the impact of natural hazards. It is important to note that the City is not obligated to implement all measures in this plan. It can do so at its discretion, as funds become available. For this reason, this Plan categorizes mitigation measures as either "short-term" or "long-term" measures. Short-term measures may be implemented with existing resources; long-term measures are those requiring new resources. This plan does not consider man-made hazards, such as hazardous materials or terrorism.

Legislative Background. The City of Medford is required by federal law to have an approved hazard mitigation plan in place by November 1, 2004. This new requirement was established by the Disaster Mitigation Act of 2000 (P.L. 1060-390) and implemented by Federal Emergency Management Administration (FEMA), on February 26, 2002, in an Interim Final Rule in the Federal Register (44 CFR Part 201). Federal law requires that the City identify a comprehensive set of mitigation measures related to local natural hazards. An additional stipulation of federal law is that only those cities with an approved Disaster Mitigation are eligible to apply for hazard mitigation grants.

Plan Development. In the fall of 2003, Oregon Emergency Management awarded the City a \$25,000 Federal Emergency Management grant to undertake the planning process. The grant was used to pay for the project management services of the Rogue Valley Council of Governments. The Deputy City Manager oversaw the planning process. The City dedicated in-kind City staff time and resources to participate in the planning process. RVCOG and City staff produced the plan. The project consulted with City staff and experts in various agencies and disciplines to research the hazards. (A list of contributing professionals follows this summary.)

The Plan was developed by a Steering Committee of City staff and outside agencies concerned with emergency preparedness and response. A second committee, the Community Partners Committee brought additional perspectives from agencies, utilities and community groups to the process. (Committee membership lists follow this summary.)

In a special effort to further involve the public, the project invited City residents, business and property owners representing a broad range of local perspectives to participate in a focus group to provide advice on prioritizing plan goals and the strategies for reaching those goals. The Oregon Natural Hazards Workshop from the University of Oregon facilitated this focus group.

Benefits of a Plan. The principal benefit of developing this plan is that the City has established a strategy for better weathering an array of natural hazards by identifying actions to pro-actively protect its citizens and resources. Not only does the plan provide an overall strategy, but it has resulted in a set of disaster-related maps that provide new baseline data to effectively plan, mitigate and respond to disasters in the City. These maps are new practical tools for City departments and officials. Should the City ever need to rely on outside assistance and agencies for disaster response and recovery, these maps will be invaluable aids in that process.

Beyond better protecting people, property and the environment from the impact of natural disasters, there are additional benefits to having a mitigation plan. With an approved plan in place, the City is eligible to apply to competitive federal grant programs, namely the Pre-Disaster Mitigation Grant Program and the Hazard Mitigation Grant Program. These grant programs offer significant assistance to local governments aiming to reduce their risk from disasters and the cost of recovery. For example, applicants can request funds for the seismic retrofit of government-owned buildings. Upon approval of this plan, the City of Medford will be among a relatively small set of cities nationwide with a plan in place. It is hoped that this will increase the probability of obtaining federal funding for a variety of City needs related to disaster preparedness.

This draft plan has already undergone a technical review by the Federal Emergency Management Administration and Oregon Emergency Management. Upon adoption by City Council, it will be integrated into other City planning mechanisms as time and resources allow.

PARTICIPANTS AND CONTRIBUTORS

The City extends its sincere thanks to the many people who participated in developing this plan, shared their expertise and provided assistance.

Steering Committee Members

Jef Faw, Deputy City Manager
Mark Burns, Chief of Operations, Medford Fire Department
Michael Curry, Emergency Services Coordinator, Jackson County
Tony Hernandez, Director of Disaster Services, American Red Cross
Bill Hoke, Economic Development Coordinator, City of Medford
David McFadden, Commissioner, Medford Planning Commission
Suzanne Myers, Assistant Planner, Medford Planning Department
Ron Norris, Deputy Chief, Medford Police Department
Wayne Pace, Chief of Operations, Medford Public Works Department
Steve Rehn, Assistant Planner, Medford Planning Department
Randy Schoen, Deputy Chief, Medford Police Department

Community Partners Committee Members

Jef Faw, Deputy City Manager
Jackson Baures, Environmental Health Specialist, Jackson County Health Department
Robert Coffan, Member, Bear Creek Watershed Council
Eric Johnson, Principal Engineer, Medford Water Commission
Larry Rains, Manager, Medford Water Commission
Robert Russell, Jackson County Airport Authority
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Robert Roe, Citizen Planning Advisory Committee, Medford

Project Manager

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Thanks to members of the community for their input and guidance.

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Gary Stevens, Jackson County Environmental Health Services
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Tom Wiley, Regional Geologist, Oregon Department of Geology and Mineral Industries

PART ONE: OVERVIEW

SECTION 1: THE PLANNING PROCESS

The Steering Committee's kick-off meeting occurred in November 2003, beginning a planning process that continued through July 2004. A five-step process guided the development of this Pre-Disaster Mitigation Plan. Figure 1-1 graphically presents that process.

Step 1: Organize for Planning

With a grant from Oregon Emergency Management, the City contracted with RVCOG to manage the planning process. Two committees were formed to participate in the process.

The Steering Committee was comprised of City staff with expertise in emergency response and management, public works and planning; a representative of the American Red Cross and the Jackson County Emergency Services Coordinator joined them. The role of this Committee was to: generate ideas for plan content; deliver required information; develop or assist in the development of plan components; react to and critique draft plan components; and participate in the generation of mitigation measures.

The Community Partners Committee was comprised of agencies, utilities, and community groups with an interest in planning, the environment and disaster preparedness. The Community Partners Committee was intended to bring a range of community perspectives, interests and expertise to the planning process. It provided a vehicle for involving the public throughout the entire planning process by including a member of the Bear Creek Watershed Council and one from the Citizen Planning Advisory Committee. The Community Partners Committee served as an advisory group to the Steering Committee. Its role was to review draft plan components; make suggestions for improvements and additions; and to bring a range of community perspectives to the process of assessing vulnerabilities and generating mitigation measures.

Step 2: Develop a Community Profile

The community profile is a document describing the City's basic characteristics and the implications of those characteristics for the impact of natural hazards on the city. The profile also suggests how those characteristics affect the city's ability to prepare for, mitigate, respond to or recover from a disaster. It identifies past and present mitigation efforts, what the City has done or is doing to decrease the vulnerability of its people and local resources. The Community Profile was developed in a collaborative fashion by the Steering Committee, using available documents and conducting additional library research.

Step 3: Assess Hazards and Vulnerability

With the profile in hand, the project began to assess the hazards faced by Medford. All potential hazards were identified and described with respect to their history, intensity, frequency, impact on the City and likelihood of occurrence. The city's vulnerability to each hazard was defined by

developing an inventory of the built and natural environment lying within the area affected by each hazard. This was done using GIS mapping and database capabilities. A variety of maps were produced by the Medford Planning Department, as were estimates of potential dollar losses from the most significant hazards. A Hazard Analysis was completed to provide a relative ranking of natural hazards faced by the City. (Appendix 1 contains that analysis, as well as an explanation of the methodology used.) Steering Committee members expressed most concern for the risk represented by storms, floods, earthquakes and wildland-urban interface fires.

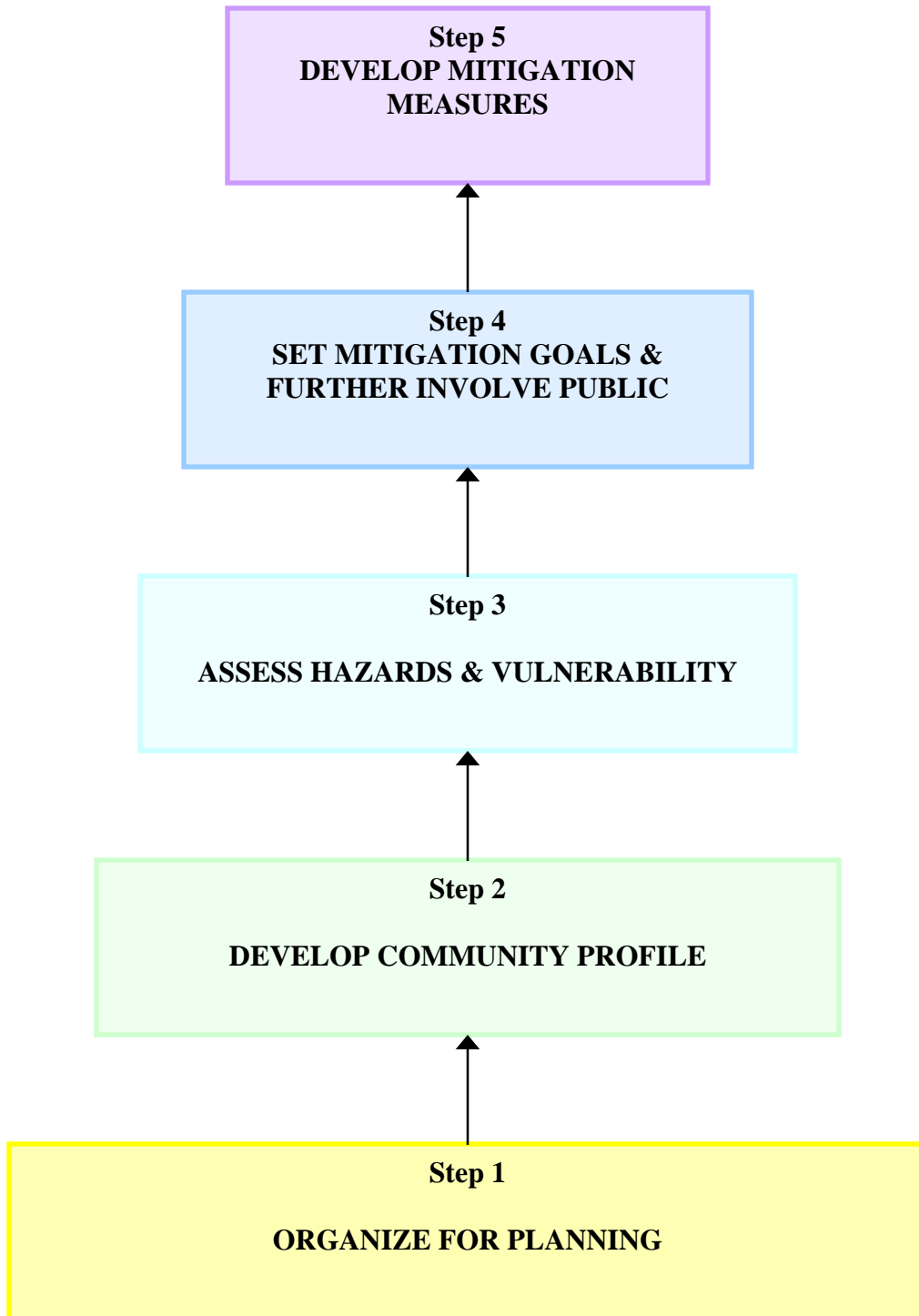
Step 4: Set Mitigation Goals and Further Involve the Public

Having assessed the hazards faced by the City and ongoing mitigation measures, the Steering Committee developed an overarching mission and four goals serving that mission. The project then invited community members representing a broad range of interests and perspectives to participate in a focus group to discuss those goals. This focus group was held at City Hall and facilitated by the Oregon Natural Hazards Workshop from the University of Oregon. From this process, the City gained insight into which mitigation goals and methods were favored by a cross-section of its residents.

Step 5: Develop Mitigation Measures

The Steering Committee developed a set of Multi-hazard Mitigation Measures pertaining to more than one hazard or goal and sets of Hazard-specific Mitigation Measures responding to particular hazards. The Community Partners Committee reviewed these measures and suggested additional measures from their perspectives.

Training Sessions. The planning process was punctuated by three special training sessions under the auspices of the Oregon Emergency Management and funded by the Federal Emergency Management Administration. Lead project staff attended these excellent training opportunities on plan development. This engaging training was provided the Oregon Natural Hazards Workshop of the University of Oregon.



**FIGURE 1-1
THE PRE-DISASTER
MITIGATION PLANNING PROCESS**

SECTION 2: PUBLIC INVOLVEMENT

Disaster mitigation cannot proceed without public participation and understanding. This planning process aimed to involve the public from the outset of the process. It then broadened that involvement to receive additional guidance on setting priorities.

Committee Membership. Public involvement in all aspects of this planning process was ensured by inviting members of the public to join the Community Partners Committee. The Citizen Planning Advisory Committee (CPAC) and Bear Creek Watershed Council each sent a representative to participate on that committee. CPAC is a long-standing committee with broad and voluntary membership by citizens interested in City planning processes. The Bear Creek Watershed Council is concerned with a broad range of issues related to the ecology of the watershed; it was a logical choice for developing a plan concerned with natural hazards and the protection of natural resources. The involvement of these two groups brought different perspectives to the table and resulted in substantive improvements to the plan.

Focus Group. In May 2004, upon the development of the plan goals, project staff convened a special focus group to represent a broad range of perspectives and stakeholders in the community. Invited were Neighborhood Watch Captains from each City ward, a developer, downtown businesspeople, the owner two assisted living facilities, a nurse who specializes in disaster preparedness from the local health care industry, a senior, and the Neighborhood Resource Coordinator for the City of Medford.

The Oregon Natural Hazards Workshop of the University of Oregon led the focus group. Participants were asked to prioritize the plan goals developed by the Steering Committee. From this process, the City learned that stakeholders strongly favor an emphasis on the goals of Promoting Public Awareness and Enhancing Emergency Services. According to the participants, residents have primary responsibility for disaster preparedness and the well being of their families. Educating the public about that responsibility and the importance of preparedness were seen as the key to mitigation. Prevention was seen as less effective and regulation as onerous and less productive.

The focus group was then asked to imagine that they were City Councilors with funds to budget among four strategies for achieving each of the four mitigation goals. The strategies were education, providing incentives, regulation, or acquisition of property or resources. The table below displays the choices they made:

Table 1-1. Preferred implementation strategies

Goal	Education	Regulation	Acquisition	Incentives
Prevention	\$44K	\$23K	\$4K	*
Emergency Services	\$35K	\$7K	\$14K	*
Public Awareness	\$28K	*	*	\$12K
Partnerships	\$16K	*	*	\$24K
*Not Applicable				

Source: Oregon Natural Hazards Workgroup (May, 2004)

Totaling the amounts allocated to each of the four strategies, the emphasis on education is clear. Of the entire \$207,000, some 59% was dedicated to the education strategy. Education was followed by incentives (17%), regulation (14%), and acquisition (9%).

These results are consistent with the ranking of mitigation goals, whereby participants deemed Promoting Public Awareness most important. These results were not surprising to City staff; they reflect commonly expressed local values that stress the importance of personal responsibility. As the City proceeds with implementing this plan, it will use this guidance.

For plans for continued public involvement, refer to Section 5.G.

SECTION 3: PLAN MISSION AND GOALS

The Steering Committee developed plan goals after assessing the array of natural hazards affecting the City and defining the scope of the City's vulnerabilities to those hazards. In this process, and later, as they developed mitigation measures, the Committees referred to the Jackson County Natural Hazards Mitigation Action Plan, and mitigation plans throughout the state of Oregon. This was done to ensure coordination within the region and to benefit from mitigation planning process experiences in other communities.

Medford's Pre-Disaster Mitigation Plan has one overarching mission:

To Protect People, Property and the Environment from the Impact of Natural Disasters

This mission is served by four goals that reduce the vulnerability of the City's people and local resources. Plan goals guide the overall direction of mitigation activities. They serve as touchstones for the City's overall mitigation program.

The four goals are:

- **Preventing personal injury, loss of life and damage to property and the environment from natural hazards.**
- **Enhancing the ability of emergency services to respond to the effects of hazards on people, property and the environment.**
- **Promoting public awareness and an understanding of natural hazards and the risk they potentially present to quality of life and economic vitality.**
- **Forming partnerships with private and public sector agencies, businesses and organizations to further comprehensive planning and implementation of mitigation measures.**

The City has identified a comprehensive set of Mitigation Measures that identify strategies and actions serving these goals. The connection between mitigation measures and goals is displayed in the tables of mitigation measures. For each mitigation measure, a dot is placed under each goal served by that measure.

Hazard-specific mitigation measures are included in sections dedicated to specific hazards in Part Two of this document. Multi-hazard mitigation measures serving more than one goal area are included in the following section.

SECTION 4: MULTI-HAZARD MITIGATION MEASURES

Mitigation measures are actions taken to reduce the vulnerability of people and resources to the impact of natural hazards or disasters. They can take many forms, some target a specific issue of vulnerability; others have broad implications for a community's ability to protect itself or recover from a disaster.

The multi-hazard mitigation measures presented in this section respond to City mitigation needs that go beyond dealing with any one particular hazard. They present broad strategies and actions that are useful no matter what disaster may strike. Some measures speak to the maintenance and administration of the mitigation plan. Others focus on the need for further developing and sharing information on natural hazards. Yet others speak to unique qualities of the City's population that have implications for mitigation, such as the number of persons with special needs.

Natural Hazard	Table 1-2 Multi-Hazard Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Short-term Multi-hazard #1	Identify and pursue new state and federal funding opportunities to develop and implement local mitigation activities.	Existing Resources	City Manager's Office (CMO)	●	●	●	●
Short-term Multi-hazard #2	Maintain public and private partnerships to foster natural hazard program coordination and collaboration within the City of Medford.	Existing Resources	Fire, Police & Public Works	●	●	●	●
Short-term Multi-hazard #3	Continue to periodically update the City Emergency Operations Plan, linking emergency services with natural hazard mitigation programs and enhancing public education.	Existing Resources	Police, Fire & Public Works	●	●	●	●
Short-term Multi-hazard #4	Make the Medford Pre-Disaster Mitigation Plan available to the public by placing it on the City's web site and in the Medford reference library.	Existing Resources	CMO	●		●	●
Short-term Multi-hazard #5	As a matter of family disaster preparedness, encourage all families to have provisions on hand that allow them to be self-sufficient for a period of up to five days. <ul style="list-style-type: none"> Use the City's Newsletter, website, and Neighborhood Watch Program to broadcast and/or distribute Red Cross Pamphlets about Family Emergency Kits. 	Existing Resources	Emergency Mgt. Team, American Red Cross (ARC)	●	●	●	●
Short-term Multi-hazard #6	Maintain the Pre-Disaster Mitigation Plan Steering Committee to facilitate implementation, monitoring and evaluation of citywide mitigation activities.	Existing Resources	CMO	●	●	●	●

Natural Hazard	Table 1-2 Multi-Hazard Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Long-term Multi-hazard #1	Increase technical knowledge of natural hazards and mitigation strategies in Medford and adjust policies and programs based on that knowledge. <ul style="list-style-type: none"> Increase the accuracy and comprehensiveness of the GIS inventory of all critical facilities, large employers & public assembly areas and lifelines. 	Pre-disaster Mitigation (PDM) Program; existing resources.	Planning, Fire, Police, Public Works	●	●	●	●
Long-term Multi-hazard #2	Refine hazard map overlays, paying special attention to what has still not been mapped by FEMA in southeast Medford, and distribute to City departments for use in reviewing development applications	Pre-disaster Mitigation (PDM) Program; existing resources	Planning, Building	●		●	
Long-term Multi-hazard #3	Create and maintain a system to support populations with special needs within Medford city limits, including evacuation and shelter. <ul style="list-style-type: none"> Begin by inviting self-advocates, advocacy organizations, social service and care facilities to meet with City staff to discuss local risks from hazards and learn how other communities have organized to provide and facilitate this support. 	Pre-disaster Mitigation (PDM) Program; existing resources; Dept. of Homeland Security	Police, Fire, Community Resources, Jackson County Health Dept., ARC, Care Facilities	●	●	●	●

Natural Hazard	Table 1-2 Multi-Hazard Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Long-term Multi-hazard #4	<p>Improve public awareness and provide people with steps to reduce their risk to natural hazards.</p> <ul style="list-style-type: none"> Obtain publications on earthquakes, wildfires, and floods from the Institute for Business and Home Safety or similar publications and make them available at popular public events at booths staffed by Community Service Officers, students in the Explorer program, or Neighborhood Watch volunteers. 	Pre-disaster Mitigation (PDM) Program; existing resources	Fire, Police, Public Works	●		●	●
Long-term Multi-hazard #5	Develop a system for data collection for non-declared natural hazard events.	Pre-disaster Mitigation (PDM) Program; existing staff resources	Planning, Public Works, Fire	●	●	●	

Natural Hazard	Table 1-2 Multi-Hazard Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Long-term Multi-hazard #6	<p>Consider the development of a long-term recovery plan for Medford from the effects of catastrophic hazards.</p> <ul style="list-style-type: none"> • Begin by researching such plans for similarly sized cities in the West and deciding which elements are applicable to Medford and the risks it faces. • Develop worst-case scenarios and long-term recovery needs for each prioritized hazard. Forecast the fiscal burden to be borne by the City alone, once all state and federal assistance has been obtained. 	Pre-disaster Mitigation (PDM) Program	Planning, Fire, Police, Public Works		●		●
Long-term Multi-hazard #7	<p>Develop an inventory of publicly owned facilities capable of offering safe haven to citizens during disaster events.</p> <ul style="list-style-type: none"> • Determine the relative safety of each facility vis-à-vis prioritized hazards and what specifically must be done to ensure the safety of persons in this facility during a hazard event. 	Existing resources.	CMO, Public Works, Fire, ARC	●			●

Natural Hazard	Table 1-2 Multi-Hazard Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Long-term Multi-hazard #8	Cooperate with the American Red Cross to assess the adequacy of service delivery in all areas of the City. <ul style="list-style-type: none"> Using GIS capabilities, compare the populations to be served with the capacities and accommodations of local facilities and services. Develop a prioritized list of needs for each area. Identify funding to serve those needs. 	Anna Mae Foundation may grant funds to the ARC; existing resources.	Fire, Police, Planning, ARC	●		●	●
Long-term Multi-hazard #9	Assess the feasibility of implementing new, effective measures for notifying citizens about impending disasters and the need to evacuate, e.g., Reverse 9-1-1, EAS.	Dept. of Homeland Security	Police, Fire	●	●	●	
Long-term Multi-hazard #10	Identify specific mitigation-related criteria that can be incorporated into the land use planning process, e.g. use of temporary gravel roads for fire access during development, providing pedestrian pathways with universal access.	Existing resources	Planning, Fire, Police, Public Works	●		●	
Long-term Multi-hazard #11	Determine ways to better integrate the resources of utility companies (personnel, equipment and information) with those of the City during events. <ul style="list-style-type: none"> Assess the effectiveness of liaison positions in the City ECC and in the Unified Command Structure. 	Existing Resources	CMO, Fire, Police, Public Works, PacifiCorp, Qwest, Avista	●	●		●

<p style="text-align: center;">Table 1-2 Multi-Hazard Mitigation Measures</p>		<p style="text-align: center;">Potential Funding Resources</p>	<p style="text-align: center;">Lead Department(s) & Partners</p>	<p style="text-align: center;">Mission To Protect People, Property and the Environment from the Impact of Natural Disasters</p>				
				<p style="text-align: center;">Goals</p>				
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Partnerships	
<p>Long-term Multi-hazard #12</p>	<p>Assess the adequacy of training, personnel and equipment available to City Emergency Services for responding to widespread and/or multiple concurrent events.</p> <ul style="list-style-type: none"> Determine the City's level of acceptable risk and ensure that Emergency Services can protect the community at that desired level. Use tabletop exercises to gain perspective on the allocation of existing resources. Identify state and federal funding to provide for additional needs. 	<p>Existing Resources; Dept. of Homeland Security.</p>	<p>CMO, Emergency Mgt. Team</p>	●	●			

SECTION 5: IMPLEMENTING THE PLAN

This section speaks to the City of Medford's overall approach to plan implementation and its intention that this document retains its vitality and usefulness as a tool to enhance the resistance of the community to natural disasters. It explains the City's prioritization of mitigation measures and how the City will administer, monitor, evaluate and update the plan in the future. It defines the City's means for continuing public involvement as the plan evolves.

A. PRIORITIZING GOALS AND STRATEGIES

With the assistance of the Oregon Natural Hazards Workshop, the City conducted a focus group meeting on the evening of May 24, 2004 in Medford City Hall. Eight citizens from diverse backgrounds with an interest in disaster mitigation planning were assembled to prioritize the plan's goals and express their preferences regarding the methods or strategies used to achieve those goals. It was clear from this activity that education and incentives were the preferred strategies for attaining goals. "Preventing personal injury, loss of life and damage to property and the environment from natural hazards" was the most important goal for this group of community members. Next in importance was "Enhancing the ability of emergency services to respond to the effects of hazards on people, property and the environment". In almost all instances, these citizens strongly favored using educational strategies for implementing goals.

With this direction from citizens, the City will place top priority on implementing short-term actions that preserve the life, health and safety of its citizens. The City will employ public awareness and preparedness strategies whenever possible.

Short-term mitigation measures are actions that can be undertaken without extra personnel or other resources. Long-term mitigation measures are those requiring additional resources for execution. The City may apply for federal grant funds for those mitigation purposes. When prioritizing potential long-term projects for implementation, the City will conduct cost-benefit analyses to inform the decision-making.

While the City intends to follow the priorities thus set by citizens, if opportunities arise for new, outside funding to implement other mitigation measures, the City may turn to those measures, as it deems prudent and beneficial to the community.

B. COMMITMENTS OF CITY COUNCIL

The Pre-Disaster Mitigation Plan is non-regulatory in nature and provides a series of recommendations that in many cases, mirror existing City goals and program objectives. In the recent past, Medford City Council has demonstrated its commitment to making public facilities earthquake resistant. In the summer of 2003, a \$750,000 seismic upgrade to City Hall was completed. While it was not economically realistic to bring the 35-year old building up to current seismic standards, the retrofit has assured that occupants of the building will be able to safely exit it in the event of a serious earthquake.

Another example of this commitment to retrofitting public facilities is the relocation in May 2004 of Rogue Valley Consolidated Communications (911-Dispatch), an essential public safety service under FEMA guidelines. The dispatch center was relocated in 2004 to a remodeled site in the City Hall Annex, a building constructed in 1998 to the highest seismic standards. Dispatch services were located previously on the basement level of City Hall; even the seismic retrofit of that building could not guarantee dispatch personnel safety and continuity in dispatch services after an earthquake. This relocation was a costly, but prudent, pre-disaster mitigation measure by the City. It is featured on the cover of this plan.

Yet another example of the City's commitment to disaster resistant services is the focus on providing a new facility for the Police Department. The Police Department is currently located in the newly retrofitted City Hall. The City Council, at its June 2004 Goal Setting in advance of the fall's biennial budgeting "kick-off", directed staff to pursue construction of a new 30,000 square foot Police Headquarters facility that will enable that essential service to continue uninterrupted in the event of a significant seismic event.

Council also approved a contract with a local engineering firm to identify and recommend corrective seismic upgrades for the downtown, historic Carnegie Library originally built in 1911, with an addition completed in 1950. The City recently gained title to the library from Jackson County upon its completion of a new headquarters library in the spring of 2004. Future plans for the library include its possible use for large and small group gatherings, and office space for selected not-for-profits. The Historical Society and City Parks and Recreation Department are on record with their desire to serve as "anchor tenants".

C. COST/BENEFIT ANALYSES

As part of evaluating mitigation measures, the City will perform cost-benefit analyses on measures being considered for implementation. The City will conduct cost-benefit analyses in order to prioritize potential projects for implementation. A cost-benefit analysis is required by City financial policy for any Capital Improvement Project funded by the General Fund in excess of \$50,000. Periodically, the City has made significant expenditures in the absence of such an analysis for purposes of guarding the lives, health and safety of its employees. Notable exceptions to the use of cost/benefit analyses include the seismic upgrade of City Hall and the transfer of the dispatch center to a seismically sound building. While a cost/benefit analysis of these projects would have supported the investments, it was a matter of City principles to move ahead with the projects.

Oregon Emergency Management, the Federal Emergency Management Agency, and other state and federal agencies rightly use cost/benefit analyses to evaluate mitigation measures. Indeed, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, requires cost/benefit analyses prior to the investment of funds. The City has at its disposal a variety of methods to assess the relative costs and benefits of mitigation measures and will conduct such assessments as a matter of standard operating procedure. The Jackson County Natural Hazards Mitigation Action Plan devotes an entire appendix to this topic (Appendix E: Economic Analysis of Natural Hazard Mitigation Projects). This appendix is accessible on the Internet and in hard copy format to City staff.

D. PLAN ADMINISTRATION

Administration of the plan will continue to emanate from the City Manager's Office with the Deputy City Manager (and City's Chief Financial Officer) playing the key role. The Deputy City Manager has personally participated in all aspects of this planning process; his role vis-à-vis the plan will provide continuity and strong support for the plan's implementation in the future. The Deputy City Manager will ensure that the plan is monitored, evaluated and updated according to City and federal requirements.

E. ACTION PLAN FOR IMPLEMENTING, MONITORING, EVALUATING AND UPDATING THE PLAN

Upon formal adoption of the plan by resolution of the City Council and submission to the State Hazard Mitigation Officer by the Deputy City Manager, the existing Disaster Mitigation Steering Committee will be charged by the City Manager to continue its role by coordinating and implementing the plan. The Steering Committee, comprised of Fire, Police, Public Works, Planning and coordinating agencies, will meet no less than twice yearly. This Committee will champion and review progress on implementing the plan's mitigation measures/action items and maintain the partnerships that are essential for the mitigation plan to retain its viability.

The City of Medford budgets on a biennial basis in odd-numbered years, consistent with the State of Oregon's fiscal planning cycle. The schedule of monitoring, evaluating and updating the mitigation plan will coincide with this cycle. Every two years as part of the biennial budget process, budget instructions will direct appropriate City departments to review sections of the plan pertinent to their operations and identify short and long-term mitigation strategies they seek to address during the upcoming two-year period. For long-term strategies, departments will consider and make recommendations for capital improvement plan (CIP) funding that will achieve priority mitigation actions.

Every five years, as required by FEMA, the City will update its Disaster Mitigation Plan under the aegis of the City Manager's Office and with the participation of the Disaster Mitigation Steering Committee.

The City will use the review of the plan as a segue to update Goal 7, the natural hazards element of its comprehensive plan and to integrate mitigation actions into zoning and planning documents as deemed appropriate by the Planning Commission and City Council.

F. IMPLEMENTATION THROUGH EXISTING PROGRAMS

The City of Medford Pre-Disaster Mitigation Plan is required to include a process through which the planned mitigation measures are incorporated into other planning mechanisms available to the City. The local planning mechanisms available to the City of Medford address the Statewide Planning Goals and their legislative rules and requirements. These include the Comprehensive Plan's goals, policies, and implementation strategies, Municipal Code requirements, and the capital improvement program. The Pre-Disaster Mitigation Plan provides recommended

mitigation measures that are often closely related to these planning programs, and which can and will be incorporated into them as appropriate.

There are certain “elements” or sections of the Comprehensive Plan that address issues related to natural hazards. These include the “Natural Resources” and “Disasters and Hazards” sections of the Environmental Element; the various primary utilities sections (water, sewer, storm drainage, transportation) of the Public Facilities Element; the General Land Use Plan Element; and the Urbanization Element. The Comprehensive Plan is periodically reviewed and updated. The planned mitigation measures will be considered and incorporated when appropriate into future revisions of the goals, policies, and implementation strategies of the Comprehensive Plan. These are used to develop implementing regulations and in review of new development.

The planned mitigation measures will also be considered and incorporated as appropriate into future revisions of the Medford Municipal Code. The sections most likely to be affected include the Land Development Code, the Building Code, and sections pertaining to public improvements and emergency management. Revisions or additions to the Comprehensive Plan’s goals, policies, and implementation strategies are often accompanied by revisions of the Medford Municipal Code needed to implement them. The planned mitigation measures will also be considered in the development of the City’s Capital Improvement Program and the updating of the Emergency Management Plan. When the City considers new technology in data collection and mapping for utilization, its application to hazard assessment and mitigation will be taken into account.

G. CONTINUED PUBLIC INVOLVEMENT

The City of Medford takes particular pride in its citizen outreach efforts and the level of civic participation. One vehicle for citizen involvement is the City Newsletter, mailed quarterly to all residents. The City has already published an article in that newsletter explaining the Pre-Disaster Mitigation Planning process; it will be used in the future to keep citizens apprised of mitigation activities as they occur, as well as further refinements of the plan.

Copies of the plan will be placed on the City’s website and catalogued and maintained at the downtown Library headquarters. The plan will include the name, local and e-mail addresses of the Deputy City Manager who will be responsible for tracking public comments relating to the plan and its implementation and bringing them forward to the Steering Committee at its periodic meetings.

The City’s Budget Committee consisting of the Mayor, eight Council members and a like number of lay citizens appointed to four-year terms will assume the principal citizens’ advisory role in the plan’s roll-out and modification as circumstances dictate. This committee meets 5 – 6 times during budget-years and at least annually on off-cycle years, and is the chief policy-recommending body for the City Council. Any citizen is welcome to make comments at the “oral requests and communications” segment of each meeting’s agenda.

The visibility and viability of the City’s hazard mitigation plan will be the responsibility of the Deputy City Manager (and Chief Financial Officer) who serves as staff liaison to the Budget Committee.

SECTION 6: 2003 COMMUNITY PROFILE

This section presents an overview of the City of Medford in 2003. It provides baseline information on the characteristics of the City, its people, economy and land use patterns, and presents the backdrop for this mitigation planning process. The implications of City characteristics for emergency management concerns are explored.

A. GEOLOGY, TOPOGRAPHY AND CLIMATE

The City of Medford lies within the upper Rogue Valley, on the edge of the Siskiyou Mountains, which are part of the Klamath Mountain Range that extends to the Pacific Ocean and divides southern Oregon from northern California. The Klamath Mountains are composed primarily of volcanic and sedimentary materials that have been folded and faulted and contain intrusive and metamorphic rock. Subsequent erosion and other mountain-building forces occurred to produce prominent geological features near Medford, such as the Table Rocks and Roxy Ann Peak, which is within a Medford City park. Medford is situated on stream deposits and sedimentary rock deposited 50 million years ago.

The Rogue Valley is bounded by the Siskiyou Mountain Range to the south, the Cascade Mountains to the east and the Coast Range to the west. The interior valley framed by these ranges contains the urban areas of Central Point, Medford, Ashland, Talent, Phoenix, Jacksonville, Gold Hill, Eagle Point and Shady Cove. They are built on flood plains, stream terraces, and flat to gentle slopes.

The City of Medford has an elevation of 1300 to 2400 feet. Bear Creek, one of the Rogue River's primary tributaries, flows directly through the City of Medford from north to south. Bear Creek is the major discharge for floodwaters. Several tributaries, such as Larson Creek and Lone Pine Creek, also flow through the City. The Bear Creek Watershed is comprised of 83 streams in 21 sub-watersheds. These waters drain into the Rogue River west of the White City industrial area. Bear Creek has been one of the major salmon spawning tributaries to the Rogue River. In addition to these natural waterways, a complex irrigation canal system surrounds the City to the east and west, transporting irrigation water in the summer and stormwater during storm events.

Medford has a moderate, seasonal climate. The average daily high temperature in the City is between 80 and 95 degrees in the summer and between 25 and 45 degrees in the winter. The Rogue Valley has the lowest precipitation among Oregon's western interior valleys, with Medford averaging about 19 inches of rain per year. This average, however, actually hides a range of rainfall values over the past 18 years that have been as low as 10.69 inches in 1985 and as high as 31.41 inches in 1996. Rainfall occurs in the winter months. The phenomenon known as "rain on snow", a combination of higher temperatures and heavy rains in the winter and early spring, can result in high runoff and flooding in the winter and early spring. Summers are dry and warm, requiring irrigation to support the region's agricultural sector.

Local topography, in combination with climatic features, contributes to periodic flooding in the Bear Creek and Rogue River Valleys. Population growth and its attendant urbanization have

heightened the impact of flooding in the valleys. Additionally, the valley's bowl-like shape, formed by bordering mountain ranges, promotes periods of atmospheric inversion, having deleterious effects on air quality.

B. HISTORIC DEVELOPMENT OF THE CITY

In 1985, the Mail Tribune presented the City's 100-year history in a special edition entitled "Medford's First Century", from which much of the following sketch of the City's development is drawn.¹ The City of Medford grew up around the depot and right of way of the Oregon and California Railroad. The tracks reached Medford in January 1884. By the end of that year, a town had arisen and a school district established. The City was incorporated as a town in February 1885. By 1890 the City had a population of 897. Eastern money was invested in valley pear and fruit orchards, bringing a boom to agriculture. Medford pears were shipped to Eastern markets and to Europe. By 1910, a 20-mile pipeline brought water from Little Butte Creek to the City.

By 1920, the City's population had grown to 5,756. The first large sawmill, Tomlin Box Co. (predecessor of Timber Products Co.), was built. By 1930, the City had built a new municipal airport and was the first Oregon city with official airmail service. Becoming the County seat, its population almost doubled between 1920 and 1930 to 11,007 people and the City tapped the Big Butte Springs for its water supply.

By 1940, the effects of war on the international marketplace resulted in the pear industry expanding its domestic market. Harry and David Holmes of Bear Creek Orchards started a gift fruit business that still bears their name today. The population between 1930 and 1940 was relatively static, reaching 11,281 in 1940.

During the period from 1941 to 1950, logging and sawmill industries expanded significantly, at first to support the war effort, and then to support the housing boom that followed the war. During World War II, the construction of the Camp White military training installation brought significant business and population to the Medford area. After the war, the Veterans Administration transformed Camp White's hospital into a domiciliary and the City acquired the military's sewage treatment plant, facilitating Medford's growth. By 1950, there was a population of 17,305.

The wood products industries continued to grow through the 1950s. A second pipeline from Big Butte Springs to the City was constructed. The City's size grew by a factor of three, due to annexations. The Medford Shopping Center opened. Rogue Valley Memorial Hospital, formerly known as Community Hospital, re-established itself on Barnett Road. The City population was 24,425 by 1960.

During the 1960s, the wood products industry overtook the pear industry as the City's most important industry. The Interstate 5 viaduct through the City was completed. Plans for a three dam system to control flooding on the Rogue River were supported and would include one on Lost Creek, the Applegate River and Elk Creek. The medical community re-established Sacred Heart Hospital as Providence Hospital on Crater Lake Ave. Medford's reputation as a regional

medical center for southern Oregon and northern California was growing. The Duff Water Filtration plant was built to draw water from the Rogue River during summer months. Medford sewage treatment began serving the region. The population reached 28,973.

During the 1970s, there was a slump in the lumber market. The public began to see the air quality problems created by burning of lumber by-products, orchard smudge pots and wood stoves as a problem. A number of shopping centers opened, including Bear Creek Plaza and Black Oak Village. The City's population reached 39,603 by 1980.

In the 1980s, the economic recession and high interest rates hurt the homebuilding industry, creating unemployment in the area due to its impact on the timber industry. Out of concerns for regional air quality, the state legislature passed an auto emission inspection and maintenance program. The population grew to 47,021 by 1990.

The 1990s saw continued expansion of the City's role as a regional medical center and a regional shopping and service center. The City grew by net in-migration as retirees were attracted to Medford by its mild climate, affordability (in contrast to California), quality medical community and natural surroundings. The population reached 59,990 by 1999, and in 2003 was estimated at 68,080.

C. LAND USE AND DEVELOPMENT TRENDS IN 2003

Medford is a city of nearly 15,000 acres within an 18,000-acre Urban Growth Boundary (UGB). Nearly all new development occurs after annexation of the property into the City. Medford abuts the City of Central Point on the northeast and a developed area within Jackson County, but associated with the City of Phoenix, on the south. The nearest other urban area is White City, an unincorporated community several miles to the north. Interstate 5 and State Highway Nos. 99, 238, 140 and 62 provide access to Medford from all directions.

Medford is divided by Bear Creek, as well as by the Interstate 5 freeway, which parallels Bear Creek. Twelve bridges cross Bear Creek in Medford. If these bridges were to fail in an earthquake event, West Medford and East Medford would be effectively separated. This is of special concern since the major health care facilities are located in East Medford. Municipal, county, state and federal offices are located in West Medford. The larger land area is located east of Bear Creek. East Medford slopes easterly upward into the foothills, and contains much of the City's current and future low-density residential areas, as well as numerous high-density retirement facilities. The highest elevation within the current UGB is 2400 feet and the lowest is about 1300 feet. SFR-2, the City's lowest density residential zoning, which allows two dwellings per acre, is utilized in the steepest areas. The street system in the older east Medford residential areas is often unconnected, with numerous pre-existing cul-de-sacs.

The larger tracts of undeveloped land in east Medford often contain Oregon White Oak woodlands and associated underbrush. The urban wildfire interface is an issue in this area. Just outside the UGB, the City owns and operates two relatively undeveloped wildland parks totaling about 1,900 acres, namely Prescott Park and Chrissy Park. The addition of these parks to the

UGB and subsequently to the City limits would alleviate jurisdictional issues and make hazard mitigation more straightforward.

Much of the City's immediate future growth will occur in the 1,000-acre Southeast Medford Plan Area. This specifically planned area will contain a dense 175-acre commercial and high-density residential "Transited Oriented District" (TOD) with residential density decreasing away from the central TOD out to the UGB. The City's newest fire station is located in the future TOD.

Another immediate growth area is located on the flank of Roxy Ann Peak below the UGB and Prescott Park. This area contains areas of unstable soils and some minor potential landslide areas. Geologic reports and appropriate design are required for new development in this area. The current UGB is expected to expand in a 20 to 50-year timeframe, mostly to the east and southeast. A concern with existing development in this area is the lack of alternative routes into and out of the developed areas, a situation that has caused problems for fire responders and residents in this wildland-urban interface area.

North Medford contains the regional Rogue Valley International–Medford Airport and much of the City's industrial and "big box" commercial areas, including most of the vacant industrial land. Residential and commercial areas are located to the north and south of the airport, including considerable new residential development northwest of the airport in the City of Central Point. Within the City of Medford, the Airport Approach (A-A) and Airport Radar (A-R) Overlay Zones restrict creation of new conflicting uses within the airport environs.

West Medford contains the older sections of the community, including the Downtown and the expanding Civic Center. Much of west Medford is developed at a higher residential and commercial density, with a tightly gridded street system. This area contains the City's stock of affordable single-family housing, often 60 to 100 years old, interspersed with newer attached housing. Older rural-residential areas to the west and southwest are seeing higher density single-family development infill. The current UGB is not expected to expand to the west due to high value agricultural soils.

Medford's most highly developed high-density residential and commercial corridor generally follows Bear Creek, including development within the 100-year floodplain. Tributaries to Bear Creek, such as Larson Creek, Lone Pine Creek, Lazy Creek, and Crooked Creek, bisect much of Medford. Development is also contained within the 100-year floodplains of these tributaries. More recently, greenways are being set aside along creeks and waterways, including the Bear Creek Greenway, which contains considerable land in public ownership. The City has acquired an additional 124 acres of parkland along Bear Creek south of the central city. This future Sports Park experienced flooding in 1997.

Future greenways are designated along the forks of Larson Creek in the Southeast Plan Area. The City's Riparian Corridor regulations limit development within 50 feet of the top of the banks of some of the creeks, including Bear Creek and Larson Creek. Other smaller creeks, such as Crooked Creek, are not regulated.

New development in the upper east side “basins” of the tributaries is resulting in an increase in flooding potential at lower elevations in already-developed areas closer to Bear Creek. The development of more impervious surfaces increases stormwater runoff from winter precipitation events, precluding infiltration of those waters to the subsurface. This reduction in infiltration during the wet season tends to reduce base flow to nearby creeks and streams in the dry summer months.

Medford’s considerable residential and non-residential growth during the 1990s, a disconnected east side street system, and a lack of alternatives to motor vehicle use have resulted in transportation system impacts and congestion. These impacts can and have affected the timing and location of new development, most significantly near State highways where high traffic-generating commercial businesses tend to locate. The State of Oregon is redeveloping Medford’s north Interstate 5 freeway interchange at Highway 62, and has plans to relocate the south interchange farther south, away from the Barnett Road crossing. Medford’s 2003 Transportation System Plan (TSP), described more fully in Section 6.J., provides for street and other transportation improvements, and identifies the related costs and funding. One of its primary goals is to increase the number of trips taken by transportation modes other than single-occupancy vehicles, by improving conditions for walking, biking, and using transit, as well as by placing housing and services/employment closer to one another.

In 2003, the City contained approximately 28,000 housing units, of which some 65% are single-family dwellings. Approximately 400 single-family dwellings are constructed annually at a density of about four units per acre. Multiple-family dwelling construction, with an average density of about 17 units per acre, is cyclical in nature, with over 300 built in some years and considerably less in others. Much of Medford’s recent high-density residential development has been in the form of large retirement facilities.

Due to its position as a regional service center for southwest Oregon and northern California, Medford contains considerable recent commercial and light industrial development, particularly along the State highways. People from outlying communities travel daily to Medford for employment, services, education, and recreation. Medford tends to attract small businesses, as well as large retail establishments, franchise restaurants, medical facilities, and trucking terminals. Large industrial uses have tended to locate in the White City area.

Due to the amount of development over the past decade, Medford’s vacant commercial land supply is lower than in the past; however, this is expected to help promote redevelopment opportunities, particularly in the Downtown and in other existing commercial districts. Four planned Transit Oriented Districts (TODs), including the Southeast TOD and the Downtown, are likely to increase commercial and other employment opportunities in existing areas. Considerable vacant industrial land remains available.

D. POPULATION AND DEMOGRAPHICS

Medford is the largest city in southern Oregon and the seventh largest in the State. According to the Population Research Center’s certified estimates, the City was home to 68,080 people in July 2003. Given its regional role, the City actually serves a population of 400,000 or more people.

The City's land area totals just less than 23 square miles. The City is the center of commerce, industry, transportation, finance, retail and health services for an immediate metropolitan area including Jackson and Josephine counties, as well as for three other southwestern Oregon and northern California counties. Medford is the county seat of Jackson County.

The compounded annual rate of population growth for the City of Medford from 1991 to 2002 was 2.81% compared to the similarly calculated growth rate for the State as a whole of 1.71% for the same period. Jackson County grew at a 2.01% annual rate during this same timeframe. Over 35% of the County's population lives in Medford. The bulk of this population growth has been east of Interstate 5. Medford's eastside census tracts captured about 40% of Jackson County's total population growth in the 1990s. Over 87% of the County's population increase is due to net in-migration as opposed to net natural increase (births minus deaths).

The forces that drove Jackson County's population growth during the 1990s are still in place today. The vast majority is attributable to continued net in-migration as opposed to new natural increases. Population growth in the County is projected to grow by approximately 2% per year through 2006. Based on past trends, Medford will continue to capture a significant share of this population increase. Per the Jackson County Comprehensive Plan, Medford's population is projected to reach 80,043 by the year 2020, representing 35% of the total county population.

Much of the driving force behind the population boom is the draw of retirees from out-of-the-area to the region, attracted by the mild climate that still has four distinct seasons. Some portion of this in-migration is likely attributable to the national notoriety of the region as a desirable place to live. The Forbes/Milken Institute ranked the Medford-Ashland area second in its 2001 "Best Smaller Places" survey. The Institute compares cities on economic factors including salary growth, job growth and level of high-tech industry. Medford/Ashland/Jackson County was also selected by The Searchers, a St. Louis-based data research/information company, as one of the best places in the country in which to retire. Quality of life, taxes, crime rate, access to high quality medical care and affordability of housing were just a few of the 70 sets of criteria used by the Searchers to make this determination.

Apart from population growth, there are other notable features to the City's demographics. They include changes in the age structure over time, the percent of persons living below poverty, and percentages of minority persons.

Regarding the City's age structure, there has been a trend toward an older population. In 1970, the median age in Medford was 30 years. By 2000, the median age had risen to 37 years. During that thirty-year period, the largest increase in any age group was in the group 65+ years. This group saw a 4% increase to 16.5% of the total population. By contrast, the largest decrease was in the 5-19 years group, which lost 5.9 percentage points.

This increase in elderly persons is reflected in the growth in retirement, assisted living, attended living and nursing home complexes in the City. Many of these are located close to the two hospitals, Rogue Valley Medical Center and Providence Medical Center. These residential centers care for frail and/or dependent elders; they present special challenges with respect to

disaster mitigation and preparedness because their residents often require special care, a variety of health aids and special means of transport.

Another demographic aspect is that of persons and families living below established federal poverty levels. In 2000, according to Census information, 13.9% of all persons in Medford were living below the poverty level. (In Jackson County, the percentage was 12.5% in 2000.) With respect to families, 10.3% of all families were living below the poverty level in 2000. The situation is most severe for families comprised of a female householder with no husband present and related children less than 5 years of age. Some 63.9% of this type of family in Medford was living below the poverty level in 2000.

A cluster of census block groups with high percentages of persons living below the poverty level is found in west and central Medford. This cluster is bounded by W. McAndrews to the north, Stewart Ave. to the south, Western and Jeanette Avenues to the west, and Pearl St. (off E. Jackson) to the east. Census block groups in this cluster present neighborhoods with 32% to 42% of their population living below poverty.

It is a commonly held assumption that the poor have a more difficult time recovering from disaster, due to their relative lack of resources. The concentration of the poor in certain neighborhoods may facilitate mitigation and preparedness planning for this special population.

While it is only partially an overlapping phenomenon, concentrations of persons self-identifying as of a race other than white or as a combination of races are also found in three of these six census block groups in west and central Medford. As part of the 2000 Census, persons were asked to identify themselves as “white”, a race other than “white” or as a combination of races. In Jackson County, 8.4% of the population selected a race other than white or a combination of races. In Medford overall, 10% selected one of these two categories. In seven west and central Medford census block groups, the percentage of persons in these two categories ranged from 17% to 30%.²

While some residents may identify a diverse set of ethnic and racial groups in their ancestry, the only other language used in Medford by a significant portion of the population is Spanish. In the 2000 Census, 9.2% of the Medford population was Hispanic or Latino. During times of disaster and recovery, adequate numbers of bi-lingual staff will be needed to serve the Spanish-speaking population.

Map 1 Special Populations locates the residences of persons likely to need more assistance or to access assistance during and after a disaster. Residential care facilities, where frail, dependent persons reside, are displayed. Using the value of residential units as an indicator of persons living in poverty, the map locates those units in the lowest value decile (ten percent).

E. EMPLOYMENT AND ECONOMIC DEVELOPMENT

In the twentieth century, Jackson County’s economy was dependent on timber, and to a lesser extent agriculture, but those days have passed. The amount of lumber cut from Federal lands has

Placeholder: Map 1 – Special Populations

fallen considerably due to environmental regulations and sustained-yield requirements. The region's Mediterranean climate supported the development of a major fruit-growing industry that has most recently declined from competition by fruits imported from South America and China. Nonetheless, Medford's pears still enjoy a worldwide reputation. Home to Bear Creek Corporation's businesses Harry and David and Jackson and Perkins, the area is still one of the world's largest shippers of fruit, food gifts and roses. A recent trend is the replacement of fruit orchards with vineyards in the region.

The forces that have been cooling the Oregon economy in recent years have not been as severe on Jackson County, as reported in a Wall Street Journal article in 2002. The County consistently has posted stronger job gains than any other during the recent recession.

The City of Medford has been transformed into a regional retail and services hub for an area that covers southern and southeastern Oregon and northern California. Ten years ago, forest products business provided more than 11% of all jobs in the County; today it is responsible for less than 5%. Retirement, tourism and health care continue to grow in importance. Despite a substantial decline in the forest products industry, manufacturing employment in Jackson County increased over the last ten years. While wood products jobs fell by 27% in the past decade to about 3,900 the rest of manufacturing increased by 50% to 5,350.

Much of the job growth has occurred in electronic and other high technology equipment, fabricated metal and machinery, printing and publishing and transportation equipment. Job growth in the service areas has been greatest in health care, followed by lodging, business services and social services. Growth in trade-related activities has occurred in department and grocery stores, auto dealerships, restaurants and non-store (catalogue/web-based) retailing. Construction jobs in the Medford-Ashland Metropolitan Statistical Area (MSA) have continued to boom with construction expanding by over 1,600 jobs in the past decade following the population growth and burgeoning commercial activity. Cutbacks in forest management have reduced federal payrolls while growth in state government employment has been flat-lined by the State's prolonged economic downturn.

According to the OR Employment Department's report "2000 Regional Economic Profile", there was a 36% increase in the number of jobs in Transportation and Public Utilities in our region and most of that increase was in trucking. The City is centrally located along Interstate 5 between Portland and San Francisco. This central location as a stopping point on the west coast is a major asset with respect to the freight industry. Oregon laws allow triple trailer rigs, while California limits rigs to two trailers. The Medford area has become a shipping hub and distribution center partly because southbound trailer rigs must drop a trailer before crossing the California border and trucks heading north into Oregon can add one.

Local, state and federal government, including public education, the Bureau of Land Management and Forest Service, are major area employers. Health care constitutes the largest single category of employment in Medford with the Asante Health System being the largest year-round private employer.

According to figures compiled by the Oregon Tourism Commission, the tourism industry accounted for 4,300 jobs in Jackson County in 2000. The amount of money spent by visitors in Jackson County has grown sharply since 1991, according to the Oregon Tourism Commission. Spending increased from \$166.1 million in 1991 to \$252.5 million in 2000, an increase of 52%.

The City is focusing development efforts in the City's downtown core. The Medford Urban Renewal Agency (MURA) was created in 1988 by the City Council and charged with the preparation of an urban revitalization proposal for the City. In October 1988, Council approved the City Center Revitalization Plan, a plan that has been supplemented by special plans for specific downtown projects and ultimately succeeded by the City Center 2050 Plan. To date, MURA has successfully implemented over 20 major renewal projects aimed at reinvigorating the City's downtown area. During MURA's operation, the incremental assessed valuation of real property in the urban renewal district has increased by \$160.6 million dollars.

With a view for mitigation activities, the City is well placed to prepare for and respond to disasters. As a regional hub for retail and services, it is at the center of a distribution network for goods and services. Several regional offices of federal and state agencies, such as the National Weather Service are located within or close to the City, allowing for coordination with those agencies and their resources. Administrative offices for power utilities are also located within or near the City; communication with these companies is crucial during a disaster. County offices are located on the same street as City offices, thereby facilitating communication. In essence, the City has at hand a set of opportunities to prepare for and weather natural disasters.

Medford's ability to return quickly to normalcy after a disaster will be very important to the broader region's well being. If Medford cannot function well, it will affect the broad region that depends upon it for a variety of goods and services.

Map 2 Economic Assets locates major employers in the City, as well as business centers (malls), the airport runway, historic districts and highways. The majority of these assets are located along State Highway 99, near I-5 interchanges, and along the City's arterials.

F. HOUSING AND COMMUNITY DEVELOPMENT

In 2001, the City Council created a Neighborhood Resources program that is currently staffed with 4 full-time positions. Using General City resources and Federal Community Development Block grant funds, the program is charged with maintaining stable, healthy neighborhoods and revitalizing challenged neighborhoods in the City of Medford. A key component of flourishing neighborhoods and a critical aspect of quality of life is the availability of adequate, affordable living accommodations for the residents of the City. Under the policy guidance of the Council-appointed Housing and Community Development Commission, efforts are underway to increase the number and availability of affordable housing units within the City.

The City issued permits for approximately 605 multiple-family dwellings from 1997 to 2002. Upwards of half were in retirement and assisted living complexes. Of the balance, around 45% were in subsidized or special needs complexes. Units in new, market-rate apartments comprised around 25 % of the 605 units.

Placeholder: Map 2 – Economic Assets

The addition of approximately 9,000 new residents between 2003 and 2008, the bulk coming from net in-migration, will require the construction of over 4,000 new housing units in the City. The estimated distribution of this new residential construction in Medford will be 2,780 single-family units and 1,310 multi-family units.³

The West Medford housing market area is substantially built-out, leaving mostly scattered vacant lots available for new infill development. A Transit Oriented District (TOD) is planned in West Medford near the intersection of Jacksonville Highway and North Ross Lane. The TOD is expected to contain a mixture of high-density residential and commercial employment uses designed to attract transit users and pedestrians. The close-in portions of the East Medford market area is also substantially at capacity though active residential development is continuing in the suburban outer northeast, east and southeast areas. The bulk of recent single-family residential construction has been the rapidly urbanizing areas south of Stewart Ave. in the Southwest Medford market area and in the outer easterly areas.

Home prices have been rising rapidly in the Jackson County area. Over a four-year period from November 1998 to November 2001, the average sales price in the county increased by approximately 23%. The East Medford sales price grew by 13.3%; the West Medford sales price grew by 22.6%. Prices in Ashland and Jacksonville grew by 44% and 56%, respectively.⁴

In general, the metro areas in the western United States are less affordable than those in other regions. According to the Housing Opportunity Index devised by the National Association of Home Builders, the Medford-Ashland Metropolitan Statistical Area has an index of 25%, by far the lowest affordability index among all the northwest metro areas. This represents the percentage of home sales in the area that would have been affordable to a family earning the median income.⁵

G. CRITICAL FACILITIES AND UTILITIES

Utilities. Within the City, Pacific Power and Light, a subsidiary of PacifiCorp, provides electrical power. Avista Utilities is the supplier of natural gas. Qwest provides telephone service. Each of these utilities operates under terms of a multi-year franchise agreement with the City for use of its right-of-way in supplying their services.

PacifiCorp is a vertically integrated utility, meaning that it owns and operates generation, transmission, and distribution assets. These assets are interconnected with many other utilities throughout Pacificorp's six-state territory. The Federal Energy Regulatory Commission, a division of the US Department of Energy, regulates PacifiCorp's 8,400 megawatts of generation and interstate transmission lines.

Oregon, Washington, and California operate within the Western Interconnection of the North American Power Grid, under the jurisdiction of the Western Systems Coordinating Council. The WSCC sets the standards and rules for reliable operation of the transmission system. To protect against a negative domino effect across the entire interconnection, each control area must maintain an operating reserve as a margin of system emergencies. Plants are protected by relays to isolate themselves from the grid when necessary to reduce the likelihood of extended outages.

Pacificorp's Medford District Operations Center serves as a Regional Emergency Action Center to coordinate materials, personnel, and equipment to respond to major outages in southern Oregon and northern California.

The highway system. The state highway system and Interstate 5, overseen by the Oregon Department of Transportation (ODOT), constitute critical infrastructure in Medford's local and regional context. In the event of a disaster affecting the I-5 corridor in Medford's vicinity, Highway 99 would serve as a detour route for freeway traffic. Structural damage from earthquakes is the greatest threat to the state system. For that reason, ODOT undertook the seismic retrofit of the Interstate viaduct through the City. While developing that project, ODOT worked with emergency responders to refine emergency response plans to deal with a range of scenarios, from minor traffic accidents to an earthquake or major hazardous materials spill. Written protocols for short-term and long-term detours were produced.⁶ With respect to upcoming interstate improvement projects in the area, ODOT is designing structures to better withstand the effects of earthquakes and floods. The agency also has developed emergency operations plans to manage such events.⁷

Water and wastewater systems. A regional wastewater treatment plant operated by the City processes the City's sanitary sewer system effluent. Because this is a regional facility, transmission line financing and development is a shared expense with the Rogue Valley Sewer Service Authority and several small cities that utilize the water recovery plant. This plant is located on a bank of the Rogue River near White City.

Domestic water service is supplied by the Medford Water Commission within all areas of the City, as well as some nearby communities and unincorporated areas. A five-member Board appointed by the City Mayor and approved by the City Council governs the Commission. The primary water source is the Big Butte Springs, which has a capacity of over 26 million gallons per day. [For more information on the system, see Part Two. Section 9. Drought.]

Water from the Springs is captured underground. The Springs are enclosed, and thus, protected from contamination at the surface. The 56,000-acre Big Butte Springs watershed on the westerly slopes of Mount McLoughlin is considered a "Drinking Water Protection Area" by the state of Oregon. The Medford Water Commission has operated a watershed protection program for many years, implementing a variety of measures to lessen potential vulnerabilities. There is very little development in the region of the Springs; fecal coliform has never been found in the Springs' waters. Nonetheless, the Commission disinfects the Springs' waters. Two separate pipelines, built for purposes of redundancy, feed water from the Springs to the water distribution system and pipelines bring water to town by gravity. Power needs for chlorination can be accommodated by an on-site generator in the event of a power outage.

If something should happen to the Springs or to the distribution system coming from the Springs, the Duff Treatment Plant next to the Rogue River in the White City area would act as the backup source. Every year, from May through early October, the Commission draws water from the Rogue River at this plant. The plant is designed to operate optimally in the summer, but winter operations are possible.⁸

The treatment plant is located out of the flood plain. Back-up power generation is sufficient to keep instrumentation running, but it would not fully power the treatment plant. The treatment plant has very high power demands; it would not operate during a power outage.

Water from the Rogue River serves as a supplemental water supply during peak summer demand periods with a current plant capacity of 45 million gallons per day and an ultimate design capacity of 65 million gallons per day. The system has almost 32,000 connections. In Medford, there are 14 concrete reservoirs for a total storage of 34.4 million gallons. Other cities served have a cumulative total storage of 17 million gallons.

Government offices. City government offices and centers are clustered in the downtown area, in City Hall and the Lausmann Annex. The City's Emergency Command Center is located in the Lausmann Annex. The Public Works Service Center is a main facility located in West Medford. The City employs 95 sworn police officers and 25 full-time personnel in 9-1-1 emergency dispatch. These personnel serve the needs of Medford and Ashland. In downtown Medford, Jackson County operates a criminal detention facility for use by law enforcement agencies in the County. The City of Medford operates 5 fire stations, employing 63 firefighters and 14 command and support staff personnel. As with most fire departments, the Medford Fire Department provides emergency medical response, in addition to fire suppression and safety services. The Medford Fire Department, under contract to the Medford Rural Fire Protection District, is also responsible for responding to fires in a broad rural area outside city limits.

County government offices and facilities are also located in the downtown area, as well as on East and West Main Streets, near the center of town.

Medical facilities. Local Medford hospitals include the Rogue Valley Medical Center (RVMC) with 305 beds and Providence Medical Center with 168 beds. Both hospitals provide emergency care services and are currently undergoing multi-million dollar facility upgrades. Asante Health System is currently managing a \$75 million remodel and expansion of its Rogue Valley Medical Center. The center will have a new emergency department, 136 additional private rooms, a larger short-stay surgery wing, a renovated imaging center, and expanded parking. The expansion is due to be completed in mid-2005. RVMC is located in southeast Medford on Barnett Road and Providence is located off Crater Lake Ave. in central Medford. Located on W. Main, La Clinica Del Valle is a smaller scale medical clinic that specializes in serving Latino and low-income residents.

With regard to mitigation planning, the level of services in the City of Medford may be expected to attract people from throughout a broad region who are seeking refuge in a post-disaster period. In particular, the quality and scale of its medical facilities and personnel will be a major draw for persons needing assistance. In addition to that, the abundance of retail establishments, restaurants and hotels will be a magnet for Californians and Oregonians whose lives have been affected by a disaster.

Map 3 Critical Facilities locates the array of facilities and services needed to respond to or recover from a disaster.

Placeholder: Map 3 – Critical Facilities

H. EDUCATIONAL FACILITIES

The Medford School district, termed 549c, is a K – 12 program and part of the Jackson Education Service district. The school district includes two high schools, two middle schools and fourteen elementary schools serving a student population just under 13,000. The district's boundaries extend well past the Medford Urban Growth Boundary. Students from the entire district attend the two middle schools and two high schools located in the City of Medford. A portion of the City, south of East Barnett Road, is located within the Phoenix-Talent School District, and one Phoenix-Talent elementary school is located within the City of Medford.

Rogue Community College serves approximately 13,000 students, 3,400 of whom are full-time. The college's district comprises Jackson and Josephine counties and the main campus is located in Grants Pass. In Jackson County, RCC has developed the Riverside Center in downtown Medford. The multi-building complex houses classrooms, labs, student and community services areas and library/bookstore facilities. The Medford RCC campus has the highest enrollment numbers of any RCC campus.

In March 2004, Jackson County opened a new 80,000 square foot library headquarters in the City's downtown near the RCC campus.

With respect to mitigation planning, the number of educational institutions in the City, especially those for school-aged children, raises concerns for sheltering and sustaining large numbers of children in place, should they not be able to return home safely. Handling communications with children's parents is a related issue.

I. TRANSPORTATION, DISTRIBUTION AND COMMUNICATIONS

The City of Medford is the leading freight distribution center for Southern Oregon and Northern California. Highway access to the City is very good. Medford lies right on Interstate 5 that runs north-south from Southern California to British Columbia. The City also enjoys excellent access to US 99 West and four major State highways. Medford is just 27 miles north of the California border and is 118 miles east of the Pacific Ocean. The Central Oregon and Pacific Railway (CORP) short line that hauls freight to both northerly and southerly locales serves Medford.

Trucking plays an important role in distributing fruit and food products to markets throughout the Northwest. The City is in a geographically strategic position to serve the Willamette Valley and Portland (273 miles away) to the north as well as San Francisco and the Bay area to the south.

Rogue Valley International – Medford Airport serves the City and surrounding areas. The third largest commercial air service in Oregon, the airport serves nine counties in southern Oregon and northern California. Commercial air service is provided by Horizon, United Express and America West offering over 40 arriving and departing flights to and from San Francisco, Los Angeles, Portland, Seattle, Denver and Phoenix.

Medford lies in a designated enterprise zone and electronic commerce zone and is capable of meeting the demands of the most rigorous high technology-related industries. It has over 20 radio stations and 5 local TV stations with satellite and cable TV service also available. The City is also home to more than 20 Internet service providers (ISPs).

At the center of a transportation and distribution network, the City is dependent on the food, fuel and consumer goods that arrive by truck, principally via Interstate 5. The fact that the City imports so much of its food and fuel may present some vulnerability in the face of a disaster that substantially disrupts the interstate system. The likelihood that people impacted by a regional disaster would come for refuge to Medford heightens the importance of maintaining those supplies.

J. THE LOCAL STREET NETWORK

The City of Medford Transportation System Plan of June 2003 provides the most recent description of the local transportation network.⁹ The street system in the Medford UGB consists of a one- and two-way grid system in the downtown and in the older urban core area located largely to the west of downtown.

Interstate 5, running in a northwest to southeast direction on the east side of downtown, bisects the City. A portion of this freeway within the City is on an elevated viaduct and is susceptible to earthquake damage. Two I-5 interchanges serve Medford. The first, at Highway 62 in the north end of town, serves the airport, the Rogue Valley Mall and other “big box” commercial areas, as well as the northwest industrial portion of the city. The second interchange is at Barnett Road in the south end of town. It serves much of the city’s residential area, as well as the commercial node located in the interchange area. Interstate 5 serves as the north-south corridor through town for much local traffic. Some 50% of the traffic between the north and south interchanges is local, cross-town traffic.

On the east side of I-5, the City’s street system follows a looser grid pattern and is characterized by a lack of higher order streets (arterial and collectors) that provide connections for longer distance, north-south through trips from one part of the city to another. Better arterial and collector connections are available for east-west traffic on the east side of the UGB. The eastern portions of the UGB are also characterized by rolling topography and the street system is influenced by this factor.

Existing travel patterns within the Medford area focus on the major activity centers within the city and on several major travel corridors. Major activity centers include, but are not limited to such areas as the downtown core area, the Rogue Valley Mall, South Gateway Center, Crater Lake Plaza, the commercial strips along Biddle Road and Highway 99, and the airport area. Major travel corridors include Highway 99, Highway 62, McAndrews Road, Crater Lake Avenue, Barnett Road/Stewart Avenue, Columbus Avenue/Sage Road, Foothill/North Phoenix Roads, Biddle Road, and Table Rock Road.

By 2023, growth in population, employment and through traffic volumes in the Medford UGB will result in increased traffic congestion on city streets and county roads within the UGB. As

the community grows, traffic volumes will also grow, leading to a worsening of existing congestion problems and the addition of new problem locations. As noted, significant improvements are planned for the North and South I-5 interchanges. These will address many of the existing and projected future intersection congestion problems in the UGB.

With regard to mitigation planning, the inadequate connectivity in the City's local street network and growing congestion may make timely emergency response increasingly more difficult. The City has plans for several street improvement projects over the next few years that should improve the overall circulation picture.

Endnotes

1. "Railroad location formed Medford," Medford Mail Tribune, June 6, 1985.
2. Rogue Valley Metropolitan Planning Organization. *Title 6 & Environmental Justice Compliance Report. Fiscal Year 2003*.
3. Medford Urban Renewal Agency. *Housing Study, Downtown Medford*. May 2002.
4. Medford Urban Renewal Agency, op. cit.
5. Medford Urban Renewal Agency, op. cit.
6. Leaming, Gary. Oregon Department of Transportation. Personal communication. February 2004.
7. Stephens, Shawn. Oregon Department of Transportation. Personal communication. February 2004.
8. Hodnett, Laura. Medford Water Commission. Personal communication. December 2003.
9. City of Medford. *City of Medford Transportation System Plan. June 2003*.

PART TWO: NATURAL HAZARDS AND MITIGATION

Part Two focuses on the array of natural hazards that has beset the City or may conceivably do so over time. It provides the overall context for mitigation planning by identifying the range of hazards, the risk they pose and relevant mitigation activities. For each natural hazard, there is a section with: a description of the nature and scope of the hazard; information on the City's history with the hazard; a description of mitigation activities by the City, other government agencies, or private, non-profit organizations, such as the American Red Cross; a vulnerability assessment of exposure to the hazard; and a set of proposed mitigation measures related to that hazard.

SECTION 1: SEVERE STORMS

A. DESCRIPTION

Severe storms are the most frequently occurring natural hazard in Medford. Fortunately, they are short-term in nature, lasting only one to two days, and can be managed with local emergency response resources. The City of Medford is not prone to a wide range of storms; however, emergency planning must include all reasonable weather potentials. Particularly common are high winds and periods of extreme cold and heat. Less frequent, but not unknown incidents of severe weather include Siskiyou Mountains snow or ice storms, which create very hazardous driving conditions and may lead to power outages.

Most common from October through April, snowstorms and windstorms can disrupt the region's utilities, telecommunications and roadway systems. Damage from windstorms is typically related to the toppling of trees and limbs and consequent downing of utility infrastructure and power outages. Severe weather and trees are the greatest cause of power outages in southern Oregon. With overall electrical service reliability at 99.96 percent, trees are responsible for approximately half of all outages to Jackson County customers. Fallen limbs and uprooted trees can also block roadways, disrupting the transportation network.

Significant storms have sustained winds of 40 mph with gusts of 55 mph for more than 2 hours. Particularly threatening are wintertime winds from the Cascades that can funnel through the Rogue Valley at 50 mph. Late summer and early fall wind storms often increase wildfire risks. Heavy rains, followed by strong winds, often result in the falling of entire, shallow-rooted trees.

Snowfalls of 6 – 12 inches in a 24-hour period over the Siskiyou Mountains cause closures of Interstate 5 at the Siskiyou Summit each winter, disrupting the flow of interstate freight and traffic. The American Red Cross opens shelters for stranded travelers every year. These events can create traffic congestion at Interstate 5 Interchanges in Medford. Low elevation snow accumulation, followed by durations of warmer rains, frequently lead to flood events.

B. HISTORY

The state's outstanding historic windstorm, the October 1962 "Columbus Day" storm, had winds gusting to 116 miles per hour in Portland and was described by meteorologists as a cyclone. It killed 38 people and created \$170 - \$200 million in damages in the state.¹ Trees and power lines were toppled in Medford by gusts at 58 miles per hour. This storm had its genesis in a Pacific Ocean typhoon.

In 1991, a winter storm front caused temperatures to drop to 6 degrees below zero at night and remain below 12 degrees during the day. This weather lasted approximately one week and caused significant damage to water pipes, heating systems and crops. It also affected natural gas distribution.

There was an unusual cold spell during the winter of 1992 that created a draw on electrical power significant enough to place Medford on the verge of a brown out. The Corps of Engineers at the Lost Creek Power Plant diverted power to Medford, thereby resolving the problem.

The summer months can also bring torrential rainstorms. In July 2000, heavy afternoon rains, lightening and strong winds left thousands in the Rogue Valley without power for periods of time, sparked small rural fires and led to serious traffic problems, as signals went off with the power outages.²

C. EXISTING MITIGATION ACTIVITIES

Medford as a StormReady City. In 2003, the City of Medford received recognition from the National Weather Service (NWS) as a StormReady city. The StormReady Program is designed to help cities and counties implement procedures to reduce the potential for disastrous, weather-related consequences. It is a voluntary program providing guidelines in a variety of areas including:

- Improving the timeliness of hazardous weather warnings
- Establishing effective hazardous weather operations
- Acquiring additional Community Rating System points assigned by the Insurance Services Organization
- Enhancing weather preparedness among citizens

To comply with the guidelines, the Public Works Department, in cooperation with other City departments, established:

- A 24 hour warning point that can receive NWS information and provide local reports, as well as an Emergency Operations Center to staff hazardous weather event functions; multiple warning reception capabilities and locations;
- Sites and capabilities for monitoring weather and water;
- Means for ensuring timely dissemination of local warning to citizens;
- Community educational activities for preparedness purposes; and
- An administrative arm producing hazardous weather action plans.

Severe Weather Watches and Warnings. The City benefits from the work of the National Weather Service (NWS), located adjacent to the Rogue Valley International—Medford Airport. The NWS, whose mission is to protect lives and property from severe weather, forecasts weather for a nine county area in Oregon and Northern California. NWS issues severe weather warnings and watches, assisted by 640 trained volunteer weather “spotters” throughout their region. NWS also provides fire weather forecasts, warnings and watches to fire agencies and the National Forests. The River Forecast Center in Portland provides modeling information on river flows to the local NWS office, which in turn issues flood watches and warnings. As noted above, the city has 24-hour a day access to NWS information.

The Power Grid. The private sector is also engaged in mitigation efforts. To protect against power outages, Pacific Power is constantly improving the redundancy in the electric power system. In new developments, Pacific Power often installs electric lines underground.

Tree removal and Trimming. These are critical activities addressing potential outages. Annual tree trimming programs are contracted by Pacific Power. Program activities are communicated to and coordinated with the Medford City Parks Department. These activities are more difficult to implement within city limits than they are in rural areas.

D. VULNERABILITY ASSESSMENT

Vulnerability assessment typically combines information on the hazard pathway with information on existing development exposed to that hazard. In the case of severe storms in Medford, there is no specific pathway to map and thus, no specification of exposed assets and persons. Nonetheless, certain types of persons and critical facilities are at risk from the impact of severe storms, especially those that result in power outages. Table 2-1 identifies those vulnerabilities.

E. PROPOSED MITIGATION ACTIVITIES

Mitigation measures related to severe storms are included in Table 2-2. They reflect an emphasis on fostering public awareness and an interest in ensuring continuity in electric power.

Endnotes

1. National Weather Service website at <http://www.wrh.noaa.gov>
2. “Wild storm batters region,” Medford Mail Tribune, July 8, 2000.

Table 2-1 VULNERABILITY ASSESSMENT: SEVERE STORMS

Location	Probability	Extent	Overview of Resources at Risk	
Generalized	> 1 chance per year	Limited or City-wide, depending on event.	High winds and heavy snows put structures at risk. Physical impacts to all types of structures and utilities may occur when trees fall and block roadways. Power outages can impact operations of businesses and industries and well-being of residents.	
SUMMARY OF IMPACT ON EXPOSED ASSETS				
Structures (Residential, Commercial, Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
All areas of the City and all structures are potentially at risk. The effects of severe storms can be felt throughout the City or only in a particular area, depending on the event.	Frail, elderly and/or disabled persons whose well-being is dependent on electric-powered assistive devices and utilities. Children in schools when storms strike.	Hospitals are vulnerable if the length of the outage surpasses the capacity of their backup electrical systems. The Water Commission's operations are dependent on electricity. Fallen trees and debris can disrupt the City and state transportation network. High winds can disrupt airport traffic by damaging airplanes on the ground. The Rogue Valley Sewer System (regional waste treatment plant) is at risk if an outage surpasses the capacity of its backup electric generator.	Commercial and industrial enterprises may close due to outages. Even on a temporary short-term basis, this can have a significant economic impact. High winds can blow roofs off of commercial buildings, warehouses, and garages. Snow loads can cause roofs to collapse.	Windstorms can blow down large numbers of trees and/or limbs. This debris can jam the waters of Bear Creek and its tributaries.

Natural Hazard	Table 2-2 Severe Storms Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Short-term Storms #1	Explore opportunities on public access television and through local schools for promoting public awareness of storm hazards and the benefits of mitigation.	Existing Resources	CMO, Emergency Mgt. Team	●	●	●	●
Short-term Storms #2	Support PacifiCorp's concept of a removal/replacement program for trees that threaten utilities. <ul style="list-style-type: none"> Present it to the City's Tree Committee for their review and recommendation to City Council for adoption. 	Existing Resources	Public Works, CMO	●			●
Short-term Storms #3	Support the concept of identifying trees that pose a risk to utilities and structures. <ul style="list-style-type: none"> Integrate this as an ongoing process into Public Works operations, such that all staff are trained in the identification of problem trees within City limits. Coordinate this effort with PacifiCorp and investigate options for defraying costs to property owners, the City and PacifiCorp. 	Existing Resources	Public Works, Parks and Recreation	●			
Short-term Storms #4	Through public incentives and partnerships, continue to support the construction of underground utilities.	Existing Resources	CMO, Planning	●			●

SECTION 2: FLOODS

A. DESCRIPTION

The Rogue Valley has a long history of destructive flood events. Over the past 50 years, major floods occurred in the Rogue Valley in 1955, 1962, 1964, 1974 and 1997. The region experiences the most severe flooding conditions when the effects of snowmelt and direct, heavy rainfall combine during periods of warmer temperatures in winter and early spring months. These floods can threaten public health, safety, and welfare by destroying or isolating structures, disrupting transportation systems, polluting water supplies, and destroying basic public facilities, such as sewer and electric services.

In addition to the flooding of Bear Creek and the Rogue River, the City of Medford has a history of slow-rise flooding along Larson Creek, Lazy Creek, Bear Creek, Elk Creek Terrain and Lone Pine Creek. Some flash flooding from heavy down pour may occur on Lone Pine Creek and Larson Creek. A portion of the City to the west borders Elk Creek tributary, which can exhibit uncontrollable flooding. Localized flooding may also result from debris blocking and plugging drainage systems. Recent incidences of record rainfall and flooding across Oregon have renewed concerns about the potential for flooding in the Medford UGB, and have rekindled interest in preparing for potential floods.

B. HISTORY

The flood of 1890. This began with the development of a solid snow pack by heavy and continual snowfalls starting in October and continuing through January. Snows blocked train travel over the Siskiyou and southbound passengers were stranded in Ashland for 33 days. In February, temperatures registered from 45 to 55 degrees Fahrenheit. In the first five days of February, 7 inches of rain fell. Nearly every bridge on every creek and river within the county was lost. The wooden Main Street Bridge over Bear Creek in Medford, but a year old, collapsed as locals posed on the bridge for photographers. Repair of the bridge was not completed until July.¹

The flood of 1962. This flood turned some Medford streets, including South Central and Riverside into small streams. According to an article in the Medford Mail Tribune², a lake formed near 706 South Central Ave. It “had a current during Sunday’s flooding. Several cars attempted to park in the lot at the Pacific Fruit and Produce Company and found water well up the side of the vehicle. This water was reported coming from a creek in southwest Medford, as was that running down Riverside Ave. The small river on that avenue turned at Eighth St., crossing the bridge to cascade down the access road to Hawthorne Park.” Buildings along Riverside and Central Avenues suffered damage from high waters.

The flood of 1964. This was characterized as a landmark “100 year” flood. There were over \$157 million of losses in the state, seven deaths and thousands evacuated. This flood was rated approximately a 100-year flood by FEMA and may have been the most damaging in Oregon’s history. It was devastating to the Rogue Valley region; some 600 persons were evacuated.

Bridges throughout the county were either washed out or rendered impassible, including Dodge Bridge, the Rogue River Bridge, the bridge over the Rogue in Shady Cove, and the Gold Ray Bridge. State highways were closed in several directions. The flood's effects led, in part, to the construction of both Applegate Dam and Lost Creek Dam by the Army Corps of Engineers.

Heavy snows followed by persistent rains triggered this flood that began in the last half of December and ran into January. At the time, Medford's normal December rainfall was 3.38 inches; December of 1964 brought 12.72 inches of rain. The communities of the Upper Rogue, Eagle Point, Gold Hill, Rogue River and Shady Cove, were hardest hit, but the effects were felt beyond their particular locales. A natural gas transmission line was washed out at the Gold Hill river crossing. Telephone service by the Oregon-Washington Telephone Co. was interrupted, as was electric service by the Pacific Power and Light Company. Damage to PP & L properties, including clean up costs, was estimated at \$3 million.³

In Medford, the effects were less dramatic, but nonetheless troublesome:

“General flooding was reported by Medford Public Works Director Venon Thorpe, on Mace Road in the Berrydale area. Water was backing across Ellendale drive behind St. Mary's High School...Closed to traffic today was Crater Lake Avenue north of Delta Waters Road, and Highland Drive from Greenwood Avenue to Barnett Road. Water was reported across the roads....Precautionary measures were being taken by the Medford Water Department to keep the 12-inch water main under the Main Street Bridge secure...Large rocks were being dumped along the stream banks to keep soil from washing away.”⁴

The New Year's Flood of 1997. The second landmark flood, known as the New Year's flood, occurred in late December 1996 and early January 1997. This flood came on the heels of two months of very wet weather that had saturated local soils. The dramatic, short-lived flood events began New Year's Eve. By January 2, however, it was reported that Bear Creek was flowing at one-eighth its New Year's Day flow.⁵ Officials estimated that Bear Creek flowed at 16,100 cubic feet per second, breaking a record set during the storm of Dec.14, 1962, when the creek flowed at more than 14,500 cubic feet per second.⁶

Residents of Crest Imperial Estates mobile home park off Barnett Road in Medford had to evacuate their homes. Some units were hauled to different locations before daybreak. One singlewide trailer was swept away in the waters of Bear Creek. A total of eight mobile homes were destroyed. About 30 people took shelter in the National Guard Armory in Medford and the armory's parking lot was used for recreational vehicles (RVs), relocated from RV parks along Bear Creek.⁷ The Barnett Townhomes, a fairly new low-income housing complex on Ellendale Drive, suffered damage from Larson Creek.

The telephone system was not fully operative on New Year's Day. A US West official reported that some 90% of all northbound long-distance telephone traffic from the Medford area was failing. This was traced to a broken fiber optic cable, exposed during a landslide on Ti Pan Peak near Rogue River.⁸ This caused many problems for a number of days, such as ATM machines being inoperable in Grants Pass.

During this flood, there was severe flood damage to the historic plaza of Ashland, while flood damage in the City of Medford was less significant. According to National Flood Insurance Program (NFIP) records on this disaster (DR-1160), ten properties in Medford, valued at a total of \$1,718,891, claimed damages with NFIP. These damages totaled \$81,458. NFIP paid a total of \$76,683 for insured damages. No NFIP payments were made for the contents of these buildings. From its Public Assistance Program that covers public facilities, FEMA provided the city with \$47,234, representing 75% of the total damage of \$62,979 to eight properties.

Jackson County's initial damage assessment report indicated that the New Year's Flood had caused \$16 million in damages to housing; \$12 million in damages to businesses; \$9 million in damages to agriculture; and \$13 million in damages to local government in costs and losses. Most of the housing damage occurred along Bear Creek. Nearly all the business damage occurred along Ashland Creek, a tributary of Bear Creek. Agricultural damage was predominantly experienced in the Little Butte Creek and Applegate River watersheds. Infrastructure damage was sustained throughout the county.

Urban Flooding. There is evidence of urban flooding in Medford. Urban flooding is an artifact of the construction of impermeable, paved surfaces, in areas that were formerly natural fields or woodlands. More water runs off, since it cannot be absorbed into the ground. According to a City engineer⁹, development in east Medford has changed both Lazy Creek and Lone Pine Creek. Much of the extent of these creeks, and others in Medford, has been piped. Development has increased the amount of runoff going into the stormwater system, which in turn, discharges into local creeks. Higher volumes of water are flowing at a faster rate into and through these creeks. When this additional water flows into the streams during a heavy rain, it can cause flash flooding. Over time, these heavy, sudden discharges have eroded and degraded the streambeds. Due to encroaching development, these streams are no longer able to meander through their floodplains, and the narrowed floodplains and filled wetlands no longer provide flood storage capacity. The encroaching development is also susceptible to damage during floods. Protection methods, such as the use of riprap, have tended to increase downstream impacts due to increased flow speeds.

C. EXISTING MITIGATION ACTIVITIES

NFIP and FIRM. The City is a participant in the National Flood Insurance Program (NFIP) and conducts its land development in accordance with the guidelines established by that program. Flood Insurance Rate Maps (FIRM), showing the anticipated levels of a hundred-year flood event (100-year flood plain), are maintained by the Building Safety Department.

FEMA is particularly concerned about the elimination of repetitive losses. According to the Oregon State Hazard Mitigation Officer, the City of Medford had no NFIP repetitive loss properties on record as of January 2004.

Stormwater Management. The purpose of the City of Medford's stormwater management program is to reduce the risk of negative impacts from stormwater to people, to residential, commercial, industrial and institutional structures, to infrastructure, such as roads, and to the environment. The City employs a constantly evolving program of stormwater management practices and

improvements designed to systematically reduce the risk. These methods may include improvements to stormwater conveyances, use of detention facilities, preservation of wetlands, and regulation of new construction in flood plains. The Public Works Department is responsible for the City's stormwater management program, including evaluating and mitigating the system-wide effects of proposed development. Historically, the primary focus of the program was to control stormwater in terms of quantity. New regulations are requiring that the City also focus on quality.

The latest drainage plan for the Medford UGB is the Comprehensive Medford Area Drainage Master Plan, produced by Brown and Caldwell in 1996. A new stormwater management plan is currently being prepared. To minimize the hazards posed by floods, the City of Medford continues to implement the recommendations of the Drainage Master Plan through revisions to Medford's Comprehensive Plan and Land Development Code, in addition to implementing state and federal regulations.

The City maintains a storm water management plan for all basins within the Urban Growth Boundary and implements it through upgrading existing facilities and providing new facilities through public and private development. The City's storm water system currently has many open ditches. During the winter, water in these ditches flows into the City's piped storm drain system and to local irrigation ditches and canals.

The Municipal Building Code. Although new construction does occur in the flood plain, the City strives to reduce new development there in order to minimize potential flood damage through their use for open space, agricultural, recreational or similar uses. Sections 9.450 to 9.490 of the Medford Municipal Building Code aims to minimize public and private losses due to flood conditions. These sections:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- **Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;**
- **Control the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;**
- Control filling, grading, dredging, and other development which may increase flood damage; and
- Prevent or regulate the construction of flood barriers, which will unnaturally divert floodwaters or may increase flood hazards in other areas.

The Building Department initially screens all permits for an array of flood plain implications, bulleted above. The Department identifies all concerns to the applicant. Thus, early in the process the applicant is notified that the construction proposal must be reviewed by one or more agencies, such as the Army Corps of Engineers, Division of State Lands, and Department of

Environmental Quality. The City works in cooperation with these agencies to see that construction complies with all pertinent state and federal regulations.

The Building Code, Sections 9.468 through 9.940, provide general construction standards for all special flood hazard areas. Areas of special flood hazard refer to land within the community subject to a 1% or greater chance of flooding in any given year or the “100-year floodplain”. Some of the many specific requirements in these sections include: the anchoring of all manufactured homes; use of construction materials that are resistant to flood damage; and ensuring that the lowest floor of new construction/substantial improvement, including the basement, is elevated to or above base flood elevation.

Medford Land Development Code. This code has provisions relating to development, which require the identification and documentation of an array of site characteristics, including: proximity to wetlands; drainage characteristics; flood-prone areas; and designated flood plains.

Post-development runoff control is a requirement of the National Pollutant Discharge Elimination System (NPDES), Phase II rules. The City is developing ordinances to require that developers provide storm water detention facilities in new developments, including land divisions and Planned Unit Developments. The new ordinances, expected to be adopted in 2004, will also require that those facilities be privately maintained.

USGS. The United States Geological Services (USGS) Water Resource Division is responsible for monitoring stream flow data in 65 places on creeks and rivers in southwestern Oregon. The local office operates equipment that measures stream flows in cubic feet per second (cfs) and by gauge height every 4 hours. Locally, there is a gauge on Bear Creek near S. Cottage Street. USGS works hand in hand with the Army Corps of Engineers as they manage the region’s dams and with the National Weather Service in flood forecasting activities.

D. VULNERABILITY ASSESSMENT

Geographic Information Systems (GIS) technology permits very detailed delineation and quantification of the City’s vulnerability to flood hazard by attaching tabular data to geographic information. Maps 4-7 combine information on of the 100-year and 500-year flood zones with information on the structures, economic assets, special populations and critical facilities within those zones. The maps visually present the flood zones and how they encompass certain resources and population. Tables 2-3 and 2-4 specify the extent of each zone in acreage; potential damage to structures and their value; the risk to specific vulnerable populations and critical facilities; and more general impacts.

E. PROPOSED MITIGATION MEASURES

Mitigation measures related to Floods are presented in Table 2-5. They reflect the importance of stormwater management and avoiding development in the flood plain.

Endnotes

1. Miller, Bill. “*A Picture-perfect Flood*,” Southern Oregon Heritage, March 2002.

2. No title, Medford Mail Tribune, December 4, 1964.
3. “*Water – Its Flow, Its Damage, It’s Future,*” Medford Mail Tribune, January 24, 1965.
4. “*Rogue Runs Wild: Homes Evacuated,*” Medford Mail Tribune, December 22, 1964.
5. Medford Mail Tribune, December 22, 1964, op. cit.
6. “*Jan.1: High waters bring day of ruin,*” Medford Mail Tribune, January 9, 1997.
7. Medford Mail Tribune, January 9, 1997, op. cit.
8. Medford Mail Tribune, January 9, 1997, op. cit.
9. Beskow, Larry. City of Medford. Personal communication. December 2003.

Placeholder: Map 4 – Flood Hazard

Placeholder: Map 5 – Vulnerable Critical Facilities

Placeholder: Map 6 – Vulnerable Economic Assets

Placeholder: Map 7 – Vulnerable Special Populations

Table 2-3 VULNERABILITY ASSESSMENT: 100 - YEAR FLOOD

Location	Probability	Extent	Overview of Resources at Risk
In the 100 - year floodplain of Bear Creek & its tributaries.	There is a 1% chance of this flood occurring each year.	474 acres	Damage to some mobile home parks, residences and several business sites. See information below for details.

SUMMARY OF IMPACT ON EXPOSED ASSETS

Structures (Residential, Commercial, Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
<p>There are 1,072 structures and 452 tax lots in this flood zone. The total improved value of affected properties is \$36,691,920. Of those structures, 868 are dwelling units.</p>	<p>Portions of 8 manufactured home parks are located within this flood zone.</p> <p>Residents of a few low-income structures are located in this zone.</p> <p>The Anna Marie congregate living facility for the elderly is in this flood zone. Next to Anna Marie is Ridgeview Assisted Living, a facility for disabled persons.</p>	<p>There is some flood risk to Rogue Valley Medical Center (RVMC).</p> <p>All Interstate-5 viaduct columns and the northbound exit at the South Medford Interchange are in this flood zone.</p> <p>Debris in water could log jam the bridges in this zone.</p> <p>East Barnett Rd. and Siskiyou Boulevard will be flooded, making access to RVMC hospital more difficult.</p> <p>Police headquarters are located west of the flood zone. It will be difficult to deliver the same level of service to East Medford locations.</p>	<p>The Rogue Valley Mall is partly in and near this flood zone.</p> <p>In this flood zone, there are 34 employers with a total of 420 employees.</p> <p>Severe erosion (wasting) of stream banks and adjoining lands may destroy structures located in the flood zone.</p>	<p>An overflow of sewage can occur, causing the pollution of ground water and surface water bodies.</p> <p>Severe erosion (wasting) of stream banks and adjoining lands will occur.</p> <p>There will be a loss of fish and general riparian habitat due to debris and infrastructure deposits in the streams.</p>

Table 2-4 VULNERABILITY ASSESSMENT: 500 -YEAR FLOOD

Location	Probability	Extent	Overview of Resources at Risk
In the 500-year floodplain of Bear Creek & its tributaries.	There is a .2% chance of the 500 – year flood occurring each year.	772 acres	This flood effectively separates the City on a northwest to southeast diagonal, following the path of Bear Creek and Interstate 5. The Interstate will be impassable in several places. Continuity in city services will be difficult. Government offices are located on the west side, while health care services are located to the east of the zone. Commercial malls and many employers are located in this zone.

SUMMARY OF IMPACT ON EXPOSED ASSETS

Structures (Residential, Commercial, Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
<p>There are 2,800 structures on 919 tax lots in this zone. The total improved value of affected properties is \$62,825,540. Of those structures, 1,620 are dwelling units.</p> <p>In particular, the area known as “old East Medford”, the neighborhood of Portland and Willamette Streets, will be inundated.</p>	<p>Some low-income residents residing in the Portland St./Willamette St. neighborhoods.</p> <p>Persons with lower incomes along Table Rock Road north of its juncture with Merriman Road will have to evacuate.</p> <p>Residents of 8 mobile home parks will need to evacuate and find temporary shelter.</p> <p>It will be difficult for persons residing in West Medford to reach either of the two hospitals in East Medford, since the flood zone separates those two city sections.</p>	<p>The Rogue Valley Medical Center will be in the center of a forked inundation area, making access difficult.</p> <p>Fire Station #4 on Table Rock Road is close to the inundation zone and may be affected.</p> <p>Access to the airport from the south and west will be difficult, although the airport itself is not in the flood zone.</p>	<p>Small historic neighborhoods in the Geneva and Cottage St. area will be inundated.</p> <p>Large commercial establishments and malls north and south of the juncture of Barnett and Stewart, including Winco, Fred Meyer, Big 5 Sporting Goods and the other businesses in the same malls.</p> <p>The entire Rogue Valley Mall will be inundated.</p> <p>There are 258 employers in this flood zone with 2,999 employees.</p> <p>Extreme erosion (wasting) of streambanks will destroy parcels of land and the structures thereon.</p>	<p>Hawthorne and Bear Creek Parks, as well as the Bear Creek Greenway will be inundated and damaged.</p> <p>Surface water pollution will result from debris and infrastructure being deposited in streams.</p> <p>There will be extreme erosion (wasting) if stream banks and adjoining lands.</p> <p>There will be significant loss of fish and general riparian habitat.</p>

Natural Hazard	Table 2-5 Flood Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Long-term Flood #1	<p>Develop mitigation and preparedness measures for critical public infrastructure and facilities located in flood hazard areas.</p> <ul style="list-style-type: none"> Using maps developed for this PDM Plan, make an inventory of critical infrastructure in hazard areas. Conduct on-site assessment at each site; identify necessary mitigation, related costs and potential funding mechanisms. 	Flood Mitigation Assistance Program (FMA); PDM.	Fire, Police, Public Works	●	●	●	●
Long-term Flood #2	<p>Pursue further public acquisition to preserve open space in the floodplain.</p> <ul style="list-style-type: none"> Investigate opportunities to acquire additional parcels next to the passive use areas of the Sports Park. Include policies supporting the City's acquisition of Greenway parcels in the Parks Master Plan. 	Voluntary service organizations, such as Rotary; FMA.	CMO, Parks and Recreation	●			

Natural Hazard	Table 2-5 Flood Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters				
				Goals				
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships	
Long-term Flood #3	Provide education related to flood hazards to households and businesses. <ul style="list-style-type: none"> Share FEMA Emergency Preparedness for Business guides with Chamber of Commerce representatives to determine member interest and the Chamber's interest in distributing them throughout their organization. 	Existing resources.	Emergency Mgt. Team, Economic Development	●	●	●		
Long-term Flood #4	Implement storm water and urban design best management practices, using the newly completed Storm Water Master Plan as a guide.	Existing resources.	Public Works	●				
Long-term Flood #5	Update applicable City codes to improve risk reduction and prevention of flood impacts.	Existing resources.	Planning, Building	●	●			
Long-term Flood #6	Participate in regional partnerships to reduce flood losses in the region. <ul style="list-style-type: none"> Partner with the Bear Creek Watershed Council on projects that promise to decrease runoff throughout the watershed. 	Oregon Watershed Enhancement Board (OWEB).	Public Works, CMO	●	●	●	●	
Long-term Flood #7	Continue to increase the City's Community Rating System rating over time.	Existing Resources.	Planning, Building	●			●	

Table 2-5 Flood Mitigation Measures		Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters				
				Goals				
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Partnerships	
Long-term Flood #8	Strengthen flood plain development regulations. <ul style="list-style-type: none"> Add Lazy Creek to the creeks protected by the Riparian Corridor regulations preventing development with a setback from the bank tops. Continue to add setbacks along other creeks. 	Existing Resources.	Planning	●				
Long-term Flood #9	Using the maps developed for this PDM Plan, conduct site visits at structures in the 100-year flood plain and determine whether they are vulnerable to floods or were specially constructed with the potential for flooding in mind. For vulnerable structures, provide the property owner with information on mitigation.	PDM; Flood Mitigation Assistance (FMA).	Building, Planning	●				
Long-term Flood #10	Request that FEMA, during its update of flood plain maps, identify structures in the flood plain, such as bridges, culverts and buildings, that impede the flow of water or raise the elevation of the flood plain.	NA	Building, Public Works, Planning	●	●			

SECTION 3: EARTHQUAKES

Historically, California has been perceived as the most earthquake-prone state in the west. More recently, however, seismologists and geo-scientists have recognized that Oregon and the entire Pacific Northwest may be subject to earthquakes of substantial magnitude. Southern Oregonians are only now becoming aware of their risks from earthquakes. Research by the Oregon Department of Geology and Mineral Industries (DOGAMI), as well as other state agencies, has clarified the degree of risk and the potential effects of such an event.

A. DESCRIPTION

Earthquakes that occur in Oregon are typically crustal, intraplate, or great subduction earthquakes. Crustal earthquakes are most common, and occur along relatively shallow faults, normally within 10 miles of the earth's surface. Intraplate earthquakes occur at greater depths, approximately 20 to 40 miles beneath the surface. Great subduction earthquakes occur along an offshore fault that parallels the Oregon and Washington coasts.¹

Medford's risk from earthquakes is related to its location between two active fault areas. To the east is the fault zone in the Klamath Falls area where researchers estimate that a 7.0 magnitude earthquake is possible. To the west is the Cascadia Subduction Zone along the coast of Oregon which may produce a severe earthquake of 7.0 or greater magnitude.

In 2003, a DOGAMI official, asked to define the probability of an earthquake occurrence in our area by using the FEMA Hazard Analysis Matrix, suggested that there was a medium to high probability of an earthquake in our area, ranging from more than 1 chance per 50 years to more than 1 chance per 10 years.² This probability is explained by active fault zones to the east and west.

Map 8 shows Medford's regional situation with respect to earthquake history.⁸ The red lines off the coast show the Cascadia Subduction Zone. Earthquakes in Jackson County are denoted according to their magnitude. To the east, the intensity of historic activity in the Klamath Falls area is depicted. Most of this activity was associated with the 1993 earthquakes.

Subduction Zone Earthquake. Great subduction earthquakes occur worldwide in subduction zones, where continent-sized pieces of the earth's crust are shoved deep into the earth. This long-term, slow "collision" between the plates requires adjustment from the rocks; after a point, no more adjustment is possible and the pressure is so great, the rocks break, sending a massive elastic rebound reaction through the earth that causes the earthquake.³ Subduction zone earthquakes are consistently the most powerful type of earthquake recorded, often registering magnitude 8.0 or 9.0.

The City of Medford lies within the geographical area bordering the Cascadia Subduction Zone. This zone is comprised of a 750-mile fault located off the West Coast, from British Columbia to Northern California. In this zone, the Pacific plate is being submerged beneath the North

Placeholder: Map 8 – Selected Earthquakes for Oregon, 1841-2002

American plate; it is part of a larger subduction system, which includes the seismically active and extremely hazardous San Andreas Fault and Alaskan earthquake zones. According to seismologists, should the entire subduction zone rupture, a magnitude 9.0 earthquake would result, similar to a 1960 Chilean subduction zone earthquake that resulted in nearly 5,000 deaths.

Based on evidence from tree rings and marshes near the Oregon coast, as well as historic Japanese documents regarding a tsunami, USGS scientists believe that Oregon's last such earthquake occurred in 1700. Southern Oregon University Professor Eric Dittmer holds that these large earthquakes occur every 300 to 600 years in the Pacific Northwest region, due to its proximity to the Cascadia Subduction Zone.⁴ This suggests that the region is "due", in geologic terms, for such an earthquake anytime in the next 300 years.

The Oregon Department of Geology and Mineral Industries (DOGAMI) has published a paper, written by Yumei Wang and J. L. Clark, on the effects of a subduction earthquake in Jackson County. Entitled "Earthquake Damage in Oregon: Preliminary Estimates of Future Earthquake Losses" (1999), this paper indicates that a severe earthquake, an M8.5 Cascadia subduction zone earthquake, is likely to occur off the Oregon Coast sometime in the next 100 years.

The study predicts that economic losses in Jackson County (related to damage to buildings, highways, airports, and communications systems) could run as high as \$552 million. The study predicts slight to complete damage to 22% of Jackson County's homes, 32% of educational buildings, 42% of government buildings, 39% of commercial structures and 42% of industrial buildings. The day after the quake, it is predicted that 25% of fire stations would be non-operational, as would be 38% of police stations, 30% of schools and 16% of bridges. The study's Executive Summary states that aspects of the computer model resulted in an underestimation of projected damages because the model did not include old-style brick buildings whose collapse during earthquakes can result in numerous casualties. Nonetheless, the estimates are useful for general planning purposes.

Few historic non-reinforced masonry buildings in the region's downtown centers are expected to remain standing. Not only is their mortar old, and thus weakened, but the brick walls are typically not attached to the roofs, floors or foundations. This would be particularly devastating to Medford and Jacksonville, whose downtown cores are replete with such historic masonry buildings.

The Klamath Fault. Significant earthquakes occur in the Klamath Falls area, related to Cascade Mountain/Basin and Range contact zone range front faulting. Magnitudes have historically been generally in the Richter 3.0 to 5.0 range. In 1993, two earthquakes occurred, one with a magnitude of 5.9 and another of 6.0. These caused very minor damage in the Rogue Valley area. They were followed by aftershocks as large as magnitude 5.1 for a period of six months.⁵ Epicenters for these earthquakes are near-north to northwest-trending faults about 19 miles northwest of Klamath Falls.⁶ Researchers estimate that a 7.0 magnitude earthquake is possible in the Klamath Falls area.⁷

Secondary disasters. Of major concern is the cascading effect of an earthquake. An earthquake may cause the disruption of a city's water system, the failure of a dam, the destruction of bridges

and breaks in the transportation network. Thus, the need arises to respond to several types of emergency situations at once, with few of the typical support systems in place and an inadequate infrastructure. In addition to structural damage to bridges, buildings, utilities, and communications systems, an earthquake of 6.0-8.0 on the Richter scale might result in:

- Additional natural/environmental emergencies, such as floods and landslides.
- Industrial/technological emergencies, such as fires, explosions, and hazardous materials incidents.
- Disruption of vital services, such as water, sewer, power, gas, and transportation.
- Damage to and disruption of emergency response facilities, resources, and systems.
- Civil and political emergencies, such as looting.
- Damage to Emigrant Dam.

According a Bureau of Reclamation engineer⁹, several studies of earthquake risk have been conducted on Emigrant Dam and no modifications have been required. Emigrant Dam is actually comprised of two dams, one built around and over the other. The first was a cement arc dam built in 1924 by the Talent Irrigation District. The second was an earthen dam built around and over the existing arc dam for purposes of fortification in 1958.

Peak Ground Acceleration. Another tool for understanding the relative risk that Medford faces from earthquake is the assessment of Peak Ground Acceleration (PGA). PGA is used as a reference in construction design for earthquake resistance. “It measures the ground motion severity experienced at a site due to an earthquake...A PGA of .2g means that the maximum horizontal acceleration is 20% of the earth’s gravity. Since force is proportional to acceleration, that would mean that the earthquake generated horizontal forces are equivalent to 20% of the structure’s weight at its base.”¹⁰

USGS Map 9, “Peak Acceleration (%g) with 10% Probability of Exceedence in 50 Years”, shows that Medford’s PGA is .13.¹¹

B. HISTORY

There is a record of small earthquakes in the Medford area. Some of that history is depicted Map 8 Selected Earthquakes for Oregon. According to the DOGAMI Regional Engineer¹² based at the Grants Pass Field Office, a series of small earthquakes were felt, about once every 20 years, over a period of 60 – 80 years, in the Medford area. The last one was in 1966. The faultlines where they occurred are not well-defined. Many of the faultlines in the Medford area have not been active in more than 2 million years; these ancient fault lines are not considered a significant risk.

DOGAMI has conducted earthquake hazard studies of larger cities in Oregon, but it has not yet conducted one in Medford. A thorough study would determine ground shaking amplification and the risks of earthquake-induced landslides and liquefaction. This information and an assessment of existing faultlines is needed before the City can integrate the risk of local earthquake activity into its land use planning processes.

Placeholder: Map 9 – Peak Acceleration with 10% Probability of Exceedance in 50 Years

In 1993, Oregon suffered three significant quakes. The first was near Salem in Scotts Mill (magnitude 5.6 on the Richter scale) and the other two were in Klamath Falls (magnitudes 5.9 and 6.0). The ones in the Klamath Falls area were felt in Medford. Nonetheless, no property damage or injury to persons from earthquakes have been reported in Jackson County in the past 100 years.

The 1993 Scotts Mill and Klamath Falls earthquakes were crustal earthquakes, which occur along short, shallow faults that are commonly visible at the earth’s surface. Historically, these earthquakes have rarely exceeded magnitude 6.0, but the historic record is too short to provide a true representation of the probable threats of crustal quakes. In areas east of the Cascades, the majority of the earthquakes originate in crustal faults.

Table 2-6 indicates earthquakes 5.0 or greater on the Richter Scale felt during Oregon’s brief recorded history.

**Table 2-6
Earthquakes Centered or Felt in Oregon
Magnitude 5.0 or Greater on the Richter Scale**

Sep. 20, 1993	An earthquake of magnitude 6.0 centered about 10 miles northwest of Klamath Falls caused serious damage to the courthouse and county offices.
Sep. 20, 1993	An earthquake of magnitude 5.9 centered 15 miles northwest of Klamath Falls closed some highways and bridges.
Mar. 25, 1993	An earthquake of magnitude 5.6 centered near Woodburn rocked most of the state, and caused damage to bridges and the State Capitol Building in Salem.
Feb. 13, 1981	An earthquake of magnitude 5.5 centered near Mount St. Helens shook the Portland area.
May 30, 1968	An earthquake of magnitude 5.1 hit the Adel-Warner Lakes area near Lakeview in south central Oregon.
Apr. 29, 1965	An earthquake of magnitude 6.5 centered between Seattle and Tacoma, Washington was felt in the Portland area.
Oct. 1, 1964	An earthquake of magnitude 5.3 hit Portland’s Sauvie Island in the Columbia River.
Nov. 5, 1962	An earthquake of magnitude 5.5 centered in Vancouver, Washington, was recorded in the immediate vicinity of Portland.
Dec. 16, 1953	An earthquake of magnitude 5.6 hit the Portland area.
Apr. 13, 1949	An earthquake of magnitude 7.1 centered between Olympia and Tacoma, Washington caused damage in Portland.
Jul. 16, 1936	An earthquake of magnitude 6.1 was centered in the Milton-Freewater area.
May 13, 1916	An earthquake of an estimated magnitude of 5.7 was centered in Richland, Washington.
Mar. 7, 1893	An earthquake of an estimated magnitude of 5.7 was centered in Umatilla.
Feb. 4, 1892	An earthquake of an estimated magnitude of 5.6 hit the Portland area.
Oct. 12, 1897	An earthquake of an estimated magnitude of 6.7 shook the Gresham area.
Nov. 23, 1873	An earthquake of an estimated magnitude of 6.3 was centered in the Crescent City, California area.

Source: DOGAMI

C. EXISTING MITIGATION ACTIVITIES

Building and Development Codes. Since 1993, when the Seismic Zone rating of Oregon was revised from Zone 2 to Zone 3, new buildings in Oregon have been required to meet more stringent seismic construction standards. Local jurisdictions can designate seismic standards for existing structures. State and local government buildings and facilities are required to be inspected and to meet higher standards.

In 1995, the Oregon Legislature created a task force to examine and develop recommendations concerning the threat of earthquakes to structures. The task force recommendations address non-reinforced masonry buildings, where the greatest amount of upgrading is required to meet current standards. Downtown Medford, like the downtowns of many Oregon cities, is especially prone to earthquake damage, due to the large number of these structures.

The City of Medford utilizes building and development standards to mitigate the potentially damaging effects of earthquakes. New construction is required to meet the standards of seismic zone 3 of the Uniform Building Code (UBC). The City is concerned that all city-owned buildings meet earthquake standards. It commissioned seismic evaluations of City Hall, the Wastewater Treatment Plant and the Carnegie Library building. Several others remain to be evaluated. A complete inventory of facilities needing retrofitting will require significant funds.

The City's Building Code (Sections 9.600 through 9.660) addresses seismic design requirements for existing buildings. These requirements are triggered by application for a permit to change the occupancy classification, add square footage or alter the building. The City conducts a FEMA 178 Evaluation to assess the potential earthquake-related risk to people posed by the building or building component. The evaluation is conducted according to the provisions of the NEHRP Handbook for the Seismic Evaluation of Existing Buildings, a handbook published by FEMA.

Protecting The Downtown Core. The downtown core of Medford contains many historic non-reinforced masonry buildings. This Downtown Historic District is bounded on either side of Main Street by Fourth and Ninth Streets, approximately five city blocks in breadth. To the east and west, it is bounded by Riverside and Oakdale Avenues, respectively. The District covers an area of 1000 acres and holds 104 historic buildings. In Medford's City Center 2050 Plan, the downtown core plays a significant role in creating a high quality downtown central core that supports the city's neighborhood districts. The Plan identifies major functions/districts of the downtown area as cultural and entertainment, governmental, educational, office, and residential. Previous downtown redevelopment activities have led to the construction of new structures and the renovation of existing ones, such as the Ginger Rogers Craterian Theater, parking structures, and a new main building for the Jackson County Library System. These investments highlight the need to protect the historic backbone of the downtown area from earthquakes.

The Medford Urban Renewal Agency (MURA) has responded to this need by creating a Historic Building Rehabilitation Loan Program and Façade Improvement Program to assist local entrepreneurs wishing to rehabilitate their properties in the target area. These funds can be used for seismic rehabilitation and other projects in order to improve a structure's health and safety standards, compliance with codes, and other objectives.

Seismic Retrofits. Notable seismic retrofit projects have been undertaken on public facilities in Medford. In 2001, the City invested \$180,000 in retrofitting the Public Works Service Center. Wall and roof structures were joined and reinforced to prevent shifting. In 2000, as the City was undergoing a comprehensive long-range facilities adequacy analysis, it became apparent that the 36-year old City Hall fell into the non-compliant seismic category. Structural engineers hired to evaluate the building's earthquake resistance concluded that future anticipated events were likely to be much more severe than the building could withstand. A further complication was the fact that the City houses its critical public safety operations (Police and 911- Emergency Dispatch) in City Hall.

The engineers recommended upgrading the strength of the building to a significantly higher level of safety, although it was not economically or practically feasible to achieve current seismic code. Their plan essentially was to increase the length of support columns around the building and to turn them into shear-walls, adding redundancy to the structure. The design better distributes the weight of the building and beams stabilize the movement of the structure during a seismic event, enabling the safe evacuation of building inhabitants and preventing loss of life. The reinforced building will be able to withstand ground swells and different motions back and forth and up and down. The \$700,000 project has significantly improved the performance of the building. According to the engineering firm, the project was designed "for an unusually large earthquake that statistically occurs on average every 500 years, and within a 50-year interval, there is a 10% chance that a larger one could take place." The end result is not only a nicer-looking building, but also one that can be expected to successfully endure anticipated moderate seismic events and enable a safe evacuation in the event of large earthquake.

In 2003, Oregon Department of Transportation completed an \$8 million Phase One seismic retrofit of the Interstate 5 viaduct that crosses downtown Medford. This viaduct handles more than 46,000 vehicles per day; it is a vital link for both Medford city residents and interstate travelers. Phase One retrofits consist of external measures to support a bridge. As part of the project, the bridge deck was tied to the vertical piers. ODOT replaced the road deck and bridge rails and enhanced the erosion protection on several of the 48 bents or piers in or near Bear Creek. The retrofit also included longitudinal cable restraints and the addition of concrete shear blocks for transverse force restraint. Thanks to the planning and cooperation among ODOT, Medford and the public, the retrofit came off without a hitch.

In 2002, the City invested in retrofitting the Regional Water Reclamation Facility to better withstand earthquake events. As noted above, this facility treats sewage from homes and businesses in Medford, Central Point, Jacksonville, Talent, Phoenix and Eagle Point. If the plant were inoperable after an earthquake, serious health problems could ensue. The upgrades prepared the plant for an earthquake with a 2% probability of occurring in 50 years. The upgrades mainly consisted of reinforcing and bracing concrete walls and other facility components.¹³

Dam Failure Exercises and Plans. As noted above, one significant spin off from an earthquake could be the failure of one of the many dams in our region. The failure of Emigrant Dam, Emigrant Dike and Reeder Reservoir would affect the City of Medford.

The Bureau of Reclamation (BOR) has produced an Emergency Action Plan to guide its personnel in identifying and handling dam failure. The plan was prepared to ensure that BOR can provide timely advance notifications to local authorities of the development of hazardous situations. Plan maps estimate that the inundation resulting from Emigrant Dam failure would reach Medford in 1.5 hours. Medford Fire District has a complete set of maps detailing flood inundation zones within the City related to the failure of Emigrant Dam. With this information, it knows which areas will be hardest hit by the failure.

The City periodically participates in tabletop exercises simulating dam failure with the regional emergency management/response community. In 2004, the Bureau of Reclamation is bringing that community together again to plan and execute such an exercise.

D. VULNERABILITY ASSESSMENT

As stated in the 1999 DOGAMI study by Wang and Clark, a subduction earthquake would significantly damage residences, educational buildings, government buildings, industrial and commercial buildings in Jackson County. With reference to Medford, non-reinforced masonry buildings in the downtown core would be especially vulnerable to a large earthquake. Table 2-7 quantifies the estimated damage to the downtown area from this effect. Based on the assumption that homes are more vulnerable to earthquakes if built before the establishment of seismic construction standards in 1954, it also identifies the number and value of homes built before that year.

Map 10 Earthquake Hazard shows the location of structures built before 1954, the location of the non-reinforced masonry buildings in the downtown area, and the locations of historic districts and the central business district.

Earthquakes can result in landslides. For an estimation of the potential damage that earthquake-related landslides could have within Medford city limits and its UGB, refer to Map 12 Landslide Hazard in Section 5 Landslides. Table 2-12 identifies the number and value of homes built on slopes greater than 25%.

Also on Map 10 is the flood zone that would result from the failure of Emigrant Lake Dam. The likelihood of failure is reported to be “extremely low, but not negligible”, according to a Bureau of Land Reclamation engineer.¹⁴ In the unlikely event that the Dam suffered catastrophic failure, the effects on the City, in combination with the other effects of a large earthquake, would be severe. Table 2-8 quantifies the impact and indicates the effect on structures, vulnerable populations and critical facilities, and economic assets.

E. Proposed Mitigation Measures

Mitigation measures related to Earthquake hazards are presented in Table 2-9. Public awareness/preparedness and the execution of seismic retrofit projects on public structures is emphasized.

Endnotes

1. Oregon Department of Geology and Mineral Industries. *Earthquake Hazard Maps for Oregon, 1996*.
2. Wang, Yumei. Department of Geology and Mineral Industries. Personal Communication. Summer 2003.
3. "Getting Ready for the Big One," Medford Mail Tribune, April 14, 2002.
4. Medford Mail Tribune, April 14, 2002, op.cit.
5. Sherrod, D.R. et al, 1997, *Volcano Hazards at Newberry Volcano, Oregon: USGS Open-File Report 97-513*.
6. Narrative accompanying DOGAMI Epicenter Map at www.oregongeology.com
7. "Seismic Hazards". Thomas Ferrero, Ferrero Geologic. Unpublished manuscript. Ashland, OR.
8. Extracted from the Department of Geology and Mineral Industries' *Map of Selected Earthquakes for Oregon, 1841-2002, 2003*. Map found at www.geologyoregon.com
9. Magers, Jeff. Engineer. Lower Columbia Area Office. Bureau of Reclamation. Personal Communication. March 2004.
10. Georisk website at www.georisk.com.
11. Map found on USGS website at <http://eqhazmaps.usgs.gov>.
12. Thomas Wiley. Regional Geologist. Grants Pass Field Office. DOGAMI. Personal Communication. June 2004.
13. "Medford wants an earthquake-proof sewer plant," Medford Mail Tribune, April 23, 2002.
14. Magers, Jeff. Engineer, Lower Columbia Area Office. Bureau of Reclamation. Personal Communication. March 2004.

Placeholder: Map 10 – Earthquake Hazard

Table 2-7 VULNERABILITY ASSESSMENT: EARTHQUAKES

Location	Probability	Extent	Overview of Resources at Risk		
Subduction zone earthquake off the southern Oregon coast.	> 1 chance per 50 years	Effects felt throughout the City; scale of damage dependent on magnitude.	Severe damage to non-reinforced masonry buildings in downtown area. Slight to moderate damage to government and educational facilities. Interstate 5, the viaduct and bridges in Medford are of special concern. Generalized damage to residences, commercial and industrial sites. Electric and gas utility infrastructure at risk, as well as water system.		
SUMMARY OF IMPACT ON EXPOSED ASSETS					
Structures (Residential, Commercial, Historic)	Vulnerable Populations		Critical Facilities	Economic Assets	Environmental Assets

Table 2-7 VULNERABILITY ASSESSMENT: EARTHQUAKES

Location	Probability	Extent	Overview of Resources at Risk		
<p>The most damage is expected to non-reinforced masonry buildings, of which there are some 369 in the downtown area.</p> <p>Homes built before 1954 will be more susceptible to the effects of an earthquake, since they were built before the Building Code included requirements sensitive to earthquake hazard (Class 2 Earthquake Rating). There are 13,535 structures built before 1954 on 11,111 tax lots. Their total improved value is \$692,885,424.</p> <p>The number of homes built on slopes greater than 25% is 116 on 82 tax lots. The total improved value of these structures is \$18,192,180.</p>	<p>Individuals who are unable to support themselves independently for at least 120 hours will be most vulnerable. Emergency services will be unable to reach most persons in need before 120 hours elapse.</p> <p>Low-income persons living in older structures.</p>	<p>Interstate 5 is vulnerable to structural damage during an earthquake, especially the viaduct through Medford, interchanges and related bridges/overpasses.</p> <p>One of Medford’s 5 fire stations has been seismically graded.</p> <p>City Hall will likely be structurally impacted by an earthquake. Operations will be possible in the Annex.</p> <p>Gas, electric and telephone service will likely be down.</p> <p>Southern Oregon Regional Communications will likely relocate to its back-up facility, due to earthquake impacts to the County Building.</p>	<p>The downtown historic district and business district will experience moderate to severe damage.</p>	<p>There is the potential for spills and releases of hazardous materials into Bear Creek.</p> <p>Debris and trash will enter the water systems and may jam the waterways.</p>	

Table 2-8 VULNERABILITY ASSESSMENT: EMIGRANT DAM FAILURE

Location	Probability	Extent	Overview of Resources at Risk
The inundation zone centers on Bear Creek & its tributaries, but extends much further.	Per a Bureau of Reclamation official, the chances of failure due to earthquake are extremely low.	2,814 affected acres	The failure of Emigrant Dam would have catastrophic effects on the City. The community would be divided by a very broad inundation zone. A high proportion of commercial and employment centers would be inundated, causing a loss of jobs and revenue. Many residential areas would be inundated, creating a need to shelter high numbers of people. Interstate 5 would be impassable. High numbers of facilities housing vulnerable people would be affected and need special assistance.

SUMMARY OF IMPACT ON EXPOSED ASSETS

Structures (Residential, Commercial, Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
<p>A total of 7,221 structures on 3,852 tax lots are in this zone. The total improved value of affected properties is \$282,007,140.</p> <p>Some 5,135 dwelling units are included in the above number of structures.</p>	<p>Ten licensed care facilities for frail and disabled persons lie within this inundation area.</p> <p>Residents of 8 mobile home parks will have to evacuate.</p> <p>Persons with lower incomes in the area between Edwards and Court Streets will need to evacuate due to inundation.</p>	<p>City offices in the downtown area will be inundated.</p> <p>Interstate 5 will be almost completely inundated on its path through the City.</p> <p>Access to the airport will be cut off, but the runway will be clear.</p> <p>Qwest’s switching station at Central and Jackson will be inundated and telephone service may be discontinued.</p> <p>Providence Hospital will be within the inundation area.</p> <p>Some 22 shelters are located within this inundation zone.</p>	<p>The downtown business district will be inundated, as will all malls and business centers along Biddle Road.</p> <p>With respect to employers, 1295 places of business are in this zone and total employment numbers 20,949.</p> <p>Collapse of the dam means the loss of the reservoir and the valley’s irrigation system. This will result in significant losses for the region’s agricultural economy and uses in the City that rely on that system, e.g., golf courses.</p>	<p>Waterways will likely be log-jammed.</p> <p>Sewer systems will overflow, polluting streams.</p> <p>Dam waters will wash a variety of debris, hazardous materials and infrastructure into streams, causing destruction of the natural habitat.</p>

Natural Hazard	Table 2-9 Earthquake Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Short-term Earthquake #1	Identify funding sources for undertaking earthquake mitigation in City-owned facilities. <ul style="list-style-type: none"> Target the structural retrofit of the Carnegie Library Building and four City fire stations, and additional "safe havens", such as the Santo Community Center, as funds become available. 	Existing Resources	CMO	●	●		
Short-term Earthquake #2	Support structural mitigation of infrastructure, schools and other public buildings. <ul style="list-style-type: none"> The City will model an active retrofit program for other public entities, share information with school districts on federal funding mechanisms, and facilitate the consideration of their applications. 	Existing Resources & Pre-Disaster Mitigation (PDM) funds.	CMO, Building	●		●	●
Short-term Earthquake #3	Ask DOGAMI to conduct a study of local earthquake hazards in Medford. Present the findings of that study to insurance companies and request that they use them to inform homebuyers of their potential risk.	Existing Resources	CMO	●		●	●
Short-term Earthquake #4	Publicize the Medford Urban Renewal Agency's low-interest loans for earthquake mitigation on the City web site and in the City Newsletter.	Existing Resources	CMO, MURA	●			

Natural Hazard	Table 2-9 Earthquake Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters				
				Goals				
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Partnerships	
Short-term Earthquake #5	Find ways to educate the insurance and real estate industries about Medford's earthquake hazards, such that they advise citizenry of the availability of earthquake insurance.	Existing Resources	CMO	●		●	●	
Long-term Earthquake #1	Ensure that all Medford residents, whatever their income, disability or ethnicity, have information on earthquake hazards and preparedness. <ul style="list-style-type: none"> Contact local advocacy groups, senior centers, social service agencies and care facilities serving these populations and provide them with pertinent Red Cross pamphlets and information about video resources in the public library system. 	Existing resources.	Emergency Mgt. Team' American Red Cross; Hispanic Interagency Committee.	●	●	●		
Long-term Earthquake #2	Develop public/private partnerships for retrofitting projects.	Pre-Disaster Mitigation.	CMO	●	●		●	

SECTION 4: WILDLAND - URBAN INTERFACE FIRES

A. DESCRIPTION

Nationally, more and more homes are being constructed in or adjacent to wildland areas. A desire for a rural or suburban living environment on the fringe of urban areas has increased the risk of fires in what is termed the urban/wildland interface. The interface is the area where residential development comes into contact with areas of natural vegetation contributing to rapid fire spread and additional fuel loading.

In recent years, Jackson County has experienced several large wildland fires and interface fires. The growth of residential developments on city peripheries and in rural areas of the county has increased this risk. The suppression of smaller scale fires in forested areas has resulted in vegetation and fuel conditions that support catastrophic fires.

Fires are caused by both human activities and natural events. For example, according to the Applegate Fire Plan, between 1970 and 1999, there were about 78 fires per year in the Applegate watershed. Some 56% of those fires were caused by human activity; lightning started the remaining 44%.

Potential is growing for the City of Medford to experience wildland-urban interface (WUI) fires. The City was identified as one of 20 incorporated/unincorporated “interface communities at risk” from such fires in the August 17, 2001, Federal Register, Vol.66, N.160.¹

According to a statewide system for assessing critical fire weather, Oregon is divided into three zones, based on the number of critical fire weather days per season. All of Jackson County is in the highest zone, Zone 3.

The region’s largest fires have occurred during periods of extreme fire danger when the Haines Index is 6. Periods of extreme fire danger typically last for about a month and a half to two months, annually. During this time, there are approximately 10-14 days when the Haines Index is 6. The largest fires have started in the mid-elevation belt, between the valley floors and the ridgetops.²

Although Medford has few interface areas, the hazard increases as the City grows farther into the eastern foothills. Some of the fire protection problems that can occur in wildland-urban interface areas include use of combustible exterior construction materials, inadequate access for fire protection apparatus, lack of fire protection water, lack of residential sprinkler systems, inadequate fuel breaks around structures, driveways that are not clearly addressed, and lack of knowledge by property owners regarding how to act when a fire threatens.

Areas within the Medford UGB that could be susceptible to WUI fires include the far eastern section of the community on the southern and western slopes of Roxy Ann Peak/Butte, and the area east of North Phoenix Road wherever steep slopes and thick natural vegetation exist. The City of Medford, the Medford Rural Fire Protection District, Jackson County, and the Oregon

Department of Forestry respond in these areas according to the location of the fire and mutual aid agreements.

The fuel loading and type of fuel in the Roxy Ann area is conducive to fast moving, high intensity wildfires, especially on the south and southwest facing slopes which receive the greatest amount of heat-of-the-day sunlight. Roxy Ann also falls within our mid-elevation belt. In addition to the high flammability of the vegetation species, the ladder arrangement of the vegetation poses the greatest challenge. Grasses provide the highest rates of fire spread, the chaparral brush provides very high intensity fire, with unusually long flame lengths, and production of firebrands (embers that produce spot fires ahead of the main fire). In the higher elevations, both the grasses and brush are situated beneath large conifers which produce the highest number of BTUs for the longest periods of time. Wildfires in these fuels and this arrangement commonly defy control efforts.³

B. HISTORY

In the past decade, there have been several significant wildfires in the Medford region, many caused by lightening and others by arson, including: the 1994 Hull Mountain fire which burned 8,000 acres and was started by arson; the 2001 Quartz Mountain fire which burned 6,300 acres; the 2002 Squires Peak fire which burned some 3,000 acres and threatened many homes; and the 2002 Timbered Rock fire which encompassed 27,000 acres.

Medford has not experienced a large number of wildland-urban interface fires. Fire professionals state that the city has been fortunate in this regard. As more residences are built and human activity increases, the chances of avoiding interface fires decrease. In the last decade, there have been two brush and grass fires on the slopes of Roxy Ann Peak just to the east of Medford city limits. In 1999, a blaze that consumed two acres was stopped by firefighters just 50 feet short of a residence. This blaze began when an overheated weed trimmer caught fire. It was in the same area as a larger brushfire that occurred in 1994, caused by a vehicle “off-roading” illegally.⁴

The situation on Roxy Ann Peak is complicated by the fact that sets of electric transmission lines are located on its slopes. Most residents move into the area in search of treed spaces and rural views; they do not appreciate efforts by the power company to control vegetation. According to a Pacific Power official, these lines “...are a critical coordinate providing energy to Southern Oregon and Northern California, from Medford to Mount Shasta—everything comes out of this hub...A tree on the line can have great ramifications.”⁵

C. EXISTING MITIGATION ACTIVITIES

Special Equipment. Wildland fires require special equipment to reach the inaccessible areas typical of wildland areas. The City of Medford has invested in specialized equipment designed specifically for wildland terrain, including four and six-wheel drive vehicles. The City employs a combination of standard fire fighting equipment with forces of fire fighters on the ground to fight wildland fires effectively.

Senate Bill 360. The most significant effort to increase protection and reduce risk from WUI fires is under the auspices of Senate Bill 360, the Oregon Forestland-Urban Interface Fire Protection Act of 1997 and its administrative rules. This act resulted in the establishment of county committees whose goal was to define and classify interface lands according to natural vegetative fuel hazard value and topography hazard value. Once all lands are classified, property owners are notified of the status of their land within that classificatory system and of modifications they must make to their homes and property for purposes of compliance. Modifications vary and include creating fuel breaks, relocating flammable materials on the property, eliminating vegetative materials impinging on the driveway and home, and other activities. Owners have 2 years to certify that their property is in compliance. The implementation of this act promises to be controversial, in as much as it requires property owners to modify their properties. The Jackson County Forestland-Urban Interface Classification Committee has produced a draft classification scheme. The next phase is to hold a series of public meetings and a final public hearing on the draft.

Air Response. The City of Medford strives to minimize the loss of life and property resulting from wildland fires within the Urban Growth Boundary. It has a contract with the Oregon Department of Forestry for air response to wildland-urban interface fires.

Education. The Medford Fire Department is undertaking efforts to educate the public in wildland fire safety. It has placed pertinent educational materials in the Jackson Co. library system, as well as on its web site.

Regulation of Grass. The City requires property owners to remove weeds over a certain height from their properties by a certain date each year. A Weeds and Grass Program Technician in the Fire Dept. sends out letters to property owners who are not in compliance.

ODF Grants to Property Owners. The Oregon Department of Forestry provides small grants from the National Fire Plan program to homeowners who develop defensible space around their homes and driveways. Residents can apply for cost-share incentives up to \$330 to modify an acre of vegetation around their homes. Modifications include removing dead vegetation, thinning flammable brush and small trees, and creating vertical spaces between flammable brush and the lower limbs of larger trees.

D. VULNERABILITY ASSESSMENT

As shown on Map 11 Wildfire Hazard, the threat of wildland-urban interface fires is present in the eastern hillsides of the City, both in city limits and in the Urban Growth Boundary. While the greatest threat is to residences on those hillsides, emergency services and utility companies also have assets at risk in the high risk areas. Those assets are identified and quantified in Table 2-10. Limited access to residential and other assets in the area complicates response and evacuation.

E. PROPOSED MITIGATION MEASURES

Mitigation measures related to Wildland-Urban Interface Fire hazards are presented in Table 2-11. There is an emphasis on working with property owners to increase their awareness of the risks and to encourage their active participation in preventing damage to their homes.

Endnotes

1. *Region 4. Southwest Oregon Hazards Assessment. Draft.* Oregon Natural Hazards Risk Assessment. Office of Emergency Management. September 2003.
2. Dennis Turco. Fire Prevention Specialist. Oregon Department of Forestry. Personal Communication. March 2004.
3. Dennis Turco. Fire Prevention Specialist. Oregon Department of Forestry. Personal Communication. March 2004.
4. "Brush fire halted," Medford Mail Tribune, September 27, 1999.
5. "Shade trees vs. power lines," Medford Mail Tribune, November 3, 2001.

Placeholder: Map 11 – Wildfire Hazard

Table 2-10 VULNERABILITY ASSESSMENT: WILDLAND-URBAN INTERFACE FIRES

Location	Probability	Extent	Overview of Resources at Risk
Area near East Medford City limits and adjacent UGB.	> 1 chance per 10 years	East Medford hillsides and nearby developments, entailing some 2,433 potentially affected acres.	Expensive, low density, single family homes on eastern hillsides, as well as residential neighborhoods in East Medford. Prescott Park and electric utility infrastructure are near Roxy Ann Peak. Landslides could cut off access to hillside homes, as well as Prescott Park.

SUMMARY OF IMPACT ON EXPOSED ASSETS

Structures (Residential, Commercial, Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
There are 1,098 structures on 1,213 tax lots in the high risk fire zone. The total improved value of structures is \$213,714,460.	Residents in this area are at risk. Discussions are being held regarding the siting of schools in this area.	Special communications equipment has been placed on Roxy Ann Peak for Oregon State Police and Oregon Department of Transportation. The City intends to install components of the Police Department’s wireless system on Roxy Ann Peak. Two power transmission lines run north/south in the adjacent UGB. The transmission substation on Lone Pine serves all of Jackson and Josephine Counties, and parts of Northern California.	Timber Products has communications equipment on Roxy Ann Peak. The homes in this zone, as well as the communications equipment on the Peak are the main economic assets. There are no commercial areas in this zone.	Prescott Park, a City park, is on Roxy Ann Peak. Chrissy Park, an undeveloped park, is also in the high risk fire area. Wildfire will destroy the natural habitat in the Roxy Ann area.

Natural Hazard	Table 2-11 Wildland-Urban Interface (WUI) Fires Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Short-term WUI Fires #1	Work with Jackson County to support the adoption of WUI fire maps and the development of requirements that assist WUI fire mitigation in the Urban Growth Boundary. <ul style="list-style-type: none"> Propose the adoption of a parallel set of requirements within City limits near interface areas. 	Existing Resources	Fire	●		●	●
Short-term WUI Fires #2	Continue to promote public awareness campaigns for property owners living in interface areas. <ul style="list-style-type: none"> Use public service announcements to reach the broader public and direct mailings to property owners in hazardous areas. 	US Fire Administration (USFA): Assistance to Firefighters Grant Program; Fire Prevention and Safety Grants.	Fire	●		●	
Long-term WUI Fires #1	Increase the communication and collaboration among WUI property owners and public agencies to identify the risks in WUI areas, increase local knowledge of protective measures and available federal assistance programs.	US Fire Administration (USFA): Assistance to Firefighters Grant Program; Fire Prevention and Safety Grants.	Fire, Public Works	●		●	●

Natural Hazard	<p style="text-align: center;">Table 2-11 Wildland-Urban Interface (WUI) Fires Mitigation Measures</p>	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	
Long-term WUI Fires #2	<p>Reduce wildfire fuels in high-risk WUI fire hazard areas.</p> <ul style="list-style-type: none"> Undertake neighborhood meetings in these areas to educate property owners about what they can do to decrease fire hazard to their homes. 	US Fire Administration (USFA): Assistance to Firefighters Grant Program; Fire Prevention and Safety Grants.	Fire, Public Works	●	●	●	●
Long-term WUI Fires #3	<p>Explore the City's ability to prohibit particular building materials and practices in high hazard areas, e.g., CC&R requirements.</p> <ul style="list-style-type: none"> If it is determined to be legal, consider including such restrictions in Hillside Ordinances. 	Existing resources.	Planning, Fire	●	●	●	
Long-term WUI Fires #4	<p>Consider the need for adequate ingress and egress for evacuation purposes during the land use planning process.</p> <ul style="list-style-type: none"> This is particularly important in the eastern hillside developments. 	Existing resources.	Planning, Fire, Police	●			●

SECTION 5: LANDSLIDES

A. DESCRIPTION

In general, a landslide is the down slope movement (sliding or falling) of soil, rock, or some mixture of the two. One or more of the following factors triggers landslides:

- Intense or prolonged rainfall, or rapid snow melt
- Undercutting of a slope by erosion or excavation
- Shocks or vibrations from earthquakes or construction
- The removal of vegetation by fires, timber harvesting or land clearing
- Placing fill (weight) on steep slopes ¹

There are at several types of landslides, including rock falls, rockslides, slumps and debris flows. Landslides in our region have most commonly consisted of debris flows along stream channels or slides along hillsides whose soils have become saturated during heavy rains.

“Debris flows commonly start on steep hill slopes as soil slumps or slides that liquefy, accelerate to speeds as great as 35 miles per hour or more, and flow down hillslopes and channels onto gently sloping ground. Their consistency ranges from watery mud to thick, rocky, mud-like, wet cement - dense enough to carry boulders, trees and cars. Debris flows from different sources can combine in canyons and channels, where their destructive power can be greatly increased.” ²

The potential for landslides has increased as population growth and the desire for “view lots” has encouraged upscale residential growth into hillside areas that previously were uninhabited and the construction of access roads into those areas. In wooded areas, logging roads have been implicated in landslide problems.

This growth onto peripheral hillsides is characteristic of recent growth in Medford. While West Medford is relatively flat, with slopes of 0% to 5%. Slopes in east Medford increase to more than 15% and become steeper into the foothills, where slopes of 30% to 50% or greater exist. The maximum slope advisable for urban development is usually less than 25%. ³

In February 2003, the Oregon Department of Geology and Mineral Industries released a set of hazard maps of “Potential Rapidly Moving Landslides” in western Oregon, named Interpretive Map Series (IMS) 22. They were intended as a first level-screening tool, a first attempt at identifying potential debris flow hazard areas. There is a reasonable chance that debris flow hazard presents itself inside the circumscribed areas. According to a DOGAMI official ⁴, the maps are to be used as a starting place, complemented by site-specific studies. These maps concern only debris flows (mud slides), not all types of landslides. Debris flows occur when there are short, heavy bursts of 3 to 4 inches of rain a day.

These maps indicate 4 smaller areas within Medford City limits with potential debris flow hazards and others in the eastern UGB. One of the smaller areas is located on the southwestern

aspect of the hill upon which the Rogue Valley Manor is built. The other three are located in the vicinity of but outside the Hillcrest Orchard parcel of county land located within Medford city limits. IMS 22 also indicates potential debris flow areas in the far eastern portion of the UGB, the southeastern slopes of Roxy Ann Peak.

B. HISTORY

Most landslides in Jackson County have occurred during flood events. During the 1997 “New Year’s Day” flood, more than 70 landslides occurred in the county. The majority (70%) of the slope failures that occurred in the county were adjacent to road cuts on steep slopes. Of these, 77% were on south-facing slopes where vegetation has a more difficult time of re-establishing itself.⁵

Medford has not experienced notable landslides in recent history. According to City Public Works staff, there were some small landslides on a slope in the Hillcrest area in 1997, associated with the heavy rains of that season. Flooding in the upper area resulted in topsoil sliding off the hillside. This was a drainage issue, rather than a structural one.

Significant landslides or earthflows occurred, however, before recorded history, in east Medford, on the slopes of Roxy Ann. Roxy Ann is a 30 million year old volcano. Its shoulders and head are gone, leaving what is called a volcanic neck.⁶ These landslides were likely the effect of a subduction zone earthquake off the coast of Oregon. In recent years, these landslide deposit areas have been developed with subdivisions of expensive homes, the Skycrest subdivision being a noteworthy example. A concern is that these deposits could further move during future severe earthquakes, creating serious damage to the people and homes in the subdivision.⁷

A related emergency management concern about this area is the limited number of access routes for ingress and egress for residents and emergency response. If a landslide should block the main road into some of these areas, no other routes would be available.

Ashland consulting geologist Thomas Ferrero has documented the instability of the ground in the Roxy Ann Peak area. He reports:

“...earthflow complexes in the vicinity are masses of unstable ground similar to the Skycrest mass before it slid. They are huge, slowly creeping unstable masses that are very unpredictable. Their movement tends to stop and go randomly, sometimes in sudden short bursts, or the whole mass may fail as at Skycrest.... Nearly every headwall on the slopes of Roxy Ann contains an earthflow complex. Houses are being constructed on one of the largest right now, in the area east of Eagle Trace. The large flat at Laurelcrest was long ago at the same elevation as the ridge above, hundreds of feet higher. The steep slope above the flat is a scarp, and the Laurelcrest flat is the top of a large earthflow mass.”⁸

This Laurelcrest development is outside the City’s Urban Growth Boundary. If the City should ultimately annex this area, however, it should be aware of the potential risk to residents.

An additional feature of interest in the Roxy Ann area is expansive clay soils. Hillside soils often consist of expansive clay and are characterized by instability. Landslides and soil erosion from development are particularly common in areas where the soils have low shear resistance, or the inability to withstand downward movement.

Expansive clay soils, averaging four to five feet in depth, exist in the Roxy Ann area and extend toward the valley floor. In some areas where there has been earthflow or downslope “creep,” the clay can be more than 20 feet in depth. The shrink-swell area, affected by fluctuations in moisture content, can extend up to eight feet beneath the surface.

According to Ferrero, many homes on the slopes of Roxy Ann are being built on foundations of imported granular fill on top of highly expansive clay. This will likely lead to foundation damage to homes, depending on localized conditions.⁹

C. EXISTING MITIGATION ACTIVITIES

Engineering Requirements. As noted above, expansive soil can cause structural damage to foundations. The City requires a foundation analysis for construction in areas exhibiting such soil. In areas potentially subject to landslides or on steep slopes, the Building Safety Department requires all foundations to be engineered. The Building Safety and Public Works Departments then review them.

Securing Infrastructure. On steep slopes, water and sewer lines must be “keyed into” hillsides. This entails the burying of a concrete anchor into the subsurface rock, a structural technique that holds the lines in place.

D. VULNERABILITY ASSESSMENT

Map 12 Landslide Hazard provides information on three types of features: debris-flow risk areas identified by DOGAMI’s computer-generated model; slope model; and structures on slopes greater than 25%. Structures on slopes greater than 25% are assumed to be at risk of landslide events.

A DOGAMI official has clearly stated that this model requires site-specific investigations to verify the potential hazard. This model is suggestive of areas needing such investigations.

Table 2-12 identifies the potential impact of landslide hazard on local assets.

E. PROPOSED MITIGATION MEASURES

Mitigation measures related to Landslide hazards are presented in Table 2-13. Evidenced is a concern to better define the degree of landslide risk suggested by the DOGAMI model. Also of significant interest is the establishment of a hillside development ordinance that protects existing and future residents and property.

Endnotes

1. Department of Land Conservation and Development website at www.lcd.state.or.us/landslides.
2. United States Department of the Interior. U.S.Geological Survey. *Debris-Flow Hazards in the San Francisco Bay Region*.
3. Marsh, William. *Landscape Planning: Environmental Applications. Second Edition*. McGraw Hill: 1991.
4. Clark, Lu. Department of Geology and Mineral Industries. Personal Communication. July 2003.
5. Atkinson, Clinton J. *Landslide Mapping Results*. Unpublished paper. June 5, 1998.
6. "Colossal Quake will Come," Medford Mail Tribune, December 4, 1998.
7. *Geologic Hazards of the Roxy Ann Butte/East Medford Area*. Thomas Ferrero. Ferrero Geologic. Ashland, OR: 2000.
8. Op.cit. Thomas Ferrero.
9. Op.cit. Thomas Ferrero.

Placeholder: Map 12 – Landslide Hazard

Table 2-12 VULNERABILITY ASSESSMENT: LANDSLIDES

Location	Probability	Extent	Overview of Resources at Risk	
East Medford City Limits and adjacent UGB in Roxy Ann area.	>1 chance per 100 years	DOGAMI-identified areas of potential debris flow cover 49 acres in the UGB.	Expensive, low density, single family homes are on the eastern hillsides susceptible to landslides. Apart from residences, Prescott City Park is on Roxy Ann Peak and there is some electric utility infrastructure in the environs, some within and outside City limits. Landslides could make the access road into this area impassable. There is concern that a subduction zone earthquake could dislodge ancient landslide areas that have been developed.	
SUMMARY OF IMPACT ON EXPOSED ASSETS				
Structures (Residential, Commercial, Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
<p>There are currently no homes in areas identified by DOGAMI as potential debris flow sites. However, some of those lands are currently being platted for future development.</p> <p>This plan assumes that structures built on slopes of more than 25% are at greater potential risk of landslide than others. Within this category, there are 116 structures on 82 tax lots with a total improved value of \$18,192,180.</p>	<p>Residents residing on ancient debris flows, on or below potential debris flows are at risk.</p> <p>Residents may be at risk if their homes were constructed on slopes greater than 25%.</p>	<p>There is a potential debris flow where the McAndrews Road extension joins Hillcrest Road. At this juncture, there is a utility corridor (water, electric, gas) that could be put at risk by a landslide. This could potentially cut off utilities to all persons living east of that location.</p> <p>Hillcrest Road, continuing on as Roxy Ann Road, is the only road providing ingress and egress to residents of the hillside developments near Roxy Ann Peak.</p>	<p>There is no commercial or industrial infrastructure in this area.</p> <p>Clean up activities related to landslides are very costly.</p> <p>Stabilization of hillsides and the reconstruction of infrastructure (roads) is very costly.</p>	<p>Prescott Park on Roxy Ann and Chrisy Park adjacent to the UGB</p> <p>Landslides result in significant increases in stream erosion and the degradation of water quality.</p>

Natural Hazard	Table 2-13 Landslide Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters				
				Goals				
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships	
Short-term Landslide #1	Explore the potential for testing the validity of the DOGAMI Debris-Flow Risk Area mapping in the Roxy Ann Peak area. <ul style="list-style-type: none"> Contact the Regional Geologist to see if he would like to partner on this idea. Explore federal funding opportunities. 	Pre-Disaster Mitigation.	CMO, Planning					●
Long-term Landslide #1	Establish a hillside development ordinance that protects existing development in landslide-prone areas; includes public education about the risks to life and property in steep slope areas; implements construction and subdivision design that reduces potential adverse impacts on steep slopes; and treats issues related to proper drainage systems. <ul style="list-style-type: none"> Re-establish the in-house Hillside Ordinance Team and identify a set of private sector participants for an Ad Hoc Advisory Committee. Determine the desired hillside components and conduct research on existing hillside ordinances in Oregon. 	Existing resources.	Public Works, Planning	●	●	●		
Long-term Landslide #2	Explore options for alternative access to existing hillside developments in steep slope areas. <ul style="list-style-type: none"> Focus on developments on the steep slopes of Roxy Ann. 	Existing resources.	Public Works	●	●			

SECTION 6: VOLCANIC ERUPTIONS

A. DESCRIPTION

Cascadia Subduction Zone movement, the movement of continental plates against each other, generates volcanic activity in the Pacific Northwest.

Per Eric Dittmer, Geology Professor at Southern Oregon University:

“When plates collide, the heavier oceanic crust dives under lighter continental crust. The diving (subducting) plate begins to melt in the heat under the crust (upper mantle) and the lighter minerals melt and rise through the crust in the form of magma that fuels volcanic eruptions. ...That is why there are volcanoes such as Shasta, Pilot Rock, Roxy Ann, the Three Sisters, ...and Hood just inland from the colliding plates off the Oregon and Washington Coast.”¹

Shield and composite volcanoes are present in the region of Jackson County. Nearby Mount McLoughlin, a shield volcano, is considered dormant and may never have erupted. It presents so little earthquake activity that seismic measurements are not taken. However, if Mount McLoughlin were to erupt, in response to another disaster, such as an earthquake, the results could be catastrophic. Prevailing winds would normally carry the volcanic dust eastward. Residue from the eruption, due to our close proximity to the volcanic action, and a natural change of wind direction, either at low levels or in the winds aloft, would cause hot or cold ash to fall most anywhere. The City would have to remove accumulated ash and extinguish fires started by air borne hot embers. An eruption could render portions of the Medford water system inoperable.

“Nuee Ardante”, very hot gasses with ash and poisonous gases, can follow a valley down from the volcano. In this instance, it could move from Mount McLoughlin down highway 140 to Medford. To save lives, advance evacuation would have to occur before the gas clouds arrived.

Mount Shasta, second in activity to Mount St. Helen’s, lies 100 miles to the south of Medford. If it were to explode, the strength of the eruption would be similar to that of Mount St. Helen’s explosion in 1980. The winds would likely take most of the ash and flumes to the east. It could, however, deposit an inch of ash over Medford. Ash and solid debris could create utility outages, fires, health problems, and transportation problems. Damage to northern California would be much more significant and the Rogue Valley could expect to see an influx of victims seeking shelter, medical care and sustenance.²

B. HISTORY

The northern reaches of volcanoes in the Cascade Range have been much more active than those in southern Oregon. “Although there have been no recent volcanic events in the Jackson County area, it is important to note the area is active and susceptible to eruptive events since the region is a part of the volcanic Cascades Range.”³

Our closest, active volcanoes are Mount Shasta and Mount Mazama at Crater Lake. These are both composite volcanoes, exhibiting activity over thousands of years. Their eruptions are explosive, destroying or threatening life and property over a broad area. Mount Shasta likely last erupted in 1786; it erupts approximately every 200 to 300 years. It has a 1 in 25 chance of erupting during this decade.⁴ With respect to its level of activity, Mount Shasta is second only to Mount St. Helens. Crater Lake's Mount Mazama had a series of explosive eruptions some 7,600 years ago. It is now slowly rebuilding magma.⁵

The City does not currently face significant risk from active volcanoes. While this baseline of safety may change, a period of activity, be it months or years, is likely to precede volcanic activity in our region. The City may be in more danger from an earthquake-triggered eruption.

C. EXISTING MITIGATION ACTIVITIES

USGS. After the dramatic and destructive eruption of Mount St. Helens in 1980, the U. S. Congress provided funding to the USGS for a volcano observatory for the Cascade Range, in order to better protect life and property in the Pacific Northwest. This observatory, the David A. Johnston Cascades Volcano Observatory (CVO), monitors several potentially active volcanoes in the Pacific Northwest. It works in cooperation with the Pacific Northwest Seismograph Network (PNSN), taking portable equipment to evaluate hazards at sites of seismic activity. The CVO also uses remote sensing aided by radar images from satellites to detect ground surface movements. The CVO shares information with emergency management and planning officials throughout the region. It studies and assesses potential hazards from volcanoes and educates officials and citizens about the potential effects of volcanic activity and earthquakes.

D. VULNERABILITY ASSESSMENT

Table 2-14 describes the potential impact of volcanic eruption.

E. PROPOSED MITIGATION MEASURES

As reflected in Table 2-15, mitigation measures related to Volcanic Activity concern the effects of ash on the functioning of the City and the health of its residents.

Endnotes

1. *"And Then There's the Volcano,"* Medford Mail Tribune, April 14, 2002.
2. Medford Mail Tribune, April 14, 2002, op. cit.
3. *Jackson County Natural Hazards Mitigation Plan.* Community Planning Workshop. Eugene: 2001.
4. *"And Then There's the Volcano,"* Medford Mail Tribune, April 14, 2002.
5. *Jackson County Natural Hazards Mitigation Plan.* Community Planning Workshop. Eugene: 2001.

Table 2-14 VULNERABILITY ASSESSMENT: VOLCANIC ERUPTIONS

Location	Probability	Extent	Overview of Resources at Risk
Among volcanoes in the region, Mount Shasta is most likely to erupt.	>1 chance per 100 years	Ash might fall throughout the City, although prevailing winds would likely send the greatest volume of ash from Mount Shasta in an easterly direction in California.	Ash fall is the most probable impact. Persons with pre-existing respiratory ailments, the elderly and infants are most vulnerable to the effects of ash. For most, it will be an annoyance, rather than a serious health risk. Ash damages motors of all types. It renders highways slippery. Home roofs can collapse from the weight of ash buildup. Ash can lead to the breakdown of public utilities, home heating, etc. If a combination of ash and acidic gasses is present, infants and the very old or infirm may experience lung damage.

SUMMARY OF IMPACT ON EXPOSED ASSETS

Structures (Residential, Commercial, and Historic)	Vulnerable Populations	Critical Facilities	Economic Assets	Environmental Assets
<p>The weight of ash can cause roofs to collapse, especially older homes with minimal pitch. This might happen throughout older sections of East and West Medford to structures, such as bungalows, built in the 1930s and 1940s.</p> <p>In general, HVAC (heating, ventilation and air conditioning) systems in all structures are vulnerable, due to ash entering filter systems. Ash (pulverized rock) destroys mechanical systems.</p>	<p>Travelers on I-5 may be stranded and in need of shelter.</p> <p>Frail or elderly persons and those with existing respiratory problems.</p> <p>People with outside occupations exposing them to ash for long periods, e.g., emergency responders and Public Works staff.</p>	<p>Public utilities are vulnerable to ash and will need repair.</p> <p>Ash can clog sewers, sewage plants and machinery of all kinds.</p> <p>Emergency service and public works personnel will need special personal protective equipment to work in the ash.</p> <p>Emergency service vehicles may be damaged.</p> <p>The City and ODOT will need to clean ash from the transportation network.</p> <p>Ashfall blots out light and creates higher demands for electric light, causing brownouts or outages.</p>	<p>Depending on the nature and amount of the ash, livestock may be sickened and crops lost.</p> <p>Industrial sites may not function, due to the effects of ash on motors, HVAC systems, etc.</p> <p>Commerce will experience a downturn until the transportation network is functional and customers are mobile, no longer concerned about being exposed to ash.</p> <p>Ashfall cleanup is extremely expensive; it can cost billions of dollars.</p>	<p>If the event occurs in summer or early fall, the Medford Water Commission may have to stop drawing water from Rogue River, due to contamination.</p>

Natural Hazard	Table 2-15 Volcanic Activity Mitigation Measures	Potential Funding Resources	Lead Department(s) & Partners	Mission To Protect People, Property and the Environment from the Impact of Natural Disasters			
				Goals			
				Preventing Injury and Damage	Enhancing Emergency Services	Promoting Public Awareness	Forming Partnerships
Short-term Volcanic #1	Research the availability of plume models to better determine the City's vulnerability to volcanic ash. <ul style="list-style-type: none"> Use the model to assess the risk posed by Mount Shasta. 	Existing resources.	Planning	●	●		
Short-term Volcanic #2	Increase the public's awareness of the potential for volcanic eruptions.	Existing resources.	Emergency Mgt. Team	●	●	●	
Long-term Volcanic #1	Explore options for a regional ash disposal plan. <ul style="list-style-type: none"> Begin pertinent discussions at a Board Meeting of the Rogue Valley Council of Governments or at the regional City Managers' Meeting. 	Existing resources.	Public Works	●	●		●
Long-term Volcanic #2	Coordinate with other agencies to protect citizens from the health effects of ash. <ul style="list-style-type: none"> Hold tabletop exercises among emergency response and health care facility personnel to simulate conditions and responses and to assess human and technical capacities. 	Existing resources.	Emergency Mgt. Team	●	●		●

SECTION 7: AIR QUALITY

A. DESCRIPTION

Given its bowl-like shape, the Rogue Valley experiences periods of air stagnation and atmospheric temperature inversions that trap pollution, particularly during the months of December, January, and February. During these months, the temperature near the ground decreases rapidly toward sunset. As the surface air cools, it flows down the mountain slopes, forming a pool of cold air on the valley floor with the warmer air above acting as a lid. The cooling within this layer typically produces fog, and, as air pollutants are discharged, they become trapped. During these stagnant conditions, the fog and trapped air can remain under this “lid” for several days, becoming increasingly polluted and unhealthy.

In the past, the largest sources of air pollution in the region included industry and wood stoves, which emit particulate matter and carbon monoxide. Substantial efforts have been made to reduce these emissions.

More recently, concerns for air quality arise when smoke from regional wildfires either blows through the valley or becomes trapped during inversions. When this occurs, people’s existing respiratory problems can become exacerbated.

Motor vehicle and industrial emissions have become a major source of air pollution. A major contributing factor to traffic congestion is Medford’s role as a regional retail, health and service center to an estimated population of 400,000 to 450,000. The number of commuters traveling to Medford for work, services, education, and recreation continues to increase, especially from the outlying communities of Ashland, Grants Pass, and Yreka, California. This will continue to affect Medford’s air quality.

There are currently three pollutants of significant concern for Medford: ozone, carbon monoxide and particulate matter. Ozone, often referred to as smog, typically forms on summer days when the temperature exceeds 95 degrees and there is a high volume of motor vehicle traffic. Carbon monoxide (CO) is a colorless, odorless, deadly gas that interferes with the body’s ability to use oxygen. All forms of combustion, including motor vehicle internal combustion engines, produce it. Sources of CO emissions include mobile “non-road” and “on-road” sources. *Non-road* sources include equipment, off-road vehicles, aircraft, and railroads. *On-road* sources are gas and diesel vehicles and trucks driven on roads. “Light duty gas vehicles” (generally cars) account for nearly 66% of CO emissions within the Medford AQMA, and most CO emissions occur on arterial streets.

Map13 Air Quality Monitoring in the Rogue Valley was provided by the Department of Environmental Quality in 2004. It identifies areas of concern with respect to the three pollutants. The map demonstrates that Medford’s highest concentrations of pollutants are located in the north central part of the City.

Particulate Matter (PM₁₀ and PM_{2.5}) comes mostly from smoke, dust, and vehicle exhaust. The current standard for particulate, set in 1987, covers particles that are 10 microns or less in

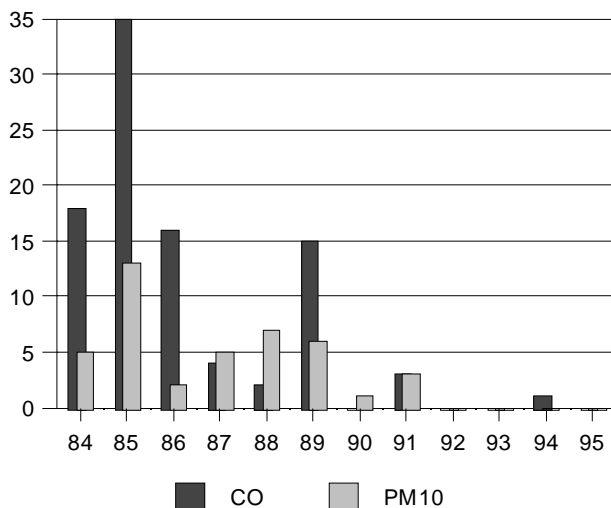
diameter (PM₁₀). A comprehensive review of the human health effects of PM₁₀ revealed that the standards were not sufficient to protect human health. Health studies show harmful effects from breathing particles as small as 2.5 microns in diameter (PM_{2.5}). This smaller particle is inhaled deeper into the lungs and can potentially cause more damage than larger particles.

B. HISTORY

Wildfire Smoke. In the summer of 2002, wildfires raged in Jackson and Josephine Counties. In late July, there were as many as 38 lightning fires in Jackson County. Smoke from the Timbered Rock fire blew in from the northeast and choked the valley. A spokesman from the Department of Environmental Quality advised people with health problems to stay inside in air-conditioned environments and to avoid exercise outside.² Firefighters fought some of the fires for months and winds carried smoke into the Bear Creek Valley until Labor Day.³

CO and PM₁₀ levels. The Clean Air Act of 1970 established National Ambient Air Quality Standards (NAAQS) for seven major pollutants. The NAAQS for carbon monoxide (CO) was exceeded throughout most of the 1980s in Medford, yet levels have decreased in recent years. Figure 2-1 graphically presents the history of the two pollutants (CO and PM₁₀) in violation of the NAAQS in the Medford-Ashland AQMA. While the reduction in the number of days of NAAQS violations is notable, the region is still considered a non-attainment area, since the AQMA has no federally approved State Improvement Plan for PM₁₀. Between 1995 and 2002, CO standards were twice exceeded in the Air Quality Maintenance Area, those dates being in 1999 and 2000.⁴

Figure 2-1
Number of Days Exceeding the NAAQS for CO and PM₁₀
Medford-Ashland AQMA, 1984-1995



Source: Jackson County Air Quality Annual Report, 1995-96.

The Medford UGB was established as the non-attainment boundary for carbon monoxide (CO) in 1978, and, in 1987, the Medford-Ashland AQMA was designated as the non-attainment boundary for particulate matter (PM₁₀). As required by federal law, SIPs were prepared for these two pollutants that exceeded the NAAQS in the Medford-Ashland AQMA. A SIP for CO was

developed in 1982 by Jackson County, and later approved by the EPA. However, the SIP for PM₁₀, developed in 1991, was not approved, and was withdrawn.

In 1989, Jackson County began programs to improve PM₁₀ levels, including regulating industry, outdoor burning, and wood stoves to reduce the regional smoke problem. The most heavily polluted areas had more than double the hazardous level of PM₁₀.⁵ The more populated areas, such as Medford, were especially affected, although all portions of Jackson and Josephine Counties were affected to some degree. The severity of the wood smoke problem has decreased in recent years because of the smoke reduction measures and a decline in the wood products industry. PM₁₀ levels have been drastically reduced, to roughly 12.5% of their 1989 levels. As of 2002, the last exceedance of the 24-hour PM₁₀ standard in the Medford area had occurred in 1991.⁶

More recent standards for PM_{2.5} will create further challenges for the Medford-Ashland Air Quality Maintenance Area (AQMA). The new PM_{2.5} standard will require new monitoring equipment to collect data. According to the Oregon DEQ, any population center in the state may potentially violate the new PM_{2.5} standards. Particular areas of concern include Bend, Eugene-Springfield, La Grande, Portland, Grants Pass, and Medford. Areas designated as out of compliance will have up to ten years to attain the new standards.⁷ Medford saw one exceedance in PM_{2.5} between 1999 and 2002; this occurred in 2002 and was attributable to the effect of summer forest fires.⁸

According to data in the *Jackson County Air Quality Annual Report, 1995-1996*, the annual average ozone level in Medford was below the proposed new higher standard of .08 parts per million (ppm) for several years; however, several days in July and September of 1998 exceeded the existing standard of .12 ppm. From 1999 to 2002, there were no exceedences.⁹

A revised, draft State Improvement Plan (SIP) for PM₁₀ and an Air Quality Maintenance Plan for CO was developed and entered a public comment period. Representatives from industry, city, county, environmentalists and public interest organizations comprised the local Medford-Ashland Air Quality Advisory Board that consulted with Oregon Department of Environmental Quality on the development of these plans. In late 2003, these draft plans resulted in a regional controversy between those in favor of and those opposed to the lowering of certain emissions requirements that would allow additional industrial pollution. Some saw the issue as a tradeoff between protecting gains made in air quality and providing more flexibility for economic growth.

Based on its work with the Board and public input, it is Oregon DEQ's role to make a recommendation to the Oregon Environmental Quality Commission. This Commission then accepts or rejects that recommendation. Environmental Protection Agency (EPA) Region 10 in Seattle reviews the Commission's decision, since Region 10 retains oversight authority on the decision, thereby ensuring compliance with the Clean Air Act.

In July 2004, it was announced that Oregon DEQ would not move ahead with its recommendation to relax emissions requirements. Popular opposition to the proposal was the main impetus for dropping the proposal.

Placeholder: Map 13 – Air Quality Monitoring in the Rogue Valley

C. EXISTING MITIGATION ACTIVITIES

Emission Reduction Programs. As noted, air quality in the Medford-Ashland AQMA has improved dramatically in recent years, due, in part, to programs implemented in Medford and the Rogue Valley to reduce emissions and bring the area into attainment with the NAAQS.

Although air quality has improved, there is a continuing need for these programs. A brief description of each program follows.

- The Vehicle Inspection and Maintenance (I & M) Program requires that all motor vehicles belonging to residents of the Medford-Ashland AQMA be tested for excessive emissions.
- In order to reduce CO emissions, the Clean Air Act required the sale of oxygenated fuel during the winter in Jackson County and other Oregon counties and cities as of 1992. As of September 28, 2002, the oxygenated fuel requirement was lifted in Jackson County, due to improved air quality indices.
- The Small Business Assistance Program, administered by Oregon Department of Environmental Quality provides information and technical assistance to small businesses that produce air emissions, such as dry cleaners, auto-body shops, printers, and small manufacturers.
- In 1983, Oregon began a long-term process of regulating the use of wood stoves. The focus was on promoting non-polluting wood stoves. By 1986, only wood stoves certified as meeting new emission standards were permitted to be sold in Oregon. Later, the EPA adopted nationwide standards for wood stove emissions. In 1991, the sale or installation of uncertified stoves by private parties was banned in Oregon, and uncertified stoves were required to be removed upon sale of a home in a PM₁₀ non-attainment area. Few installation permits are now issued in the City of Medford for new wood stoves, and weatherization of the home is required when a new wood stove is installed.
- The Housing Authority of Jackson County administers programs for lower income households that replace wood stoves used as a sole source of home heating. Most are replaced with natural gas furnaces. The Housing Authority receives federal Community Development Block Grant (CDBG) funds through the City of Medford for such “emergency” repairs. By 1989, these programs had replaced 253 wood stoves in Medford.
- Medford is part of the Interagency Air Quality Team, consisting of representatives from Ashland, Central Point, Jackson County, ACCESS, Inc., the Housing Authority of Jackson County, Pacific Power, Avista Natural Gas, and Oregon DEQ. The Jackson County Environmental Health Division conducts training for air quality staff to reduce duplication of services, and to provide a consistent unified approach to monitoring, surveying and education.

- The Wood Burning Advisory program is used to permit or prohibit smoke emissions in the Critical PM₁₀ Curtailment Area. It serves to inform the public of the status of PM₁₀ levels in the atmosphere relative to federal standards. The Jackson County Environmental Health Division staff establishes the daily advisory by 6:00 a.m. each day from November 1 through February 28. The winter of 97-98 marked the seventh consecutive winter with no *red* days. Red days indicate that PM 10 levels are approaching unhealthy levels and stagnant air conditions are predicted.
- Outdoor burning is not permitted within the City of Medford, and, in Jackson County, is permitted only when the predicted afternoon ventilation index is 400 or greater. From November 1 through February 28, all outdoor burning within the Medford-Ashland AQMA is prohibited.
- Educating the public about ways that individuals can help improve and maintain air quality in the Rogue Valley has been one of the most effective means of improving air quality. The goal of these educational programs is to teach residents that continued compliance with air quality improvement programs is necessary, and that air quality continues to improve because of public cooperation.
- The federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program has provided considerable funding to jurisdictions within the Medford-Ashland AQMA for dust and motor vehicle emission reduction programs. The City of Medford was allocated funds to pave alleys, install curbs, gutters, sidewalks, and bicycle lanes, and enhance street sweeping. Additional funds have extended the Bear Creek Greenway multi-use path, and aided in the construction of a park-n-ride lot and transit transfer station at the South Gateway Shopping Center for the Rogue Valley Transportation District (RVTD) and a compressed natural gas fueling station in Medford.
- The City of Medford has implemented a computerized traffic signal control system designed to minimize overall delay for motorists, thus decreasing CO emissions from idling automobiles.
- The City's Public Works Department has a year-round Street Sweeping Program that cleans dirt from streets, thus keeping contaminants from the stormwater system, creeks and streams, and decreasing the amount of dust in City air.

Land Use Strategies. Implemented through the Land Development Code and Comprehensive Plan, land use strategies, such as those that reduce vehicle miles traveled (VMT) and retain vegetation can assist in achieving and maintaining compliance with the new standards. Currently, local and state agencies are working to develop an air quality plan for the region that will not only maintain federal air quality standards, but also continue to improve air quality, while satisfying the provisions of the Statewide Planning Goals. The City of Medford has also begun undertaking preventive strategies to reduce motor vehicle emissions. The 2003 Medford Transportation Plan requires the development of Transit Oriented Districts (TODs) in four locations in Medford to reduce the growth of vehicle miles traveled (VMTs). These will contain mixed residential and commercial development, which lessens the number and length of auto

trips for work or shopping. These locations include Downtown Medford and the “Village Center” portion of the Southeast Plan Area.

RVTD. The Rogue Valley Transportation District (RVTD) is one of the local agencies that are active in air quality issues through their efforts to reduce single-occupancy vehicle trips and their use of non-polluting, compressed natural gas-fueled buses.

City Cooperation and Participation. The City of Medford aims to achieve and maintain compliance with National Ambient Air Quality Standards (NAAQS). It shall continue to provide leadership in developing, adopting, and implementing regional air quality improvement strategies to achieve compliance with those standards. The City has participated, along with state and local agencies involved in air quality attainment, in the preparation and implementation of the applicable Air Quality Management Plans (AQMPs) and State Implementation Plans (SIPs) for the Medford-Ashland Air Quality Maintenance Area (AQMA). The City plans to continue participating, along with Jackson County and other affected agencies, in administering air quality public education and smoke reduction programs.

Transportation Planning. The arena of transportation planning offers the City other avenues for preventing the degeneration of regional air quality. The Medford Transportation System Plan (TSP), the State Implementation Plan (SIP) and the Oregon Transportation Planning Rule (TPR) present strategies for reducing emissions and improving air quality, such as increasing the use of alternative transportation modes, the use of alternative motor vehicle fuels, such as compressed natural gas and electricity. The City is undertaking efforts to develop a well-connected circulation system and promote other techniques that foster alternative modes of transportation, such as pedestrian-oriented mixed-use development and a linked bicycle transportation system.

In a related vein, the City is promoting the use of incentives by Medford’s larger employers to induce employees to use alternative modes of transportation or work at home in an effort to reduce motor vehicle emissions.

City Focus on Fuel Efficiency. In 2002, the City Manager directed department heads to review their fuel usage and fleet management, in an effort to reduce costs, ameliorate air quality, and increase efficiency. Since then, a migration to alternative energy, high mileage City vehicles has begun. The Police Dept. has two diesel compact sedans and two hybrid compact sedans. The Building Safety Dept. has purchased a hybrid sedan and anticipates buying more as fleet replacement unfolds. The Public Works Dept. is developing strategies to enhance traffic flow throughout the City to decrease congestion and improve air quality.

D. VULNERABILITY ASSESSMENT

Poor air quality puts the health of all persons at risk. With the exception of air quality issues with smoke from wildfires, the effects of poor air quality are long-term, chronic, and often difficult to trace. Those persons most at risk tend to be the elderly, very young children and people with pre-existing respiratory problems. Wildfire smoke during summer months has also been associated with a decrease in tourism.

Apart from the health effects, air quality is clearly a constraining factor on transportation choices and commercial/industrial development in the valley. Cars, trucks, industry and commerce and diverse activities discharge pollutants into the air.

E. PROPOSED MITIGATION MEASURES

At this point in time, the City proposes no new mitigation measures to be uniquely implemented by the City. The City focuses many of its efforts to mitigate air quality issues within the context of its participation in regional organizations, such as the Rogue Valley Metropolitan Planning Organization, and on the advisory bodies of regulatory agencies at the state and federal government levels.

Endnotes

1. *Oregon 90 SIP: Introduction and Overview*. Draft Plan. Department of Environmental Quality.
2. "Timbered Rock blaze spews smoke," Medford Mail Tribune, July 27, 2002.
3. "Tourism choked on smoke," Medford Mail Tribune, November 18, 2002.
4. Department of Environmental Quality. Air Quality Division. *2002 Oregon Air Quality Data Summaries*.
5. Jackson County Environmental Health Division. *Jackson County Air Quality 1995/96*.
6. Department of Environmental Quality. Air Quality Division. *2002 Oregon Air Quality Data Summaries*.
7. United States Environmental Protection Agency. *Proposed New Air Standards and How They Might Affect Oregon Communities*. December 1996.
8. Department of Environmental Quality. Air Quality Division. *2002 Oregon Air Quality Data Summaries*.
9. Department of Environmental Quality, op. cit.

SECTION 8: EPIDEMICS

A. DESCRIPTION

Epidemics are outbreaks of infectious disease that spread rapidly through a localized community to a broader and more extensive population. Understanding how and why a particular epidemic spreads requires a multi-disciplinary study of biology, culture, society, economics, environment and technology. Epidemics are caused by viruses, bacteria or protozoa, which infect humans in a variety of ways. Some are water borne, some air borne, others food borne, and yet others are transmitted via interpersonal contact or contact with a vector, such as a mosquito. The common cold and flu are examples of familiar viruses. Examples of bacteria are E. coli and streptococcus. Familiar protozoas include malaria and giardia.

The City of Medford is more likely to be affected by an epidemic because it is the largest, most concentrated population in our region. As a regional employment, recreational, residential, retail and health care hub, the City draws many non-residents on a daily basis into the City, multiplying the opportunities for further exposure to both visitors and residents.

The scale of certain City public services, such as the Medford Water Commission's water system, is of concern when discussing epidemics. If the Water Commission's system should become contaminated, more than 90,000 Rogue Valley residents could be negatively affected. This has never happened to date. Indeed, the purity of Medford's spring water is a matter of pride.

According to the Regional Engineer for the State Drinking Water Program, Medford faces no special vulnerabilities with respect to contamination of its surface water. Partially dependent upon river waters, it faces the same vulnerabilities as other cities that draw from rivers. Rivers are vulnerable to many types of contamination. It is not possible to fully control a multiple-use watershed like the Bear Creek Watershed which is home to urban and rural development, farming and ranching operations, recreation sites and many other land uses.

B. HISTORY

The last 30 years in our region have seen a series of epidemics. There were outbreaks of hepatitis in the 1970s related to sewage disposal and septic systems that failed in the county's clay soils. There were outbreaks of bacterial infection in the 1980s related to food preparation in restaurants, and illnesses associated with E. coli.

In 1992, more than 4,000 people became ill with cryptosporidiosis, a waterborne parasite similar to giardia. All persons served by the Medford Water Commission system were on a "boil water order". Intensive research ultimately substantiated that the source of the problem was not the Medford Water Commission system.

Over the last 10 years, there have been periodic outbreaks of illnesses, such as the noro-virus family and salmonella, in nursing homes and assisted living facilities.¹ In as much as congregate living facilities for the elderly are clustered in Medford near our regional health facilities, the City is more susceptible to these outbreaks than other cities in the region.

In 2003, there was an outbreak of pertussis, known as “whooping cough”, among children. This contagious disease, caused by bacteria, can engender serious health problems in very young children. In September 2003, Jackson County had the highest rate of infection of any county in Oregon, namely 53.8 cases per 100,000 residents. The majority of cases were in Medford.²

One contemporary concern is the arrival of West Nile Virus (WNV) in our region. WNV is a mosquito-borne virus that produces mild symptoms in most infected persons. In a small number of cases, however, encephalitis (inflammation of the brain) may occur. The virus was expected to arrive in the Medford area in the summer of 2003, but it did not. It was present, however, in all the other states west of the Rocky Mountains. Professionals assume that it will arrive in the summer of 2004.

C. EXISTING MITIGATION ACTIVITIES

Environmental Health Services. Jackson County’s Environmental Health Services Division is responsible for enforcing laws that protect community health, clean air, water purity, and food service. In many ways, it is the Health Department for the City of Medford. If the County requires security and/or assistance for Environmental Health Services activities within City limits, it depends on City Police and Public Works Departments.

In the arena of food services, the Division licenses and inspects restaurants, mobile units such as coffee, hot dog and taco stands, and temporary restaurants, such as food booths at local events. The Division regulates food handlers by offering food handler classes, administering food handler tests, and issuing certificates.

With respect to drinking water, the Division reduces and/or prevents the contamination of public drinking water supplies throughout the county in smaller water systems. It does not have a regulatory relationship with the Medford Water Commission. However, it is legally responsible for conducting disease investigation in the City of Medford. If there is an outbreak of a disease, the Division works to track down the source of that problem, how it is spreading, and monitors its progression.

State Drinking Water Program. The Regional Engineer for the State Dept. of Human Services’ Drinking Water Program oversees all municipal water systems in the region, ensuring that they periodically test and perform all necessary treatment of drinking water. Contamination testing consists of two types: microbiological and chemical. The Medford Water Commission conducts 80 – 100 microbiological tests per month. Microbiological testing begins with testing for coliform bacteria, the indicator organism. If tests are positive, then further testing is conducted for e. coli and fecal coliform. The state works hand in hand with the county to investigate contaminations.

Chemical testing is done for inorganic and organic chemicals. Inorganic chemicals are heavy metals, such as arsenic. Inorganic testing occurs once per year for surface water and once every 3 years for ground water. Organic chemicals are categorized as either volatile or synthetic; they are considered possible carcinogens. Volatile organic chemicals include cleaners and degreasers. Testing for volatile organic chemicals occurs yearly for surface water and once every 3 years for ground water. Synthetic chemicals include herbicides and pesticides. Testing for these is done

once every 3 years. Apart from monitoring testing results, the Regional Engineer is responsible for inspecting the entire water system, including all 14 reservoirs in the City.³

Jackson County Vector Control District. This special district was formed in 1968 to provide mosquito and fly control to residents. The goal of the District is to prevent new vector sources from developing and to abate existing vector populations and their sources, all in an effort to protect public health and comfort. Vectors are insects, rodents or any other animal that can host and/or transmit diseases to human or their domesticated animals. The District has a surveillance program that collects dead crows for laboratory research related to identifying and tracking West Nile Virus. During the summer, the District's operators use all terrain vehicles to spray mosquito breeding sites with larvicides. Recent regulations protecting riparian areas have resulted in the protection of vector breeding grounds, especially those of mosquitos. It is assumed, however, that functioning wetlands harbor enough natural predators to control the vector populations.

D. VULNERABILITY ASSESSMENT

In an effort to identify patterns in epidemics, the Jackson County Health Department used GIS technology in 2004 to map all reported diseases. The result showed no particular geographic patterns to epidemics, with the exception that outbreaks of noro-virus occur in large care facilities for the elderly and disabled. Since several of these facilities are located in Medford, the City may be subject to that type of illness more than other communities in the region.

E. PROPOSED MITIGATION MEASURES

At this point in time, the City is not proposing City-led mitigation measures related to epidemics. A representative from Jackson County Health Department, the agency responsible for overseeing this natural hazard, participated in this planning process and did not identify additional, needed forms of cooperation from the City.

Endnotes

1. Stevens, Gary. Jackson County Environmental Health Services. Personal communication. July 2003.
2. "Pertussis rate persists," Medford Mail Tribune, September 10, 2003.
3. Curry, Scott. Regional Engineer. Drinking Water Program. Oregon Dept. of Human Services. Personal communication. December 2003.

SECTION 9: DROUGHT

A. DESCRIPTION

Rain in southern Oregon results from a very specific weather process over the Pacific Ocean. To quote a Mail Tribune article¹, whose source was the U. S. Geological Survey:

“ Southern Oregon gets its moisture when warm air from subtropical areas moves north over the Pacific and meets Pacific air moving south from the Arctic. The meeting of the two air masses creates unstable boundaries, and prevailing winds blow the moisture eastward into the coast. In the summer, this meeting ground shifts to the north, so that 80% of the region’s moisture comes from October through March.”

As the moisture-laden air offshore moves over the coast and Cascade Range, it rises, cools, condenses to fall as rain. As the air moves over to the east side of the mountains it warms and condensation slows down, to rainfall decreases.”

Jackson County has extended hot and dry weather conditions during the summer and early fall months. Sequential years of below normal rainfall over winter months can result in severe drought conditions, as were seen in 1939, 1976 through 1981, 1987 through 1994, and again in 2001. Although professionals formerly spoke of a 10-year drought cycle in our region, some now believe that drought has become a more common phenomenon, occurring in a 5- to 7-year cycle.²

Although the phenomenon of El Nino is not entirely understood, climatologists point to El Nino as a cause of below-normal rainfall in Oregon. Occurring approximately every 5 years, the El Nino effect consists of the warming of Pacific waters. This rise in water temperatures sets off changes in ocean currents and climate patterns. One typical climate change is the northerly movement of typical weather patterns, whereby Californian weather moves into Oregon and Oregon’s weather moves into southern British Columbia.³

B. HISTORY

The City of Medford draws its water supplies from the Big Butte Springs and Rogue River. It is not affected by drought in the same way as the region’s small towns and rural communities that are on separate, smaller water systems or dependent on wells.

The Medford Water Commission’s system at Big Butte Springs can handle a capacity of 26.4 million gallons per day. Drought has never required the implementation of a water curtailment program in the City of Medford. A long drought cycle, however, has affected the volume of flows from the Big Butte Springs and required drawing water from the nearby Rancheria Springs. This has happened three to four times since the 1960s. During winter months, the Water Commission supplies some 17 million gallons per day to customers from the Springs. From May through October each year, the Commission uses water from both the Springs and the Rogue River. Total water consumption averages 45 – 50 million gallons per day during these summer months.

During the drought of 1977, Ashland instituted water rationing in February. Reeder Reservoir was then at 80 percent of capacity. Medford Water Commission officials discussed voluntary conservation measures, but imposed none. In April 1977, the Rogue and Umpqua mountain snow pack was 48 percent of the average for that date. Fortunately, record rains (200 percent of the average) in May 1977 eased the situation.⁴

The 1992 drought was clearly worse than that in 1977. It resulted from a run of 8 of the warmest and driest years on record. Normal annual precipitation in the City of Medford is 19.84 inches. From 1985 through 1992, annual precipitation was closer to 15 inches for all but one year. Even the flows at Big Butte Springs, Medford's water source, showed declines in the spring, rather than the usual increases from snow melt. The flow in the Springs fell from 32 million gallons per day to 28 million gallons. The Medford Water Commission can compensate for the shortfall at the Springs by pulling water from the Rogue River at the Robert A. Duff Water Treatment Plant.

During drought years, the southern Oregon economy is hurt as irrigators, local orchardists and farmers face diminishing water supplies. Fruit harvests that occur later in the growing season, such as Bosc and Comice pears, are especially vulnerable. Small portions of two irrigation districts (ID) are within City limits. They are the Rogue River Valley ID with close to 9,000 irrigated acres and the Medford ID with close to 13,000 irrigated acres in the region. On these acres, a variety of orchard fruits are grown, as well as alfalfa, grass hay, row crops, grass seed, pasture gardens and sugar beet seed. Following the principle of "first in time, first in use" during a drought, the Watermaster cuts back users with junior water rights when the stream system cannot satisfy all users. At times, this has resulted in no users with rights dating after 1906 receiving their appropriation.

Each of the IDs have diversions off Bear Creek that feed their systems. During times of drought, the needs of migrating fish can compete with irrigation needs. As more water is taken from Bear Creek, water temperatures rise. Silt is released into Bear Creek when canal gates are lifted, decreasing the amount of oxygen in the water and increasing water temperatures. Thus, conflicts can arise between the needs of the agricultural community and wildlife habitat.

Drought conditions also increase the risk of wildland fires, thus threatening the safety of the growing number of residents residing in wildland-urban interface areas and rural communities.

C. EXISTING MITIGATION ACTIVITIES

Curtailment Plan. The Medford Water Commission has developed a curtailment plan which can be implemented during drought or other events, e.g., concerns regarding contamination, broken water lines, etc. The plan has a set of actions ranging from voluntary to restrictive, depending on the severity of the problem.

Conservation. The Medford Water Commission is developing a conservation program to set the stage for people to think about their water usage. As a free service, the Commission provides a Sprinkler Survey Program that visits residences to assess how people are watering their lawns and offer advice on how to do it more effectively. The City of Medford is studying ways to use and require the use of drought-tolerant landscaping to reduce water use.

Dam Flows. The regional context of drought management and mitigation includes activities by the Bureau of Reclamation, irrigation districts, the Corps of Engineers, and neighboring cities. The Army Corps of Engineers (ACE) manages Applegate Dam and Lost Creek Lake Dam, the two largest dams in our region. Using information and predictions regarding the snow pack and expected run off, ACE regulates the flow from the dams. The Bureau of Reclamation oversees the smaller dams in the region, such as those at Fish Lake, Immigrant Lake, and Howard Prairie. It is the Irrigation District Managers, however, who actually manage the flow of water from the dams, according to needs and available resources.

Irrigation Districts. For mitigation purposes during drought periods, irrigation districts will often move to lengthier rotation schedules in an attempt to stretch the available water resources. This may entail changing the delivery schedule from 7 to 14 days or as many as 24 days, depending on circumstances.

Irrigation Districts work with irrigators and watershed councils to educate users about better irrigation practices that lead to more efficient use of water.

Irrigation Districts avail themselves of high technology in efforts to better manage the available water. The Bureau of Reclamation has a Hydromet satellite system that takes readings of water temperatures and volume of water in ditches, streams and reservoirs. Telemetry readings on the canal systems check water volumes, allowing ongoing management adjustments to the canal systems. The Districts are also piping their irrigation systems in order to avoid evaporation and to decrease maintenance needs. Rogue River Valley ID is working with the regional sewage treatment plant on a pilot program to irrigate 500 acres with the effluent of plant-treated waters.⁵

D. VULNERABILITY ASSESSMENT

The effects of drought on Jackson County are serious, especially with respect to increasing the risk of wildfire and harming agricultural productivity. The greatest risk to Medford from drought is the heightened risk of wildland-urban interface fire in the eastern Urban Growth Boundary area and city limits. Agricultural activity is very limited within city limits. Medford is not considered vulnerable to drought with respect to its drinking water supply.

E. PROPOSED MITIGATION MEASURES

As suggested above, the main risk posed by drought to the City is in the increased risk of wildland-urban interface (WUI) fires. Pertinent WUI-related mitigation measures are identified in the section on that hazard.

Endnotes

1. "A seasonal cycle out of harmony," Medford Mail Tribune, June 28, 1992.
2. Mentee, Larry. Watermaster. Personal communication, December 2003.
3. "The Sea's Influence," Medford Mail Tribune, June 28, 1992.
4. "How does it compare to other droughts," Medford Mail Tribune, June 28, 1992.
5. Eicher, Jeff. Rogue River Valley Irrigation District. Personal communication. January 2004.

APPENDIX 1

HAZARD ANALYSIS MATRIX

JURISDICTION: CITY OF MEDFORD, OREGON

HAZARD	HISTORY WF=2	VULNERABILITY WF=5	MAXIMUM THREAT WF=10	PROBABILITY WF=7	TOTAL =
Severe Storms	<u>10</u> x 2 = 20	<u>10</u> x 5 = 50	<u>10</u> x 10 = 100	<u>9</u> x 7 = 63	= 233
Floods	<u>10</u> x 2 = 20	<u>9</u> x 5 = 45	<u>9</u> x 10 = 90	<u>10</u> x 7 = 70	= 225
Earthquakes	<u>1</u> x 2 = 2	<u>10</u> x 5 = 50	<u>10</u> x 10 = 100	<u>7</u> x 7 = 49	= 201
Poor Air Quality	<u>8</u> x 2 = 16	<u>4</u> x 5 = 20	<u>8</u> x 10 = 80	<u>9</u> x 7 = 63	= 179
Epidemics	<u>10</u> x 2 = 20	<u>1</u> x 5 = 5	<u>9</u> x 10 = 90	<u>9</u> x 7 = 63	= 178
Drought	<u>10</u> x 2 = 20	<u>2</u> x 5 = 10	<u>6</u> x 10 = 60	<u>10</u> x 7 = 70	= 160
Volcanic Eruptions	<u>1</u> x 2 = 2	<u>10</u> x 5 = 50	<u>10</u> x 10 = 100	<u>1</u> x 7 = 7	= 159
Wildland-Urban Interface Fires	<u>5</u> x 2 = 10	<u>5</u> x 5 = 25	<u>5</u> x 10 = 50	<u>9</u> x 7 = 63	= 148
Landslides	<u>1</u> x 2 = 2	<u>10</u> x 5 = 50	<u>5</u> x 10 = 50	<u>1</u> x 7 = 7	= 109

DATE: 3/10/04

WF = weight factor

PREPARED BY: Steering Committee, Medford Pre-Disaster Mitigation Planning Process

AGENCY: City of Medford

HAZARD ANALYSIS

YOUR COUNTY¹

The local emergency management organization and other interested parties should begin the emergency planning process by examining the hazards which could affect the area.

Conducting a hazard analysis is a useful first step in planning for mitigation, response, and recovery. The method that follows provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

The following categories are used in conducting this hazard analysis:

HISTORY (weight factor = 2)

The record of occurrences of previous major emergencies or disasters. Examples of events to include in assessing history of a hazard in your jurisdiction are events for which the following types of activities were required:

- < The EOC was activated;
- < The alternate EOC was activated;
- < Activation of three or more EOP functions (alert & warning, evacuation, shelter etc.);
- < A multi-jurisdictional response was required;
- < A "local emergency" was declared.

These criteria are not exclusive. Include any additional events you think are significant.

VULNERABILITY (weight factor = 5)

The percentage of population and property likely to be affected.

MAXIMUM THREAT (weight factor = 10)

The maximum percentage of population and property that could be impacted under a worst case scenario.

PROBABILITY (weight factor = 7)

The likelihood of occurrence within a specified period of time.

By multiplying the "severity rating" of the rating system shown on page 3 by the weight factors associated with the categories above, we can arrive at a subscore for history, vulnerability, maximum threat, and probability for each hazard. Adding the subscores will produce a total score for that hazard.

For example: look at "**flood**" on the Example Hazard Analysis Matrix shown on page 3. The history of flooding is high in the sample jurisdiction. In this case, high is scored with eight (8) points for the severity rating, and history has a factor weighting of two. $2 \times 8 =$ subscore of 16. The vulnerability of the sample jurisdiction is low, however: a flood normally would not affect more than 1% of the lives and property in the jurisdiction. Low is scored with three points for the severity rating, and vulnerability has a factor weight of five. $5 \times 3 =$ subscore of 15. After figuring maximum threat and probability, the total score for flooding is 144.

The total score isn't as important as how it compares with the total scores for other hazards the jurisdiction faces. By comparing scores, the jurisdiction can determine priorities: Which hazards should the jurisdiction be most concerned about? Which ones less so?

The hazard analysis process should be completed on at least the 12 hazards listed on the form provided. If additional disaster events are likely to occur, please develop data on those events as well. Upon completion, you should have a fairly good idea on which events to focus your initial concentration.

Provide a narrative or write-up on those hazards likely to occur within your jurisdiction. For example you may include past history, likely site specific details on hazards, areas of vulnerability, areas of planned or in-place mitigation measures, maps and displays, or any other facts or data that may be relevant.

POSSIBLE HAZARDS TO CONSIDER:

1. Hazardous Materials; transportation or fixed facility
2. Wildland Fires; range or forested
3. Dam Failure
4. Flood
5. Drought/Water Emergency
6. Earthquake
7. Severe Weather
8. Nuclear Incident
9. Volcano or Fallout
10. Transportation Accident
11. Tsunami
12. Utility Failure
13. Landslide
14. Civil Disorder
15. Tornado
16. Pipeline Disruption
17. ANY OTHER - area specific hazard

EXAMPLE HAZARD ANALYSIS MATRIX

HAZARDS	HISTORY (weight factor = 2)	VULNERABILITY (weight factor = 5)	MAX THREAT (weight factor = 10)	PROBABILITY (weight factor = 7)	TOTAL
Hazardous Materials	2 x 9 (H) = 18	5 x 10 (H) = 50	10 x 8 (H) = 80	7 x 9 (H) = 63	211
Flooding	2 x 8 (H) = 16	5 x 3 (L) = 15	10 x 5 (M) = 50	7 x 9 (H) = 63	144
Dam Failure	2 x 1 (L) = 2	5 x 9 (H) = 45	10 x 10(H) = 100	7 x 2 (L) = 14	161
Earthquake	2 x 2 (L) = 4	5 x 7 (H) = 35	10 x 9 (H) = 90	7 x 3 (L) = 21	150
Wildland Fire	2 x 8 (H) = 16	5 x 6 (M) = 30	10 x 6 (M) = 60	7 x 10 (H) = 70	176

SEVERITY RATINGS (to be applied to the four categories)

LOW	=	1 - 3	points
MEDIUM	=	4 - 7	points
HIGH	=	8 - 10	points

The following categories are considered in determining the severity:

HISTORY: (The record of occurrences of previous major emergencies or disasters.)

LOW	0 - 1 event per 100 years
MEDIUM	2 - 3 events per 100 years
HIGH	4 + events per 100 years

VULNERABILITY: (The percentage of population and property likely to be affected.)

LOW	< 1% affected
MEDIUM	1 - 10% affected
HIGH	> 10% affected

MAXIMUM THREAT: (The maximum percentage of population and property that could be impacted under a worst case scenario.)

LOW	< 5% affected
MEDIUM	5 - 25% affected
HIGH	> 25% affected

PROBABILITY: (The likelihood of occurrence within a specified period of time.)

LOW	> 1 chance per 100 years
MEDIUM	> 1 chance per 50 years
HIGH	> 1 chance per 10 years

¹ This file is entitled "OEM-FEMA Hazard Analysis Methodo.doc (Feb.24, 2002)" and was received from Dennis Sigrist, OEM.

APPENDIX 2

MAP METHODOLOGY

Steve Rehn, Assistant Planner, Medford Planning Department, served as the planning cartographer on this project. Steve wrote this explanation of the methodology used to prepare the various maps in this plan.

Special Populations

Purpose

To locate those populations that would be the most vulnerable in the case of a natural disaster.

Approach

Special Population maps were designed to locate concentrations of older and disabled people, and concentrations of vulnerable housing types. The Vulnerable Special Populations map further identified the proximity of these people and housing types to flood plains.

Data

1. Licensed residential care facility list, provided by RVCOG.
2. County Assessor data on existing land use (“Property Classification”) and on property improvement valuations.
3. Official FEMA flood plain map.

Methodology

1. Geocode and display taxlots used as residential care facilities
2. Display taxlots with a “mobile home park” property classification.
3. Display taxlots with the lowest improvement valuations (lowest decile), as an indicator of poverty or housing vulnerability.

Critical Facilities

Purpose

To locate public facilities critical to disaster response, and those which provide critical functions, disruption of which would cause public endangerment.

Approach

Government services, Red Cross, fire stations, police stations, electrical substations, hospitals, bridges, and equipment service yards were identified as critical facilities.

Data

1. Government facilities GIS data developed by Jackson County GIS.
2. Critical facilities GIS data developed by Jackson County GIS, which provides point locations for schools, fire stations, hospitals, law enforcement stations, and hospitals.
3. Water commission facility point locations provided by the Medford Water Commission.

4. An updated Red Cross shelter data list (provided by the local Red Cross).
5. A new bridge location point file created by the Medford Planning Dept.
6. County digital taxlot map.
7. Airport District boundary data created and maintained by Medford Planning.
8. Official FEMA flood plain map.

Methodology

1. The County critical facilities data and the water commission facilities could simply be displayed.
2. Heavy equipment storage yards belonging to Medford Public Works and Pacific Power & Light, were identified from digital Assessor map
3. The bridge location point data was created by overlaying Medford streets and streams.
4. Red Cross shelter locations were geo-coded from the updated data list. Bed and meal capacity was displayed for each shelter.

Economic Assets

Purpose

To locate major employment locations and irreplaceable community assets that could be vulnerable or subject to disruption by a natural hazard event.

Approach

Locate major employers and business centers. Show historic district locations to ascertain their vulnerability from flood.

Data

1. OLMIS proprietary employer data list for 2000.
2. Medford business center data produced by Medford Planning.
3. Historic District boundary data maintained by Medford Planning.
4. Official FEMA flood plain map.

Methodology

1. Geocode employer list, and display those with the largest number of employees.

Earthquake Hazard

Purpose

To identify structures likely to be at risk from the direct and indirect effects of a major earthquake, and evaluate the potential financial risk to these structures.

Approach

Peak Ground Acceleration and Shaking Intensity maps are not yet available for Medford from the USGS. Direct earthquake vulnerability is indicated here by identifying those structures built before the 1954 seismic standard upgrade. Indirect vulnerability is indicated by the anticipated inundation zone from earthquake-induced failure of the Emigrant Lake Dam.

Data

1. Year Built and Improvement Valuation data from the Jackson County Assessor.
2. Results of a Dam Failure Inundation Model commissioned by Jackson County.
3. Results of a windshield survey of apparent non-reinforced masonry structures, conducted by the Medford Building Safety Department, and restricted to the downtown area.
4. Historic and Central Business District boundaries maintained by Medford Planning.

Methodology

1. Valuations (by category) were displayed for structures built before 1954.
2. The Inundation Model results for a sudden failure of the Emigrant Lake Dam were displayed. This dam failure would have the most significant impact on Medford of any of the dams studied in the model.
3. Locations of apparent non-reinforced masonry structures were geocoded to street addresses using the address ranges in a GIS street layer maintained by Medford Public Works.

Wildfire Hazard**Purpose**

To identify the locations of areas of high fire risk, locate the structures within those areas, and evaluate the potential financial risk to these structures.

Approach

Display wildfire risk area maps produced by ODF and cooperating agencies, and locate developed parcels within those areas.

Data

1. Wildfire Risk Area GIS layer, made available by Jackson County GIS.
2. ODF Fuel Load Model for wildfire risk.
3. County Assessor data on existing land use and property improvement valuations.
4. Critical Facilities GIS data, made available by Jackson County GIS.

Methodology

1. Locate improved taxlots in fire risk zones, and display them by valuation categories.
2. Display electrical transformer towers from the Critical Facilities GIS layer that are located in the fire risk areas.

Landslide Hazard**Purpose**

To identify the locations of areas at risk of rapid debris-flow hazard and other landslide potential, and to locate the structures within those areas.

Approach

Identify structures in debris-flow risk areas and areas with steep slopes.

Data

1. DOGAMI Debris-Flow Risk Model results.
2. Slope model created from 2' contours by Medford Planning.
3. Planimetric structure data, commissioned by the City of Medford.

Methodology

Display point locations for structures on slopes greater than 25%. No existing Medford structures were identified in debris-flow risk areas.

Flood Hazard**Purpose**

To show the locations of the 100-year and 500-year flood plains, and the extent of the 1997 flood – the largest flood for which accurate extent data is available. Locate the structures at risk of flood damage. Counts and evaluations derived from the map were discussed in the text of the report.

Approach

Structures within the 100-year flood plains deemed sufficiently at risk to depict.

Data




1. FEMA official flood plain GIS data.
2. 1997 flood extent boundary for Bear Creek, made available by Jackson County GIS.
3. Planimetric structure data, commissioned by the City of Medford.

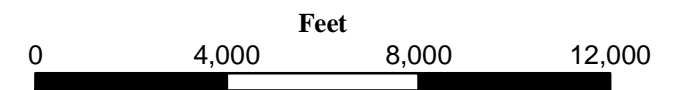
Methodology

Displayed footprints of structure that are fully or partially inside the 100-year flood plain.

Map 1 City of Medford Pre-Disaster Mitigation Special Populations

Legend

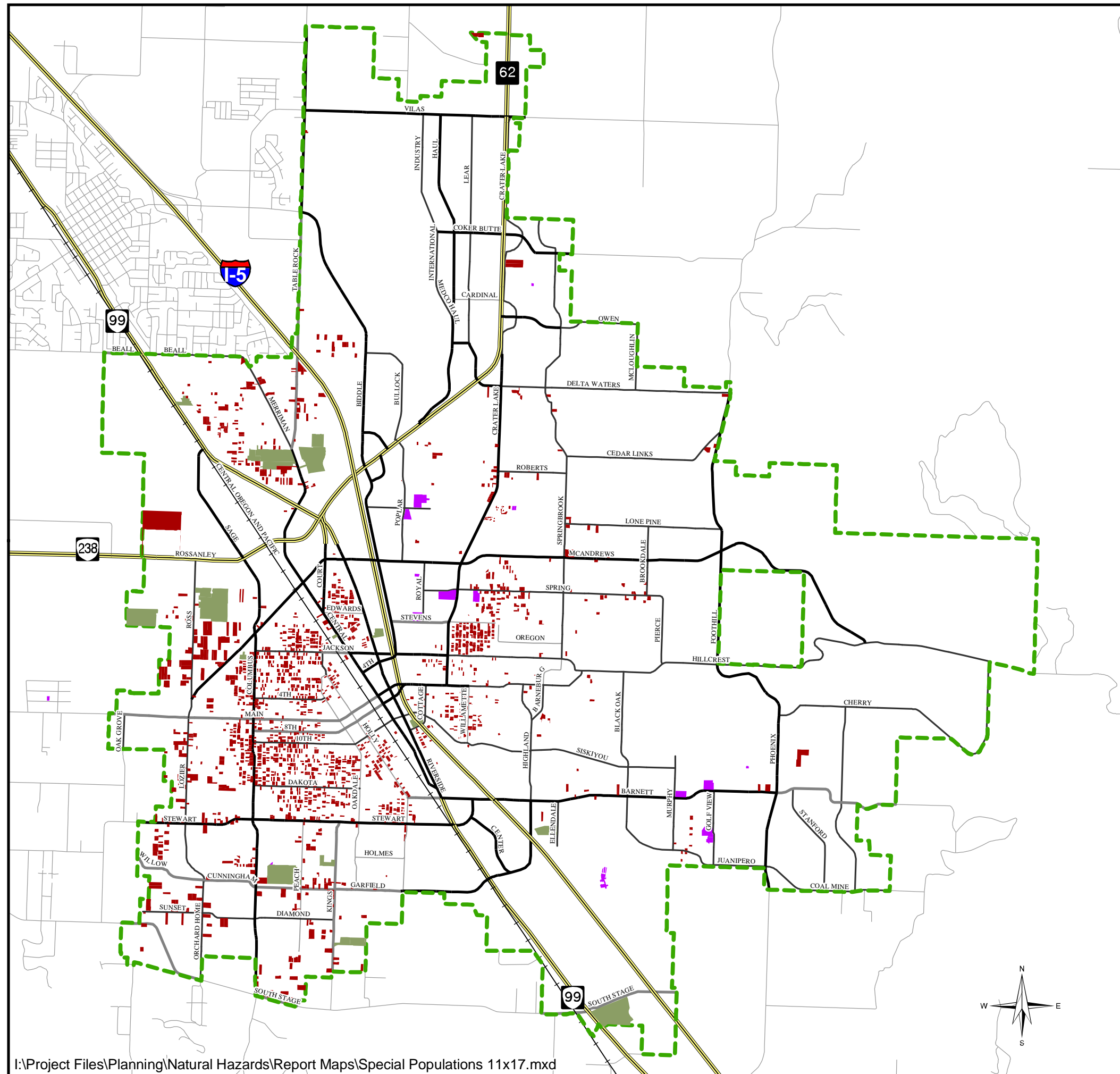
-  Residential Care Facilities
-  Mobile Home Parks
-  Lots with Residential Units in Lowest Value Decile
-  UGB



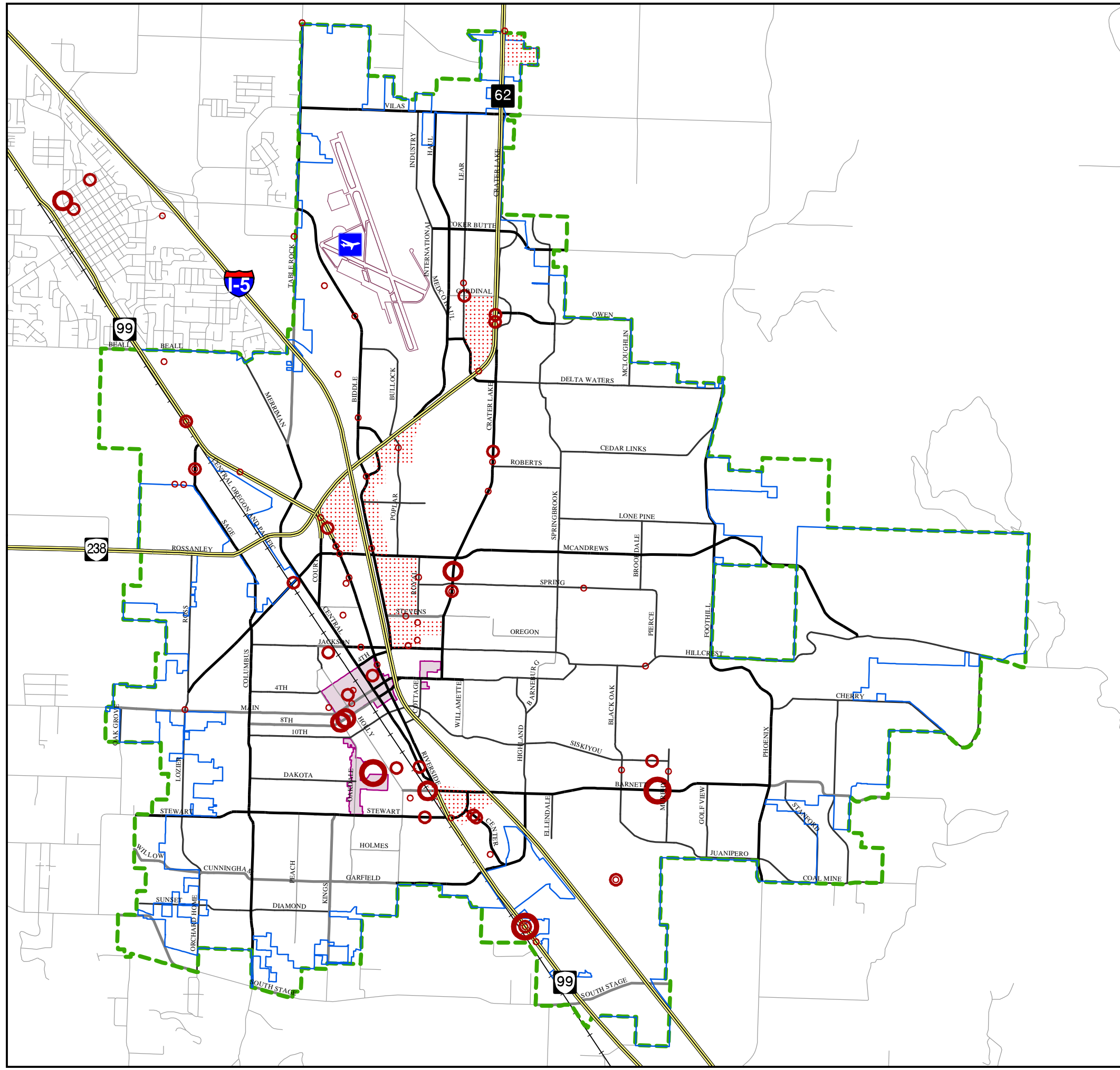
1" = 4,000 feet



May 2004
Medford Planning Department
Data produced by City of Medford, Jackson County,
and local Special Districts
February 2004
Steve Rehn, Assistant Planner



Map 2 City of Medford Pre-Disaster Mitigation Economic Assets



Legend

Major Employers Maximum Employment in 2000

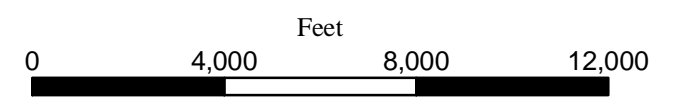
- 100 - 200
- ◌ 201 - 500
- ◉ 501 - 1500
- ⊙ 1501 - 6290

◻ Business Centers

◻ Airport Runway

◻ Historic Districts

== Highways

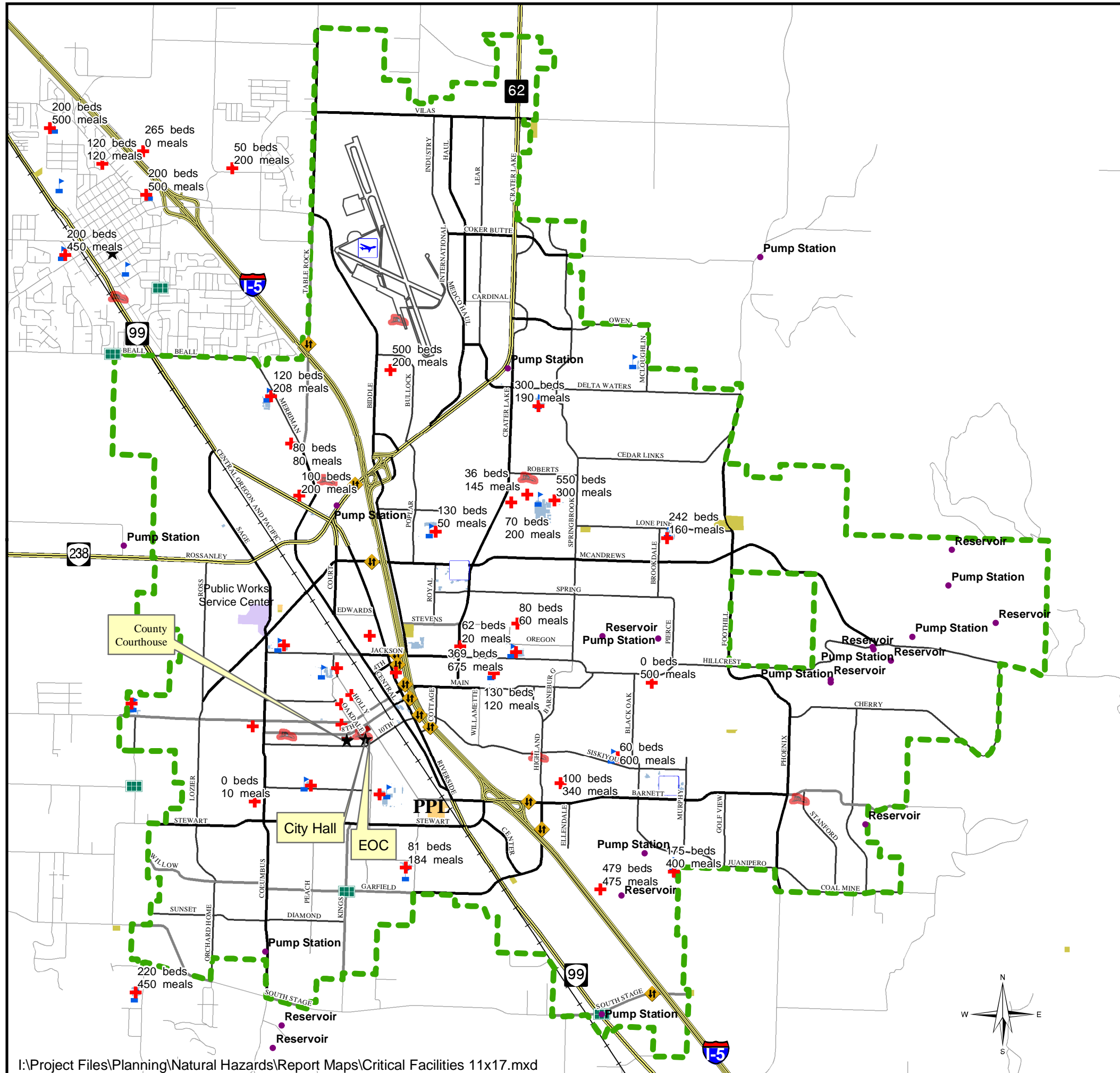


1" = 4,000 feet



May 2004
Medford Planning Department
Based on Jackson County Assessor Data -
February 2004
Steve Rehn, Assistant Planner

Map 3 City of Medford Pre-Disaster Mitigation Critical Facilities



Legend

- GOV'T ADMIN BUILDINGS
- PPL Facilities
- Critical Structures
- AIRPORT
- UGB

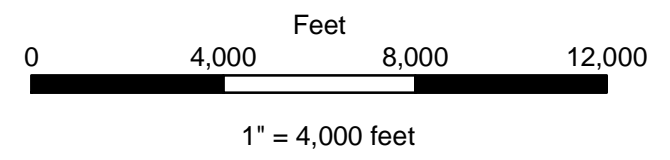
Other Critical Facilities

Type:

- Hospital
- ★ Law Enforcement
- ♫ School
- + Red Cross Shelters
- 🚒 Firestations
- ⚡ Bridges
- Water Commission Facilities
- Water Commission Master Meters

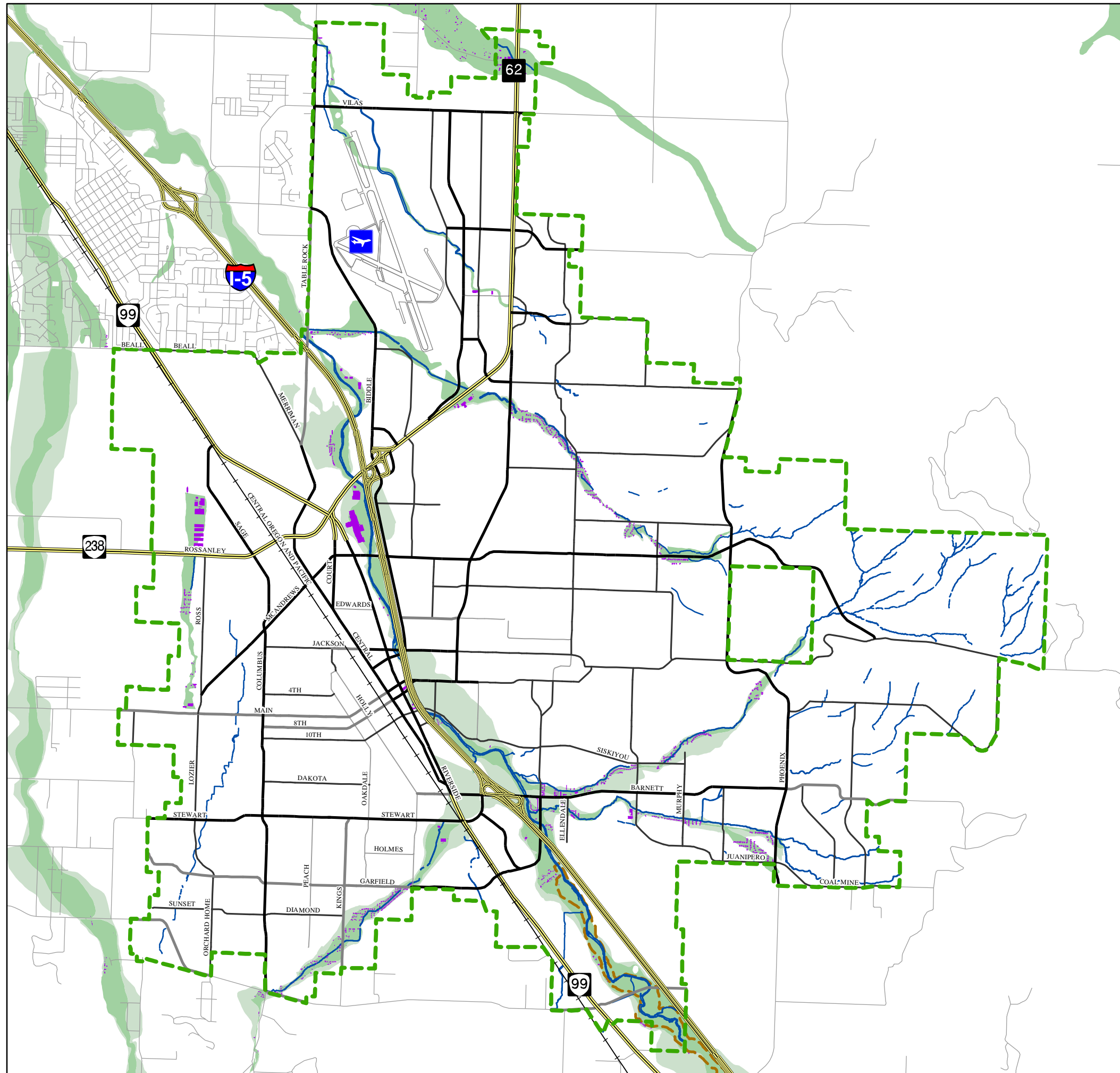
Public Facilities

- Substation
- Public Works Facilities



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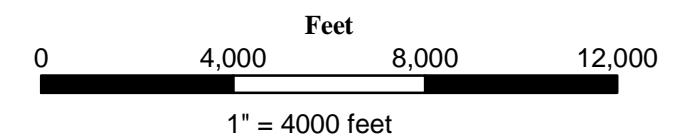
Map 4 City of Medford Pre-Disaster Mitigation Flood Hazard



Legend

Approved Flood Plain Boundaries

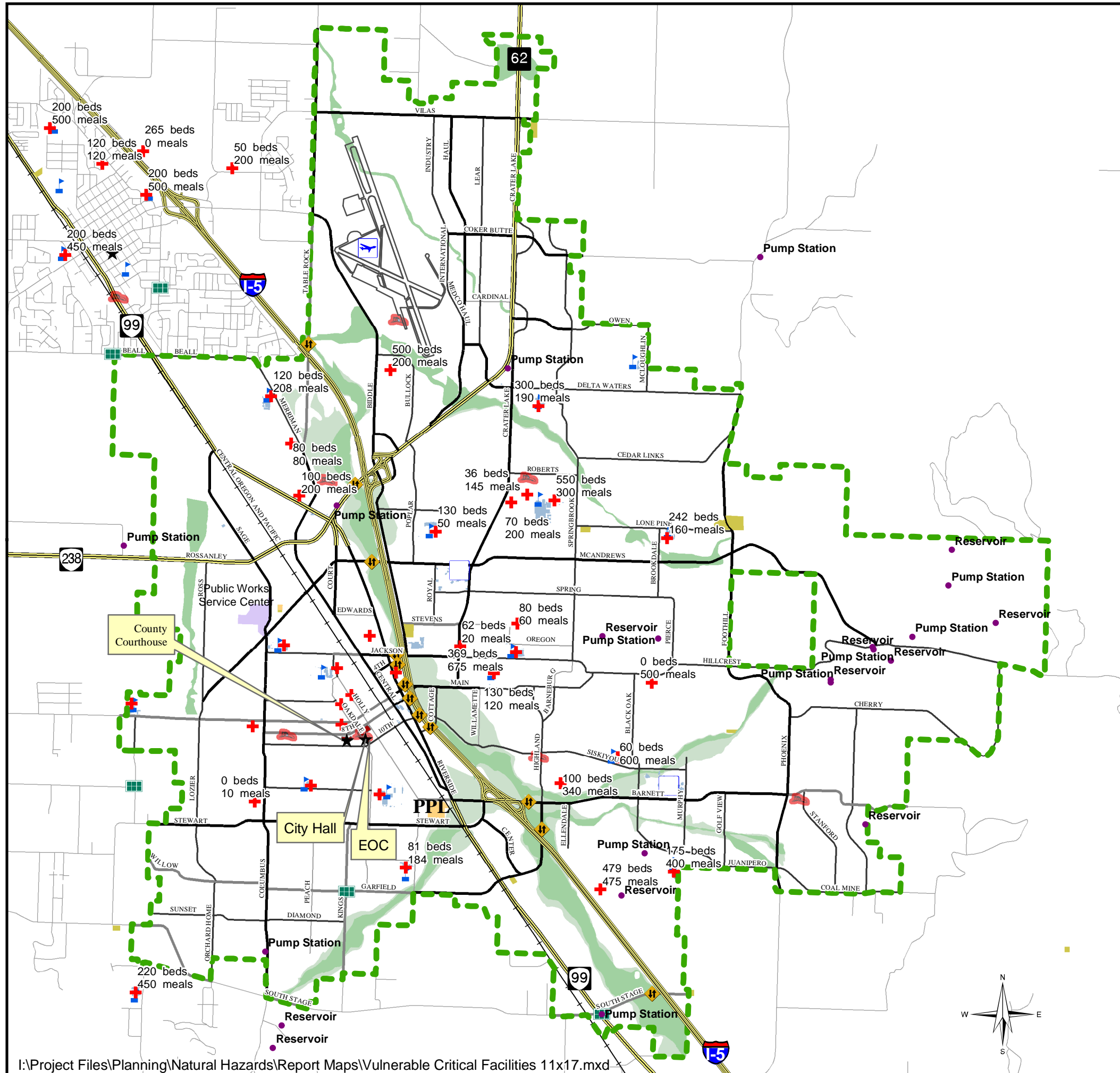
- 100-Year
- 500-Year
- 1997 Flood Extent
- UGB
- Streams
- Interstate
- Structures in 100-yr flood plain



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Map 5 City of Medford Pre-Disaster Mitigation Vulnerable Critical Facilities



Flood Zones

- 100-Year
- 500-Year

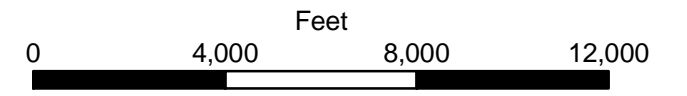
Other Critical Facilities

Type:

- Hospital
- Law Enforcement
- School
- Red Cross Shelters
- Firestations
- Bridges
- Water Commission Facilities
- Water Commission Master Meters

Public Facilities

- Substation
- Public Works Facilities



1" = 4,000 feet






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Map 7 City of Medford Pre-Disaster Mitigation

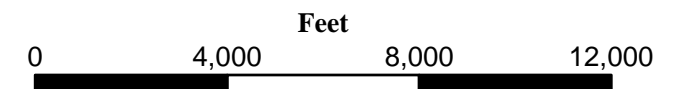
Vulnerable Special Populations

Legend

-  Residential Care Facilities
-  Mobile Home Parks
-  Lots with Residential Units in Lowest Value Decile

Flood Zones

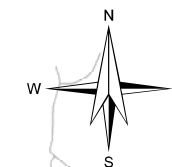
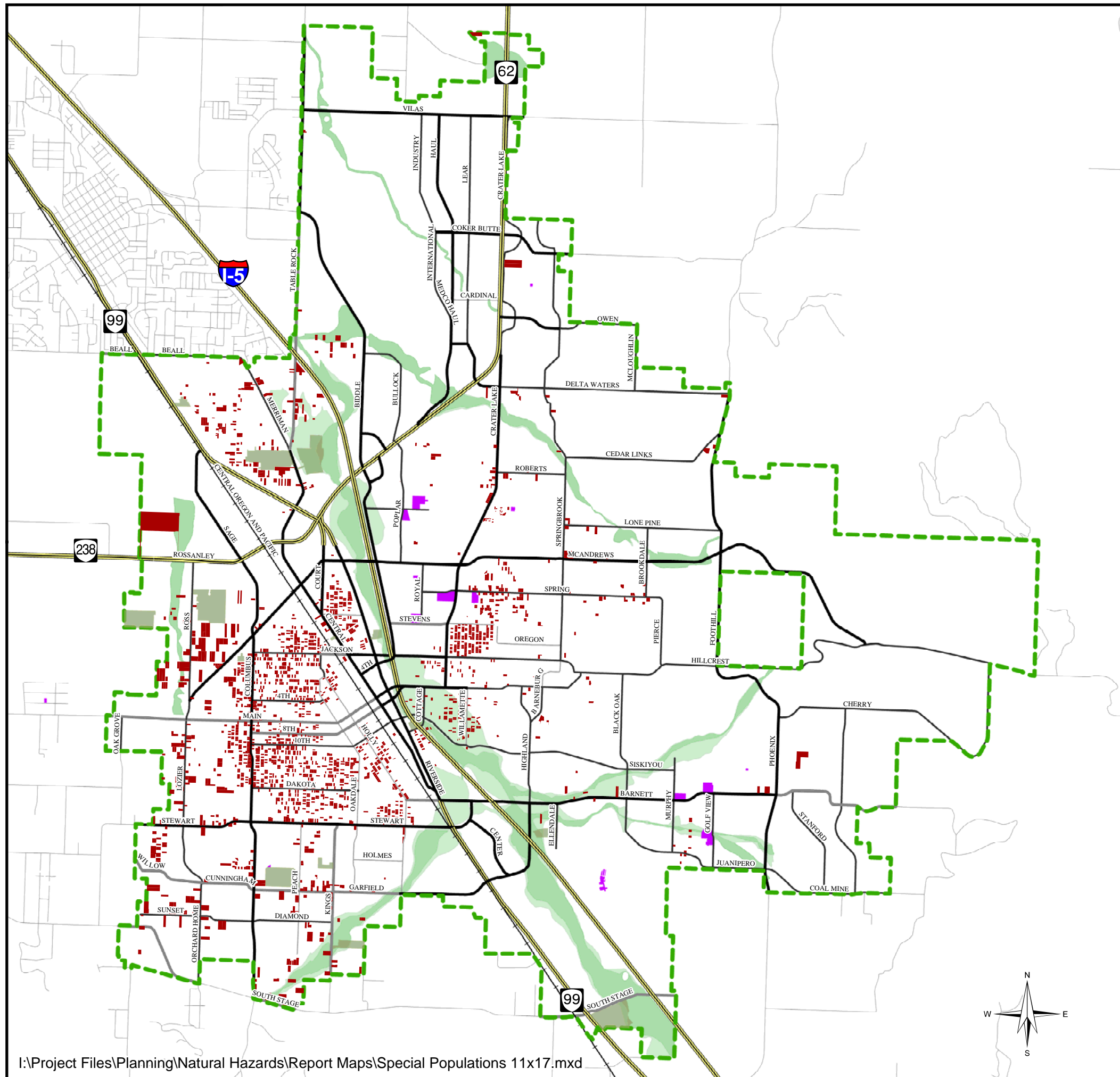
-  100-Year
-  500-Year



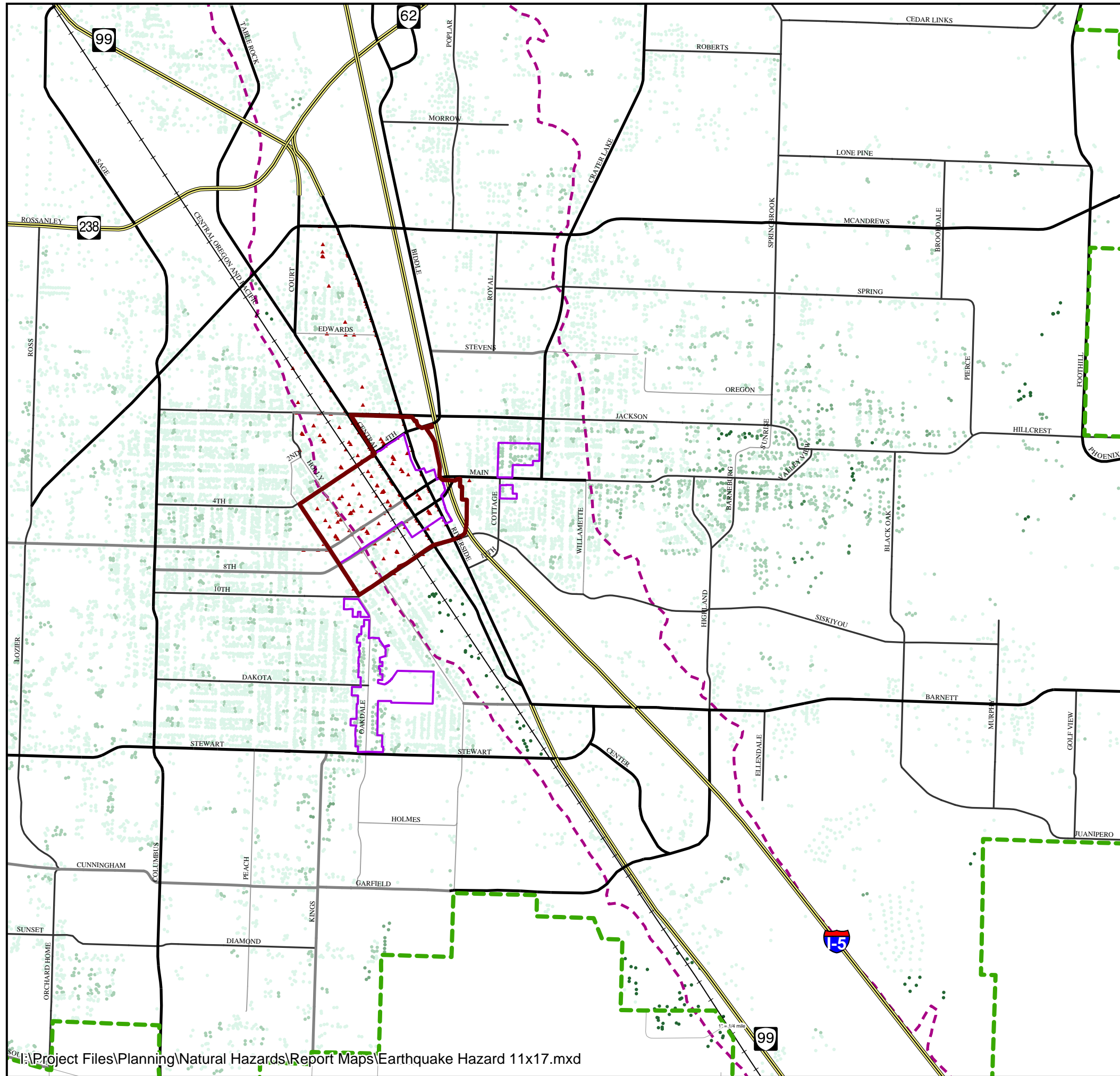
1" = 4,000 feet



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Map 10 City of Medford Pre-Disaster Mitigation Earthquake Hazard



Legend

Jackson County Dam Failure Model

Emigrant Lake Dam Inundation Zone

Non-Reinforced Masonry Structures

Structures Built Before 1954 Seismic Standard

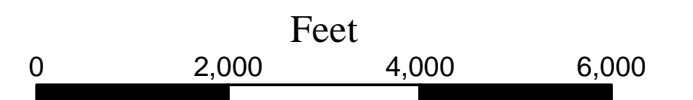
Improved Value

- 0 - 75,000
- 75,001 - 200,000
- 200,001 - 350,000
- 350,001 - 500,000
- 500,001 - 62,845,600

UGB

Central Business District

Historic Districts












1" = 2,000 feet

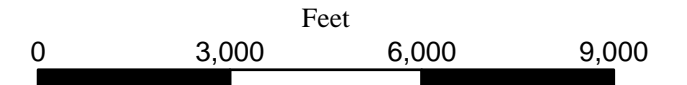


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Map 11 City of Medford Pre-Disaster Mitigation Wildfire Hazard

Legend

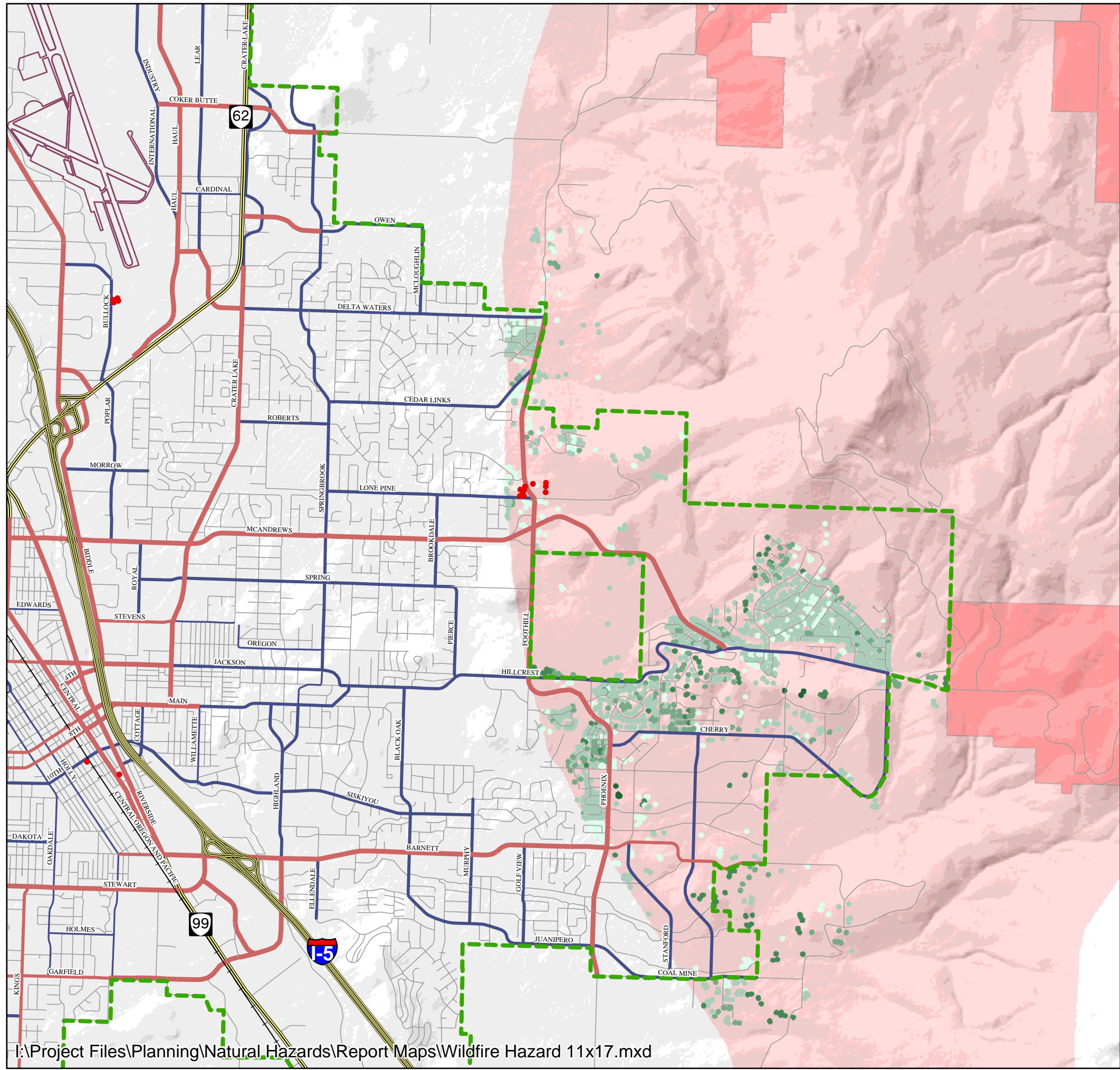
-  Wildfire High Risk Areas
- ODF Fuel Load Model:**
-  Highest Risk Areas
- Structures in Fire-Risk Areas
Improvement Value**
-  \$0 - \$100,000
-  \$100,001 - \$250,000
-  \$250,001 - \$400,000
-  \$400,001 - \$1,000,000
-  \$1,000,001 - \$1,921,630
-  Transformer Towers
-  UGB



1" = 3000 feet











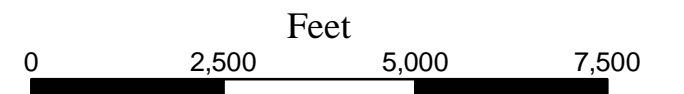
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Steve Rehn, Assistant Planner



Map 12 City of Medford Pre-Disaster Mitigation Landslide Hazard

Legend

-  DOGAMI Debris-Flow Risk Areas
- Slope model**
- Percent Slope**
-  0 - 5 Percent
-  6-10 Percent
-  11 - 15 Percent
-  16 - 25 Percent
-  26 - 35 Percent
-  Structures on Slopes > 25%
-  UGB



1" = 2,500 feet



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