

E.1 BENEFIT COST ANALYSIS GUIDELINE

Hazard mitigation projects are specifically aimed at reducing or eliminating future damages. Although hazard mitigation projects may sometimes be implemented in conjunction with the repair of damages from a declared disaster, the focus of hazard mitigation projects is on strengthening, elevating, relocating, or otherwise improving buildings, infrastructure, or other facilities to enhance their ability to withstand the damaging impacts of future disasters. In some cases, hazard mitigation projects may also include training or public-education programs if such programs can be demonstrated to reduce future expected damages.

A Benefit-Cost Analysis (BCA) provides an estimate of the “benefits” and “costs” of a proposed hazard mitigation project. The benefits considered are avoided future damages and losses that are expected to accrue as a result of the mitigation project. In other words, benefits are the reduction in expected future damages and losses (i.e., the difference in expected future damages before and after the mitigation project). The costs considered are those necessary to implement the specific mitigation project under evaluation. Costs are based on similar completed engineering projects. Benefits, however, must be estimated probabilistically because they depend on the improved performance of the building or facility in future hazard events, the timing and severity of which must be estimated probabilistically.

All Benefit-Costs must be:

- Credible and well documented
- Prepared in accordance with accepted BCA practices
- Cost-effective ($BCR \geq 1.0$)

General Data Requirements:

- All data entries (other than Federal Emergency Management Agency [FEMA] standard or default values) MUST be documented in the application.
- Data MUST be from a credible source.
- Provide complete copies of reports and engineering analyses.
- Detailed cost estimate.
- Identify the hazard (flood, wind, seismic, etc.).
- Discuss how the proposed measure will mitigate against future damages.
- Document the Project Useful Life.
- Document the proposed Level of Protection.
- The Very Limited Data (VLD) BCA module cannot be used to support cost-effectiveness (screening purposes only).
- Alternative BCA software MUST be approved in writing by FEMA HQ and the Region prior to submittal of the application.

Damage and Benefit Data

- Well documented for each damage event.
- Include estimated frequency and method of determination per damage event.
- Data used in place of FEMA standard or default values MUST be documented and justified.
- The Level of Protection MUST be documented and readily apparent.
- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

Building Data

- Should include FEMA Elevation Certificates for elevation projects or projects using First Floor Elevations (FFE).
- Include data for building type (tax records or photos).
- Contents claims that exceed 30 percent of building replacement value (BRV) MUST be fully documented.
- Method for determining BRVs MUST be documented. BRVs based on tax records MUST include the multiplier from the County Tax Assessor.
- Identify the amount of damage that will result in demolition of the structure (FEMA standard is 50 percent of pre-damage structure value).
- Include the site location (i.e., miles inland) for the Hurricane module.

Use Correct Occupancy Data

- Design occupancy for Hurricane shelter portion of Tornado module.
- Average occupancy per hour for the Tornado shelter portion of the Tornado module.
- Average occupancy for Seismic modules.

Questions to Be Answered

- Has the level of risk been identified?
- Are all hazards identified?
- Is the BCA fully documented and accompanied by technical support data?
- Will residual risk occur after the mitigation project is implemented?

Common Shortcomings

- Incomplete documentation.
- Inconsistencies among data in the application, BCA module runs and the technical support data.
- Lack of technical support data.

- Lack of a detailed cost estimate.
- Use of discount rate other than FEMA-required amount of 7 percent.
- Overriding FEMA default values without providing documentation and justification.
- Lack of information on building type, size, number of stories and value.
- Lack of documentation and credibility for FFEs.
- Use of incorrect Project Useful Life (not every mitigation measure = 100 years).

E.2 FEDERAL RESOURCES

The Federal government requires local governments to have a hazard mitigation plan in place to be eligible for mitigation funding opportunities through FEMA such as the UHMA Programs and the HMGP. The Mitigation Technical Assistance Programs available to local governments are a valuable resource. FEMA may provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

Bureau of Reclamation. The mission of the Bureau of Reclamation is to manage, develop and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:

- **How-to Guides.** FEMA has developed a series of how-to guides to assist states, communities and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements (<http://www.fema.gov/fima/planhowto.shtml>).
- **Mitigation Resources for Success compact disc (CD)** (FEMA 372, 2001). This CD contains a wealth of information about mitigation and is useful for state and local government planners and other stakeholders in the mitigation process. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications and contact information (http://www.fema.gov/pdf/library/poster_fnl2.pdf).

- ***The Emergency Management Guide for Business and Industry*** (FEMA 141, 1993). This guide provides a step-by-step approach to emergency management planning, response and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas (<http://www.fema.gov/pdf/business/guide/bizindst.pdf>).
- **NFIP**. NFIP provides Flood insurance to citizens in communities that adopt and implement NFIP siting and building standards. The standards are applied to development that occurs within a delineated floodplain, a drainage hazard area, an area subject to inundation during a base flood event and properties within 250 ft of a floodplain boundary. These areas are depicted on federal Flood Insurance Rate Maps that are available through the City of Beaverton. Oregon's Department of Land Conservation and Development is the state's NFIP-coordinating agency.

US Department of Agriculture. Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service and Rural Business and Cooperative Service.

- **NRCS**. NRCS provides a suite of federal programs designed to assist state and local governments and landowners in mitigating the impacts of flood events. The Watershed Surveys and Planning Program and the Small Watershed Program provide technical and financial assistance to help participants solve natural resource and related economic problems on a watershed basis. The Wetlands Reserve Program and the Flood Risk Reduction Program provide financial incentives to landowners to put aside land that is either a wetland resource or that experiences frequent flooding. The Emergency Watershed Protection Program (EWP) provides technical and financial assistance for clearing debris from clogged waterways, restoring vegetation and stabilizing riverbanks. The measures taken under EWP must be environmentally and economically sound and must generally benefit more than one property.

US Department of Energy, Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program. This program minimizes the adverse effects of high energy costs on low-income, elderly and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.

US Department of Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an

announcement of funds available, the primary areas of focus, review criteria and the method of application. (<http://www.acf.hhs.gov/programs/ana/>)

US Department of Housing and Urban Development (HUD), Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for Federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities and construction of certain public facilities and housing.

HUD, Community Development Block Grants. Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities and infrastructure improvements that would primarily benefit low-and moderate-income persons.

US Department of Labor, Employment and Training Administration, Disaster Unemployment Assistance. Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.

Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.

Internal Revenue Service, Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses and allows amendment of previous tax returns to reflect loss back to three years.

National Weather Service, Portland Bureau. The NWS provides flood watches, warnings and informational statements for rivers in the City. The NWS Portland office provides river level information online and by phone.

National Earthquake Hazards Reduction Program (NEHRP). NEHRP's mission includes improved understanding, characterization and prediction of hazards and vulnerabilities; improved model building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. FEMA is the lead agency of the program and assigns several planning, coordinating and reporting responsibilities.

National Earthquake Loss Reduction Program (NEP). NEP was formed as a result of the report "Strategy for National Earthquake Loss Reduction" prepared by the Office of Science and Technology Policy in April 1996 which stated, the NEP "aims to focus scarce research and development dollars on the most effective means for saving lives and property and limiting the social disruptions from earthquakes, coordinate federal

earthquake mitigation research and development and emergency planning in a number of agencies beyond those in NEHRP to avoid duplication and ensure focus on priority goals and cooperate with the private sector and with state and local jurisdictions to apply effective mitigation strategies and measures." The NEP does not replace NEHRP but encompasses a wider range of earthquake hazard reduction activities than those supported by the NEHRP agencies and provides a framework within which these activities can be more effectively coordinated.

The National Earthquake Technical Assistance Program (NETAP). The NETAP is a technical assistance program created to provide ad hoc, short-term architectural and engineering support to state/local communities as they are related to earthquake mitigation. The program was designed to enhance the state/local communities' ability to become more resistant to seismic hazards. This assistance cannot be used for actions that are covered under the State's/Territories Performance Partnership Agreement. This program assists in carrying out the statutory authorities of the National Earthquake Hazards Reduction Act of 1977, as amended.

National Seismic Hazard Mapping Project. National maps of the earthquake shaking hazard in the US have been produced since 1948. Scientists revise these maps as new earthquake studies improve their understanding of this hazard. After thorough review, professional organizations of engineers in turn update the seismic-risk maps and seismic design provisions contained in building codes. More than 20,000 cities, counties and local government agencies use building codes, such as the International Building Code, to help establish the construction requirements necessary to preserve public health and safety in earthquakes. The 1996 USGS shaking-hazard maps for the US are based on current information about the rate at which earthquakes occur in different areas and on how far strong shaking extends from quake sources.

United States Army Corp of Engineers (USACE). The USACE Civil Works Branches study potential water resource projects throughout the nation. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control, or ecosystem restoration. The agency also tracks flood hazard data on floodplains or the sea coast. These data help local communities assess their flood risks to help them prepare for potential future floods.

United States Geological Survey (USGS). The USGS website provides current stream flow conditions at USGS gauging stations in Oregon and throughout the Pacific Northwest. The Oregon USGS office is responsible for water-resources investigations for Oregon and part of southern Washington. Their office cooperates with more than 40 local, state and federal agencies in Oregon. Cooperative activities include water-resources data collection and interpretive water-availability and water-quality studies.

USGS, National Landslide Information Center (NLIC). The NLIC website provides good information on the programs and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications and current projects. USGS scientists are working to reduce

long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.

US Small Business Administration (SBA). May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to OEM.

E.3 STATE RESOURCES (OREGON 2009)

Oregon Emergency Management (OEM). OEM administers FEMA's Hazard Mitigation Grant Program to provide post-disaster monies for acquisition, elevation, relocation and demolition of structures located in the floodplain. OEM also administers FEMA's Flood Mitigation Assistance Program. This program provides assistance for NFIP-insured structures only. OEM also helps local jurisdictions to develop hazard mitigation plans. OEM is heavily involved in flood damage assessment and works mainly with disaster recovery and hazard mitigation programs. OEM provides training for local governments through workshops on recovery and mitigation. OEM also helps implement and manage federal disaster recovery programs.

Oregon Department of Consumer and Business Services-Building Codes Division (BCD). The BCD sets statewide standards for design, construction and alteration of buildings that include resistance to seismic forces. BCD is active on several earthquake committees and funds construction-related continuing education programs. BCD registers persons qualified to inspect buildings as safe or unsafe to occupy following an earthquake and works with OEM to assign inspection teams where they are needed.

Oregon Economic and Community Development Department (OECDD) CDBG. These grants are made available to communities in the State of Oregon, usually via OECDD with funding provided by HUD. While these grants originate with a federal agency, the funding is usually considered non-federal for matching grant purposes (i.e., CDBG can usually be utilized as non-federal match to other federal funding sources).

Oregon Department of Environmental Quality (DEQ). DEQ is responsible for protecting and enhancing Oregon's water and air quality, for cleaning up spills and releases of hazardous materials, for managing the proper disposal of hazardous and solid wastes and for enforcing Oregon's environmental laws.

DEQ staff use a combination of technical assistance, inspections and permitting to help public and private facilities and citizens understand and comply with state and federal environmental regulations.

The DEQ staff consists of scientists, engineers, technicians, administrators and environmental specialists. The agency's headquarters are in Portland with regional administrative offices in Bend, Eugene and Portland; and field offices in Coos Bay,

Grants Pass, Hermiston, Medford, Pendleton, Salem and The Dalles. DEQ operates a modern pollution-control laboratory in Hillsboro.

Oregon Department of Fish and Wildlife (ODFW). ODFW's mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. ODFW regulates stream activity and engages in stream enhancement activities.

Oregon Department of Human Services (ODHS). The ODHS mission is to make it possible for people to lead lives that are independent, healthy and safe. To do this, ODHS employs approximately 9,800 individuals throughout the state who provide crucial safety net services to persons facing job loss, health problems and other uncertainties. ODHS also ensures Oregonians have clean drinking water, safe food and an effective emergency trauma services system.

Department of Land Conservation and Development (DLCD). DLCD administers the State's Land Use Planning Program. The program is based on 19 Statewide Planning Goals, including Goal 7, related to flood and other natural hazards. DLCD serves as the federally designated agency to coordinate floodplain management in Oregon. They also conduct various landslide related mitigation activities. In order to help local governments address natural hazards effectively, DLCD provides technical assistance and conducts workshops, reviews local land use plan amendments and works interactively with other agencies.

Oregon Division of State Lands (DSL). DSL is a regulatory agency responsible for administration of Oregon's Removal-Fill Law. This law is intended to protect, conserve and make the best use of the state's water resources. It generally requires a permit from DSL to remove, fill, or alter more than 50 cubic yards of material within the bed or banks of state waters. Exceptions are in state scenic waterways and areas that are designated essential salmon habitat; in these areas, a permit is required for all in-stream activity regardless of volume. DSL and the USACE may issue these permits jointly.

Oregon Department of Transportation (ODOT). ODOT provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians. ODOT develops programs related to Oregon's system of highways, roads and bridges; railways; public transportation services; transportation safety programs; driver and vehicle licensing; and motor carrier regulation.

In addition, ODOT and OEM coordinate buyout projects to ensure that there are no potential right-of-way conflicts with future use of land for bridge and highway projects and collaborate on earthquake mitigation.

Additionally, ODOT uses its resources to identify the hazard, plan and initiate mitigation activities to meet the transportation needs of Oregonians and make Oregon a better place to live and work. ODOT budgets for the temporary replacement bridges and

materials necessary to make the multi-model transportation system operational following a natural disaster.

Oregon Parks and Recreation Department (OPRD). OPRD operates Oregon's state parks through a headquarters staff in Salem and field regions. It is also responsible for Oregon's Recreation Trails, the Ocean Shores Recreation Area, Scenic Waterways and the Willamette River Greenway. OPRD's Heritage Programs Division, which includes the State Historic Preservation Office, Heritage Commission and the Oregon Commission on Historic Cemeteries, operates a number of cultural and historic preservation programs. Oregon State Parks has given grant money to nearly every city in Oregon to purchase land and build or upgrade community parks. For additional information go to: <http://www.oregon.gov/OPRD/GRANTS/>.

The Oregon Partnership for Disaster Resilience. In partnership with OEM, the Oregon Partnership for Disaster Resilience has established a statewide Pre-Disaster Mitigation planning program that systematically provides both funding and technical assistance to local governments to develop and update existing local natural hazard mitigation plans. For additional information go to: <http://www.oregonshowcase.org/mitigation/planning>

Oregon Department of Forestry (ODF). The mission of the ODF is to serve the people of Oregon through the protection, management and promotion of a healthy forest environment, which will enhance Oregon's livability and economy for today and tomorrow. ODF regulates forest operations to reduce the risk of serious injury or death from rapidly moving landslides related to forest operations and assists local governments in the siting review of permanent dwellings on and adjacent to forestlands in further review areas.

Department of Geology and Mineral Industries (DOGAMI). DOGAMI is an important agency for landslide mitigation activities in Oregon. Some key functions of DOGAMI are development of geologic data, development of maps and regulation of mining and drilling for geological resources. The agency also provides technical resources for communities and provides public education on geologic hazards. DOGAMI provides data and geologic information to local, state and federal natural resource agencies, industry and private groups.

Oregon Water Resources Department (WRD). The WRD's mission is to serve the public by practicing and promoting wise long-term water management. The WRD provides services through 19 Watermaster Offices throughout the State. In addition, five regional offices provide services based on geographic regions. The Department's main administration is performed from the central office in Salem.

Oregon Watershed Enhancement Board (OWEB). OWEB was created by the 1987 Oregon Legislature. OWEB is charged with supporting implementation of *The Oregon Plan for Salmon and Watersheds*, which includes the Oregon Coastal Salmon Restoration

Initiative (OCSRI) and the Healthy Streams Partnership. For additional information go to: <http://www.oweb.state.or.us/>

E.4 REGIONAL RESOURCES (OREGON 2009)

Metropolitan Service District (Metro). Metro manages the urban growth boundary and developed the 2040 growth concept. Metro provides land-use planning services and provides maps and data to businesses, local government and citizens. Metro helps residents and governments protect fish and wildlife habitat. Metro's transportation planning section develops the regional.

Regional Emergency Management Group/Regional Emergency Management Technical Committee (REMG/REMTEC). Emergency Management professionals coordinate regional resources and resolve regional issues through the "hands on" technical committee which proposes and reports to the "public official level" regional emergency management group. Recently, the committee has developed maps for regional emergency response routes.

Multnomah County Emergency Management. Responsible for the coordination of county programs such as Public Health, County Roads, Animal Control, libraries, county jails and the cities within the unincorporated areas of the county.

E.5 CITY RESOURCES (OREGON 2009)

Portland Office of Emergency Management (POEM). POEM is responsible for the coordination of plan development, training, exercise and equipment procurement and/or distribution. Its primary responsibility is the readiness of the Emergency Coordination Center for the City of Portland. Emergency Management is responsible for updating plans as codified by Title 15 of the City Code and in alignment with federal and state standards.

Portland Bureau of Development Services (BDS). PBDS has geotechnical engineering staff to review all building permits for new development in landslide-prone areas. As part of these building permit reviews, PBDS can require geotechnical engineering or engineering geology reports to address landslide concerns. In addition, the Zoning Code requires geotechnical engineering/engineering geology reports to be submitted for land use review applications in some situations. In a land use review application, the land use planning staff and the geotechnical staff review the submitted reports to ensure that applicable approval criteria are met.

Portland Bureau of Planning and Sustainability (BPS). *The City Comprehensive Plan* includes policies that relate to landslide hazards both implicitly and explicitly. These include: Natural Hazards, Uplands Protection and Slope Protection and Drainage. Sustainable Development's Multifamily Assistance Program works with property owners and managers to market the benefits of energy efficiency and simplify the process of

weatherizing rental properties. They provides technical information on insulation and high-efficiency windows, maintains a list of qualified contractors and assists property owners in applying for rebates, state tax credits and low-interest financing that may be available for energy-efficiency projects. The resulting energy-efficiency projects increase the value of the property, reduce tenants' energy bills and improve indoor comfort. During an extreme winter storm event, residents in weatherized properties have additional protection against cold if there is an electricity blackout, since most local multifamily properties have electric space heat.

Portland Parks & Recreation (PP&R). The City Nature Division of Portland Parks and Recreation manages approximately 7400 acres of City park natural area. *The Park Natural Area Vegetation Surveys (2004-2006)* and the *Wildfire Risk Assessment & Gap Analysis Plan (2009)* identify flammable invasive species and potential risks to PP&R natural area parks from wildfire. The Wildfire Risk Plan states that wildfire hazard is currently low, but makes several important observations:

1. Flammable invasive species are the primary hazardous fuels sources beneath utility ROWS and at the wildland urban interface with urban development.
2. Hardwood stands in the park are currently functioning as shaded fuel breaks that generally keep ground fire from reaching the tree canopy. However, these conditions will change over time due to forest succession to a more fire susceptible conifer dominated tree stand.

Therefore, wildfire risk should be reassessed periodically for change on the same 10-year schedule recommended for monitoring vegetative change in the Park. The Wildfire Risk Plan also recommends that the city form a Wildfire Technical group to address coordination, training and vegetation management issues.

Bureau of Transportation (PBOT). PBOT's importance in mitigation has been very under estimated. They coordinate the clearance of roads after a disaster, keep the street network free from cracks or sluffs and maintain knowledge of the below and above surface infrastructure. If areas of greatest risk are identified prior to a disaster, mitigation efforts can be planned or response routes changed to accommodate the lack of thoroughfare due to the landslide effects.

Portland Bureau of Environmental Services (BES). BES's work for ecosystem restoration and stabilization has many similarities to natural hazard mitigation. The natural systems are what make Portland and the region livable. With the increased development in the Portland Metro area, our natural habitat is at risk and being depleted. Ecological protection and mitigative actions go hand in hand to strengthen the endangered terrain, habitat and wildlife.

Portland Water Bureau (Water). The Water Bureau is an active partner in landslide mitigation. Since a 1996 report indicated that the Water Bureau should, "Continue to mitigate landslide hazards to the conduits from Bull Run", mitigation projects have successfully protected the water pipes and storage systems ensuring continued availability.

Portland Fire & Rescue (PF&R). The Portland Bureau of Fire & Rescue is the responding agency in charge of plan development for the coordination of an earthquake event. With 27 stations across the Portland area and many more regional partners in the fire service, the Bureau of Fire and Rescue lends a trained force that has familiarized itself with the buildings' plans, the street network and the neighborhood of their fire management areas. With this knowledge they know where vulnerable people live and can work with the community to save lives and property expediently.

Portland Office of Neighborhood Involvement (ONI). ONI is responsible for increasing the number and diversity of people who are involved and volunteer in their communities and neighborhoods. They help strengthen and build capacity, increase the public's impact on public decisions and provide tools and resources to improve neighborhood livability and safety. ONI operates the Information and Referral phone bank that allows easy access by the community to correct contacts within the City bureaus.

Landslide Coordination Committee. The Landslide Coordination Committee was established after the 1996 landslides. It consists of staff representing the Bureau of Development Services, the Portland Office of Transportation, the Bureau of Maintenance, the Bureau of Environmental Services, the Parks and Recreation Bureau, the Water Bureau and Risk Management. It meets primarily in the fall through spring months to review landslide occurrences within the City, communicate details of the landslide event and coordinate review, permitting and mitigation activities. The group has developed a procedure for quickly alerting members by email with pertinent information on a landslide occurrence so that each bureau can determine actions that need to be taken. The group has also developed a procedure for processing landslide repair projects in environmental zones.

Capital Improvement Plan. The City of Portland's Capital Improvements Program (CIP) is a dynamic document that is reviewed by a CIP development team who prioritizes projects to be scheduled into a five-year citywide projected budget. Each bureau submits their projects after reviewing them through weighted criteria. Some landslide mitigation projects might be considered as part of the capital improvement plan.

Wildfire Technical Committee. This group was formed in 2009 at the request of Portland City Council and is composed of City and Multnomah County agencies. The committee coordinates the implementation of the wildfire mitigation actions across the city. Priority actions include vegetation management policy and code, mapping, education and training and funding.

Appendix E Benefit Cost Analysis

Portland State University, Department of Geology. Portland State University conducts research and prepares inventories and reports for communities throughout Oregon. Research and projects conducted through the Department of Geology at Portland State University include an inventory of landslides for the Portland metropolitan region after the 1996 and 1997 floods and a subsequent susceptibility report and planning document for Metro in Portland. The City of Portland has existing staff, land and financial management tools to implement hazard mitigation activities. The resources available in these areas have been assessed by the hazard mitigation Steering Committee and are summarized in Table E-5a and E-5b below.

Table E-5a City of Portland Staff Resources

Staff/Personnel Resources	Y/N	Department/Agency and Position
Planner and/or engineer with knowledge of land development and land management practices	Yes	BP&S – Planner
Engineer and/or professional trained in construction practices related to buildings and/or infrastructure	Yes	BP&S - Engineer
Planner and/or engineer with an understanding of natural and/or human-caused hazards	Yes	POEM – Planner
Floodplain Manager	Yes	BP&S – Floodplain Manager
Staff with education or expertise to assess the jurisdiction’s vulnerability to hazards	Yes	Emergency Management Steering Committee – key infrastructure bureaus
Personnel skilled in GIS and/or HAZUS	Yes	BP&S , Bureaus with GIS technicians
Scientists familiar with the hazards of the jurisdiction	Yes	DOGAMI, USGS, PSU Geology Dept., NWS
Emergency Manager	Yes	POEM - Director
Grant writers	Yes	Water – Engineer; BES – Prog. Mgr.; POEM – Planner; BP&S - Planner

Table E-5b City of Portland Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
General funds	Yes
Capital Improvement Projects Funding	DK
Fees for water, sewer, gas, or electric service	Yes
Impact fees for homebuyers or developers for new developments/homes	DK
Authority to levy taxes for specific purposes	Yes, with voter approval
Incur debt through general obligation bonds	Yes, with voter approval
Incur debt through special tax	Yes, with voter approval
Incur debt through revenue bonds	Yes, with voter approval or With Board of County Commissioners Approval
Incur debt through private activity bonds	Yes, with voter approval or With Board of County Commissioners Approval
Hazard Mitigation Grant Program (HMGP)	FEMA funding which is available to local eligible communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding which is available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects.
Flood Mitigation Assistance (FMA) grant program	FEMA funding which is available on an annual basis. This grant can be used to mitigate and protect repetitively flooded structures and infrastructure.
United States Fire Administration (USFA) Grants	The purpose of these grants is to assist state, regional, national or local organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors and firefighters.
Fire Mitigation Fees	Finance future fire protection facilities and fire capital expenditures required because of new development within Special Districts.

Based on the above information, the City has the capability to develop, manage and complete mitigation projects using appropriate and available resources and expertise to fulfill federal grant requirements.

The City has the capability to hire or utilize existing resources to manage their hazard mitigation planning goals, initiatives and plan implementation and management requirements.

E.6 OTHER FUNDING SOURCES AND RESOURCES

The following provide focused access to valuable planning resources for communities interested in sustainable development activities.

Cascadia Region Earthquake Workgroup (CREW). CREW provides information on regional earthquake hazards, facts and mitigation strategies for the home and business office. CREW is a coalition of private and public representatives working together to improve the ability of Cascadia Region communities to reduce the effects of earthquake events. Members are from Oregon, Washington, California and British Columbia.

American Planning Association. A non-profit professional association that serves as a resource for planners, elected officials and citizens concerned with planning and growth initiatives. <http://www.planning.org>

Institute for Business and Home Safety. An initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters. <http://www.ibhs.org/ibhs2>

American Red Cross. Provides for the critical needs of individuals such as food, clothing, shelter and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools and some bill payment may be provided. <http://www.redcross-pdx.org>

Firewise, The National Wildland/Urban Interface Fire program. Firewise maintains a website designed for people who live in wildfire-prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences.

State of Washington, Department of Ecology. The Washington State Department of Ecology has a landslide website with tips for reducing risk, identifying warning signs and using hazard maps. <http://www.ecy.wa.gov/programs/sea/landslides>.

Western States Seismic Policy Council. A regional organization that includes representatives of the earthquake programs of 13 states (Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon Utah, Washington and Wyoming), three US territories (American Samoa, Commonwealth of the Northern Mariana Islands and Guam), one Canadian Province (British Columbia) and one Canadian Territory (Yukon). The organization has primarily sought to improve public understanding of seismic risk, to improve earthquake preparedness and to provide a cooperative forum to enhance transfer of mitigation technologies at the local, state, interstate and national levels. The mission of the Council is to provide a forum to advance earthquake hazard reduction programs throughout the western region and to develop, recommend and present seismic policies and programs through information exchange, research and education.

Appendix E Benefit Cost Analysis

Lindbergh Grants. Each year, The Charles A. and Anne Morrow Lindbergh Foundation presents Lindbergh Grants to individuals whose proposed research or education projects will make important contributions toward improving the quality of life by balancing technological advancements and the preservation of our environment. Awarded in amounts up to \$10,580 each (a symbolic figure representing the cost of the "Spirit of St. Louis" in 1927), the Grants are made in numerous areas of special interest to Charles and Anne Lindbergh, including aviation/aerospace, agriculture, arts and humanities, biomedical research and adaptive technology, conservation of natural resources, education, exploration, health and population sciences, intercultural communication, oceanography, waste disposal management, water resource management and wildlife preservation.