

1. INSTRUCTIONS FOR BUREAU ACTION SELECTION

This document provides instructions and guidance for the selection of action items and completion of the action plan tables by City of Portland Bureaus and Offices for the 2016 update to the Natural Hazard Mitigation Plan. There is also some information on City capabilities and plan integration that the Natural Hazard Mitigation Plan planning team would like City Bureaus and Offices to review and provide Bureau-specific information as appropriate.

Please read through this entire document before beginning action item selection.

DUE DATES

Completed, action plan tables should be submitted by close of business on **Wednesday, June 1, 2016**. Comments on additional documents, such as the capability assessment and plan integration, should also be submitted at this time. Action items will be reviewed by the steering committee at its Wednesday, June 15th steering committee meeting. Any comments will be sent to Bureaus and Offices for their consideration and finalized action plans will be due by close of business on **Friday, July 1, 2016**.

Please save your completed documents with your Bureau or Office name added to the end of the file name. For example:
Portland_NHMP2016_BureauActions_PBEM.docx

Any questions on completing the action plan tables or other items related to this planning process should be directed to:

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Associated Documents:

Portland_NHMP2016_DRAFTCapabilityAssessment.docx
 Portland_NHMP2016_BureauActions.docx
 Portland_NHMP2016_ProgressReport_v3.docx
 Portland_NHMP2016_BureauMitigationCatalog.docx
 LossMatrix_CityofPortland_v6.xls
 Folder – FOUO_CriticalFacilityResults
 Portland_NHMP2016_AdditionalRiskAssessmentSummary.docx
 Portland_NHMP2016_DRAFTIssues.docx
 Portland_NHMP2016_DRAFTSurveySummary.pdf
 FOLDER – Grant Information
 Note: Some documents may have version or dates at the end of the file name

A Note About Formatting:

The template for the action plan is a Microsoft Word document in a format that will be used in the final plan.

Content should be entered within the yellow (or blue), highlighted text or appropriate columns that is currently in the template, rather than creating text in another document and pasting it into the template. Text from another source will alter the style and formatting of the document.

If you are having difficulty with any formatting issues, please ask for help or make a note for the NHMP planning team.

CAPABILITY ASSESSMENT AND PLAN INTEGRATION

CAPABILITY ASSESSMENT

The planning team has completed a draft capability assessment for the City of Portland. By reviewing existing capabilities, we can identify capabilities that currently reduce disaster losses or could be used to reduce losses in the future, as well as capabilities that inadvertently increase risks in Portland. FEMA identifies the primary types of capabilities for reducing long-term vulnerability through mitigation planning as:

- Planning and regulatory
- Administrative and technical
- Financial
- Education and outreach.

The planning team recognizes that some bureaus may also wish to identify capabilities that fall outside of these categories, such as those that build community capacity; therefore, we have included an “additional capability” section. Please remember that we are not striving to identify ALL capabilities, only those with most relevance for disaster risk reduction. Please note that the education and outreach capability assessment was completed earlier in the process via a questionnaire distributed to the Bureaus and other relevant stakeholders.

We ask that each Bureau and Office review the draft capability assessment to ensure that we have not missed or misrepresented any capabilities. It is often the case that those who work most often with these codes and regulations have the deepest familiarity. If you are able to provide any missing information or would like to correct or add information, please do so in the document provided in track changes.

Document: Portland_NHMP2016_DRAFTCapabilityAssessment.docx

The following sections describes each section of the capability assessment:

Legal and Regulatory Capability

Legal authorities available to the City of Portland and/or enabling legislation at the state level affecting planning and land management tools that can support hazard mitigation actions. In the table titled “Legal and Regulatory Capability,” we have indicated “Yes” or “No” for each listed code, ordinance, requirement or planning document in each of the following columns:

- **Local Authority**—“Yes” if your jurisdiction has prepared or adopted the identified item; otherwise, “No.” If yes, the code, ordinance number, or plan name and its date of adoption has been entered in the comments column.
- **Other Jurisdiction Authority**—“Yes” if there are any regulations that may impact your action that are enforced or administered by another agency (e.g., a state agency or special purpose district) or if you know that there are any state or federal regulations or laws that would prohibit local implementation of the identified item; otherwise, “No.” Note - If the answer is yes, please indicate the other agency in the comments.
- **State Mandated**— “Yes” if state laws or other requirements enable or require the listed item to be implemented at the local level; otherwise, “No.”
- **Comments**—The code number and adoption date for any local code indicated as being in place has been entered; other comments as appropriate should be provided to describe capabilities for each entry.
- For the categories “General or Comprehensive Plan” and “Capital Improvement Plan,” the specific questions shown have been answered, in addition to the four columns indicating level of capability.

Fiscal Capability

This section identifies what financial resources (other than the Hazard Mitigation Grant Program and the Pre-Disaster Mitigation Grant Program) are available for implementing mitigation actions.

The table titled “Fiscal Capability” has been completed by indicating whether each of the listed financial resources is accessible to Portland. “Yes” has been entered if the resource is fully accessible to Portland. “No” has been answered if there are limitations or prerequisites that may hinder your eligibility for this resource.

Administrative and Technical Capability

This section takes inventory of the staff/personnel resources available to your jurisdiction to help with hazard mitigation planning and implementation of specific mitigation actions.

The table titled “Administrative and Technical Capability” has been completed by indicating whether your jurisdiction has access to each of the listed personnel resources. If yes, the department and position title in the right-hand column has been entered.

Please note that if you have contract support staff with these capabilities you can still answer “Yes.” Please just indicate contract support in the department column.

Classification in Hazard Mitigation Programs

The table titled “Community Classifications” has been completed to indicate your jurisdiction’s participation in various national programs related to natural hazard mitigation. For each program “Yes” or “No” has been entered in the second column to indicate whether your jurisdiction participates. If yes, the classification that your jurisdiction has earned under the program in the third column has been entered and the date on which that classification was issued is entered in the fourth column; “N/A” should be entered in these columns if your jurisdiction is not participating.

INTEGRATION WITH OTHER PLANNING INITIATIVES

After reviewing the plans, programs and ordinances identified in the above capability assessment tables, please help us to identify those plans and programs where the goals and recommendations of the hazard mitigation plan have already been integrated and those plans and programs that offer opportunities for future integration. **It is important to describe the process by which these plans and programs are or will be integrated.**

The goal of plan integration is to effectively integrate plans and policies across disciplines and agencies by considering the potential impact of hazards as one of the key factors in future development. There are two primary ways to accomplish plan integration:

1. Integrate natural hazard information and mitigation policies and principles into local planning mechanisms and vice versa.
2. Encourage collaborative planning and implementation and inter-agency coordination.

Generally speaking, FEMA recommends integration through

- Integrating plan goals with community objectives (e.g. incorporating goals for risk reduction and safety into the policies of other plans)
- Using the risk assessment to inform plans and policies (e.g. incorporation into land use plans and site plan review)

- Implementing mitigation actions through existing mechanisms (e.g. including mitigation projects in the capital improvement plan)
- Thinking about mitigation pre- and post-disaster (e.g. building recovery planning on existing mitigation plans and goals).

Please review the draft integration information that has been provided by the planning team and provide comments for those plans and programs that your Bureau or Office administers. This section can be found at the end of the capability assessment document indicated above.

HAZARD MITIGATION ACTION PLAN

Please review the instructions below and complete the tables as appropriate.

Document: Portland_NHMP2016_BureauActions.docx

STATUS OF PREVIOUS PLAN ACTIONS

All action items identified in the 2010 plan must be reconciled in the 2016 plan update. Action items must all be marked as:

- completed,
- carry over, or
- removed; no longer feasible.

We have an excellent start on this process as a result of the successful completion of the progress report in late 2015 and early 2016. All actions marked as complete in the progress report have been identified as such and no additional information is needed.

Remaining action items must be reviewed. Please review these items and determine if they should be carried over to the 2016 plan or removed.

- **Removed**—If action items are to be removed because they are no longer feasible, a reason must be given. Lack of funding does not mean that it is no longer feasible, unless the sole source of funding for an action is no longer available. Place a comment in the comment section explaining why the action is no longer feasible (e.g., “Action no longer considered feasible due to lack of political support.”). If a 2010 action is extremely unclear, and you are not sure what the intention was, this can be a reason for removal.
- **Carry Over**—For carry over actions, we would encourage you to reword the actions as appropriate to make sure that they are clear and easy to understand. We would also encourage that actions be worded so that the next step in implementing the action is obvious – actions can be revised during the annual progress report.

ACTION PLAN MATRIX

Identify and Select Actions

Identify potential actions your Bureau or Office would like to pursue with this plan. These actions will go through an equity screening and refinement process and, if ultimately selected, implementation information will be identified (lead agency, timeframe, etc.), the actions will be prioritized using a standard process, and the actions will be categorized by mitigation type (prevention, natural resource protection, etc.). **We would encourage you to review the entire process outlined in this document before your begin selecting potential actions.**

There are a wide variety of sources for actions for your Bureau or Office:

- **Mitigation Best Practices Catalog**—We have developed a catalog that includes FEMA and other agency identified best practices, steering committee and other stakeholder recommendations, and recommendations from the Critical Energy Infrastructure Hub report. (Portland_2016NHMP_BureauMitigationCatalog.docx).
- **Risk Assessment and Issues**—Bureaus and offices may want to review the risk assessment information provided in the tool kit to identify issues that came out of the planning process as well as exposure and vulnerabilities to critical facilities that Bureaus and Offices may own or operate or upon which they depend (LossMatrix_CityofPortland_v6.xls; Folder – FOUO_CriticalFacilityResults; Portland_NHMP2016_AdditionalRiskAssessmentSummary.docx; Portland_NHMP2016_DRAFTIssues.docx).
- **Public Input**—The results of the public survey and summary notes from the planning for real workshops have been included for your review and consideration (Portland_2016NHMP_DRAFTSurveySummary.docx).
- **Other Plans and Programs**—Bureaus and offices should include projects or actions that have been identified in other plans and programs such as the Climate Action Plan, Local Energy Assurance Plan, Capital Improvement Program, etc.
- **Capability Assessment**—Review the capability assessment. Are there items listed that the City does not currently have that you would like to pursue? If so, pursuing these capabilities are excellent mitigation actions (Portland_NHMP2016_DRAFTCapabilityAssessment.docx).
- **2010 Natural Hazard Mitigation Plan**—Finally, Bureaus and Offices should be sure to include any actions that were identified as “carry-over” actions from the 2010 plan. Remember, these actions can be reworded as needed (Portland_2016NHMP_BureauActions.docx see Tables 1 and 2).

When reviewing these sources for potential actions, be sure to keep the following factors in mind:

- Identify actions that are consistent with the overall vision, mission, goals, and objectives of the hazard mitigation plan.
- Identify actions that promote equity (you may want to review the equity screening tool below before selecting potential actions).
- Identify projects where benefits exceed costs.
- Include any project that your Bureau or Office has committed to pursuing regardless of grant eligibility.
- Know what is and is not grant-eligible under the HMGP and PDM (see fact sheets provided). Listing HMGP or PDM as a potential funding source for an ineligible project will be a red flag when this plan goes through review. If you have projects that are not HMGP or PDM grant eligible, but do mitigate part or all of the hazard and may be eligible for other grant programs sponsored by other agencies, include them in this section.
- Hazard-specific projects for every hazard from each Bureau or Office are not required. The planning team will work to ensure that we have an adequate array of projects after action plans have been submitted.

Wording Your Action Descriptions:

Descriptions of your actions need not provide great detail; but we ask that they be detailed enough to understand the scope and impact of the action and that they are clearly actionable.

If you have a large, complicated action and you know what the first step of the action will be, consider including both the overall action and the next step.

Similarly, if you plan to collaborate with another bureau on a large, over-arching action, consider including both the over-arching action and the specific part of that action for your Bureau.

It is important to note that this may not be possible for every action, so please do your best to make the actions clear and easy to understand.

Equity Analysis Screening

After you have selected actions, perform an equity analysis screening for each action using the following question matrix and review tool. It is expected that revisions may be needed to the identified action based on the review or that some actions may not be pursued at this time after being reviewed using this screening.

Review Tool

This review tool was developed by the Portland Bureau of Planning and Sustainability as part of the Climate Action Plan Equity Implementation Guide and adapted with guidance from the Portland Officer of Equity and Human Rights. Questions should be reviewed and discussed as appropriate during the equity analysis screening process.

A Note on Equity:

The Portland Plan defines equity as:

when everyone has access to the opportunities necessary to satisfy their essential needs, advance their well - being and achieve their full potential. We have a shared fate as individuals within a community and communities within society. All communities need the ability to shape their own present and future. Equity is both the means to healthy communities and an end that benefits us all.

Equity concerns that are of particular importance in hazard mitigation include policies and programs that influence an individuals, households, or groups ability to:

- Anticipate
- Cope with
- Respond to, and
- Recover from a hazard event.

Policies and programs can enhance or diminish vulnerability.

	Procedural	Distributive	Structural
Programs/ Services	<ul style="list-style-type: none"> ✓ How was the target audience included in the design of the program? ✓ What actions will be taken to ensure that services and programs are physically and programmatically accessible and inclusive? ✓ What are the criteria for participation or receipt of benefits? 	<ul style="list-style-type: none"> ✓ Is the program or service designed to meet the needs of underserved and underrepresented communities? If not what would need to be changed to ensure their equitable participation? ✓ How will program dollars be allocated to ensure inclusive and accessible service delivery? ✓ Does the cost structure of the program result in disparate use?/Does the fee structure of the service result in increased burdens for low-income communities? 	<ul style="list-style-type: none"> ✓ Does this program/service create unintended consequences for communities that are underserved and underrepresented? How will they be mitigated? ✓ Is there an opportunity to extend additional benefits through this program/service that can help support the healing of past harms to communities? ✓ Does the program empower and build capacity of a community
Capital Investments	<ul style="list-style-type: none"> ✓ What are the criteria for prioritizing projects and investments? ✓ Does the data and information used consider the demographic, geographic and real-world 	<ul style="list-style-type: none"> ✓ Will the investment provide improved safety, health, access or opportunity for the communities who need it most? 	<ul style="list-style-type: none"> ✓ What measures will be taken to mitigate the potential impacts involuntary displacement in the project? ✓ How will business or employment opportunity

	<ul style="list-style-type: none"> experience of residents and businesses in the area? ✓ If data gaps exist, what are you using to guide decisions? ✓ What process will be used to get input from the community? ✓ How will you reach underserved populations? 	<ul style="list-style-type: none"> ✓ How will the underserved people who currently live and work in the area benefit from the investment? 	<ul style="list-style-type: none"> created through the project be extended to communities of color, people with disabilities, and low-income people? ✓ How will community benefits be negotiated?
Regulation	<ul style="list-style-type: none"> ✓ Has analysis been done on the impacts to communities of color, people with disabilities, low-income populations, seniors, children, renters, and other historically underserved or excluded groups? ✓ How will impacted communities be able to learn about and understand changes with the regulation? ✓ How will the regulation be enforced? 	<ul style="list-style-type: none"> ✓ Will the regulation provide improved safety, health, access or opportunity for the communities who need it most? ✓ How will the regulation alleviate any cost-burden for those who are already in a position where it is difficult to pay? 	<ul style="list-style-type: none"> ✓ Does the regulation create or inhibit opportunity for communities of color, people with disabilities, and low-income populations? ✓ Will enforcement disproportionately negatively affect low-income communities or communities of color? How will this be mitigated?
Planning	<ul style="list-style-type: none"> ✓ How will impacted communities be involved in the planning process? ✓ What measures will be taken to ensure the process is fair and inclusive? 	<ul style="list-style-type: none"> ✓ How does the plan prioritize and address the needs of the most impacted or vulnerable in the community? ✓ Does the plan improve safety, health, access or opportunity for the communities who need it most? ✓ How will resources shift to ensure equitable implementation of the plan? 	<ul style="list-style-type: none"> ✓ What measures will be taken to mitigate the potential impacts involuntary displacement? ✓ How will policies support community development? ✓ What support is needed to build the community's ownership and self-determination with the plan?

Question Matrix

The question matrix is designed as a conversation tool. Please talk through these questions for each identified action. Bureaus and Offices are encouraged to have a group discussion about actions so that multiple perspectives can be brought into the screening process. If notes are taken, please provide these to the planning team for documentation.

#	Evaluation Question	Response
1	What issue/problem/risk is the action designed to address? And what are the expected benefits?	Issue: Benefits:
2	Who is the target audience/beneficiary for this action? Who is affected if no action is taken?	
3	How would you classify the mitigation action? (Programs/Service; Capital Investment; Regulation; Planning). Refer to questions in table above based on your answer to this question.	
4	Will any community groups be involved in the design/implementation of this action? (i.e. potential partners)	
5	Will this action reduce risk from natural hazards for the following groups? How?	
	Communities of color	
	Persons with disabilities and/or access and functional needs	
	Households with limited English Proficiency	
	Renters	
	Economically disadvantaged families	
	Seniors (age 65 or older)	
Children (under 15 years of age)		
6	How could this action benefit the following groups? Or How could this action be modified so that there are benefits?	
	Communities of color	
	Persons with disabilities and/or access and functional needs	
	Households with limited English Proficiency	
	Renters	
	Economically disadvantaged families	
	Seniors (age 65 or older)	
Children (under 15 years of age)		

7	How could this action burden/negatively impact/leave out the following groups, for example through communication, transportation, physical or programmatic barriers?	
	Communities of color	
	Persons with disabilities and/or access and functional needs	
	Households with limited English Proficiency	
	Renters	
	Economically disadvantaged families	
	Seniors (age 65 or older)	
	Children (under 15 years of age)	
8	If you have identified burdens, barriers, or negative impacts, or opportunities for benefits please <u>revisit the action</u> to identify strategies to reduce or eliminate burdens or negative impacts; remove communication, transportation, physical or programmatic barriers; or enhance potential benefits.	
9	Have you identified a performance metric for evaluating progress on this action? How will you know when this action is complete? (please provide) Have you considered outcomes for communities of color, people with disabilities, low-income families, people with limited English proficiency, renters, seniors, and children?	

Action Plan Table

Complete the table titled “NHMP Action Plan Matrix” (Portland_NHMP2016_BureauActions.docx see Table 3) for all the actions you have identified:

- Enter the action number and description.
- **Lead agency**—Indicate who will be the lead in administering the project. This should be either your Bureau or Office or a department or section of your Bureau or Office.
- **Potential partners**—Indicate any potential partners that may be able to assist with implementation.
- **Hazard addressed**— Identify the specific hazards the action will mitigate. This can be all hazards, any of our identified hazards of concern or a combination. Our hazards of concern are: Dam or Reservoir Failure; Drought; Earthquake, Flood, Landslide, Severe Weather, Space Weather, Volcanic Hazards, Wildfire. If you have an action that addresses a secondary hazard of concern, such as erosion or invasive species, please feel free to include that as well.

Action Item Numbering:

Please use the following action item naming convention:

Please use an acronym for your Bureau or Office similar to the example that follows:

- PBEM-1
- BES-1

- **Action Source**—Indicate where this action came from, for example Climate Action Plan or Steering Committee Recommendation. If the action is an item in another plan or program, please include the reference number as appropriate.
- **Performance Metric**—Please indicate how you will measure progress on this action.
- **New or existing assets**— Indicate whether the action mitigates hazards for new or existing assets or both. This column may not apply to all actions.
- **Funding**— Identify funding sources for the project. If it is a grant, include possible funding sources for the cost share.
- **Timeframe**—Indicate the timeframe as **Near-term** (plan adoption to May 2018); **Mid-term** (June 2018 to December 2021); **Long-term** (2022 or beyond); **Existing/on-going** (currently underway or annual/semi-annual schedule); **Uncertain** (depends on funding/other factors)
- **Objectives met**— Identify by number the mitigation plan objectives that the action addresses (see below).
- **In previous plan**—Indicate “yes” or “no” if the plan was a carry-over action from the 2010 plan. If yes, indicate the former action item number.

The table below provides an example of how the action plan table is to be completed:

Hazards Addressed	New or Existing Assets	Funding Options	Timeframe	Objectives Met	In Previous Plan? (# from previous plan)
PBEM-1 —This sentence is actionable and is detailed enough to be easily understandable.					
Lead Agency: PBEM		Partner Organizations: BDS and IRCO			
Action Source: Steering Committee Recommendation		Performance Metric: Number of people trained			
All Hazards	New	FMA, HMGP, UASI	Mid-term	1,3,6,10	Yes (ST MH #1)

Vision, Mission, Goals, and Objectives

The vision, mission, goals, and objectives for the planning process are shown in the table below. *Please note – if you identify a key “gap” in our objectives through this process, please feel free to email the planning team with a suggested addition to the objectives.*

Vision	(Our desired future state)
<i>Portland is a prosperous, healthy, equitable and resilient city where everyone has access to opportunity and is engaged in shaping decisions that affect their lives (City of Portland 2035 Comprehensive Plan)</i>	
Mission	(What we do, who we do it for, and how)
<i>To equitably reduce risk and the adverse impacts of natural hazards by building community resilience through collaborative, cost-effective actions and strategies.</i>	
Goals	(General guidelines that explain what we want to achieve with the plan)
<ol style="list-style-type: none"> 1. Protect life and reduce injuries. 2. Engage and build capacity for the whole community. 3. Minimize public and private property damage. 4. Protect, restore, and sustain natural systems. 	

<ol style="list-style-type: none"> 5. Minimize the disruption of essential infrastructure and services. 6. Integrate mitigation strategies into existing plans and programs. 7. Prioritize multi-objective actions that reduce risk to vulnerable communities. 	
Objectives	(Broader than actions, but more specific than goals, objectives are specific enough to help determine whether a proposed project or program would advance the values expressed in the mission and vision. Objectives may also be thought of as ‘policies.’ In our planning process objectives will be used to define and prioritize actions)
<ol style="list-style-type: none"> 1. Strengthen development codes and update land use designations to facilitate effective disaster risk reduction (Adapted from Portland CP 4.78) 2. Prevent or reduce mitigation-related disparities affecting under-served and under-represented communities through plans, investments and engagement (adapted from Portland CP 7.2) 3. Promote the use of natural systems to limit natural hazard related impacts (adapted from Portland CP 7.4b) 4. Increase the resilience of high-risk and critical infrastructure through monitoring, planning, maintenance, investment, adaptive technology, and continuity planning (Portland CP 8.25) 5. Coordinate land use plans and public facility investments between City bureaus, other public and jurisdictional agencies, businesses, community partners, and other emergency response providers (adapted from Portland CP 8.99) 6. Support community outreach activities that increase stakeholder awareness and understanding of hazard risk, mitigation options, and preparedness strategies (adapted from Multnomah NHMP O1.2) 7. Identify and seek various funding opportunities for mitigation activities and look for ways to leverage existing funds (adapted from Multnomah NHMP O1.5) 8. Seek opportunities in which hazard mitigation also benefits other community goals (adapted from Multnomah NHMP O3.4) 9. Collect data to track progress on meeting mitigation goals. 10. Use the best available data, science and technologies to improve understanding of the location and potential impacts of natural hazards, the vulnerability of building types and community development patterns, and the measures needed to protect life safety. 11. Retrofit, purchase, or relocate structures in high hazard areas, especially those known to be repetitively damaged. 12. Promote, incentivize and support the mitigation of private property. 13. Improve systems that provide warning and emergency communications. 14. Promote mutual information exchange and incorporate existing community networks in the identification and implementation of mitigation actions. 15. Build City staff and community capacity to ensure effective implementation and equitable outcomes of mitigation action efforts (Adapted from Portland 2015 Climate Action Plan) 	

ACTION PLAN PRIORITIZATION

A separate table will include information on action item prioritization. Prioritization is a required component of the planning process and must include a special emphasis on benefits versus costs. This methodology was adapted from an identified best practice. Complete the “NHMP Action Plan Prioritization Table” (Portland_NHMP2016_BureauActions.docx see Table 4) with the following:

- **Action #**—Carry down the action item number indicated above.
- **# of Objectives Met**—Carry down the number of objectives met indicated above.

- **Benefits**—Insert high, medium or low.
 - **High:** Action will support compliance with a legal mandate or, once completed, will have an immediate impact on the reduction of risk exposure to life and property.
 - **Medium:** Once completed, action will have a long-term impact on the reduction of risk exposure to life and property, has a substantial life safety component, or project will provide an immediate reduction in the risk exposure to property.
 - **Low:** Long-term benefits of the action are difficult to quantify in the short term.
- **Cost Impact**—Insert high, medium or low.
 - Insert estimated cost if known.
 - **High:** Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.
 - **Medium:** Could budget for under existing work-plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
 - **Low:** Possible to fund under existing budget. Project is or can be part of an existing ongoing program or would not require substantial effort to initiate or appropriate funds.
- **Do Benefits Meet or Exceed Costs?**—Insert yes or no.
- **Can the project be funded under existing program budgets?** —Insert yes or no.
- **Is the project grant eligible?**—Insert yes or no.
- **Implementation priority**—Insert high, medium or low.
 - **High Priority**—An action that meets multiple objectives, has benefits that exceed cost, has funding secured or is an ongoing project. High priority actions can be completed in the short-term or mid-term (1 to 5 years) or are projects that are long-term projects that can be initiated in the short-term and will have large positive impacts once completed. The key factors for high priority actions are that they have funding secured and can be completed or initiated in the short- or mid-term.
 - **Medium Priority**—An action that meets multiple objectives, that has benefits that exceed costs, and for which funding has not yet been secured, but is eligible for funding. Actions can be completed in the short- or mid-term, once funding is secured, or are projects that are long-term projects that can be initiated in the short-term and will have large positive impacts once completed. Medium priority actions will become high priority actions once funding is secured. The key factors for medium priority actions are that they are eligible for funding, but do not yet have funding secured, and they can be completed or initiated within the short- or mid-term.
 - **Low Priority**—An action that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for grant funding, and for which the time line for completion is long-term or uncertain. Low priority actions may be eligible for grant funding from other programs that have not yet been identified. Low priority projects are generally “blue-sky” or “wish-list.” projects. Financing is unknown, and they can be completed over the long term.
- **Grant Pursuit priority**—Insert high, medium or low.
 - **High Priority**—An action that has been identified as meeting grant eligibility requirements, assessed to have high benefits, is listed as high or medium priority, and where local funding

options are unavailable or where dedicated funds could be utilized for projects that are not eligible for grant funding.

- **Medium Priority**—An action that has been identified as meeting grant eligibility requirements, assessed to have medium or low benefits, is listed as medium or low priority, and where local funding options are unavailable.
 - **Low Priority**—An initiative that has not been identified as meeting grant eligibility requirements, or has low benefits. Additionally, projects that are already being funded and are likely to continue to be funded as identified as low grant pursuit priority.
- **Equity Action**—If the target audience/beneficiary identified for the action is one of the groups of focus for the assessment (e.g. people with disabilities, communities of color, etc), the priority will be noted with an E (e.g. High-E). If you have noted the action with an E, please provide an explanation to document your decision process.

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is project Grant Eligible?	Can Project be Funded under Existing Programs/Budgets?	Implementation Priority (High, Med., Low)	Grant Pursuit Priority (High, Med., Low)
PBEM-1	4	High	Medium	Yes	Yes	No	Medium-E	High-E
Please provide an <u>explanation</u> for any <u>actions noted with an E</u> .								
<i>Note: This will be used for tracking purposes only, and will not be included in the final plan document.</i>								

ANALYSIS OF MITIGATION ACTIONS

The planning team will complete the table titled “Analysis of Mitigation Actions” summarizing the mitigation actions by hazard of concern and the following seven mitigation types. The information below is included for your reference, although we encourage you to keep these categories in mind as you select actions. Overall, the action plan must include action items in each category for a variety of hazards.

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and storm water management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.

- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Community Capacity Building**—Actions that identify, strengthen or link the community’s tangible and intangible resources. Includes investing in food independence projects (ex. community gardens), promoting and supporting rain water collection systems, alternative energy sources (ex. solar power, wind power, micro-level hydro power), culturally appropriate community-level training for emergency and trauma response.

When you have completed your action plan, please submit all documents to Danielle Butsick (danielle.butsick@portlandoregon.gov).

1. BUREAU ACTION SELECTION

This document is a companion document to
Portland_NHMP2016_BureauActionSelectionInstructions.docx.

Please save this completed document with your Bureau or Office name added to the end of the file name. For example:

Portland_NHMP2016_BureauActions_PBEM.docx

The completed document should be submitted by close of business on **Wednesday, June 1, 2016** to Danielle Butsick: danielle.butstick@portlandoregon.gov

2010 NHMP PRIOR ACTION PLAN RECONCILIATION

Table 1. 2010 Action Items by Lead Agency that still need to be reconciled

Bureau	Action Items	Bureau	Action Items
PBEM	ST MH #1 LT EQ #11 New MH #5 ST EQ #2 ST-LS #1 LT V #1 V (removed?)	Fire and Rescue	ST WF #11 ST WF #13 ST WF #14 ST WF #16 LT WF #2 LT WF #5 WF
PBOT	LT MH #6 LT MH #11 SW #2	BDS	LT MH #3 New MH #3 ST SW #7 ST FL #1 ER #5
Water	ST MH #8 LT EQ #6 LT FL #9 FL #10 ST-LS #3	CGIS	LT WF #4
Office of Government Relations	LT MH #10	Parks and Recreation	LT FL #5
CAMG	New MH #4 LT EQ #3	Office of Management and Finance	FL #2 ST WF #1

Bureau	Action Items	Bureau	Action Items
BES	ST MH #11 New MH #2 New Reworded MH ST EQ #3 ST EQ #4 ST FL #2 ST FL #4 ST FL #6 ST FL #8 ST FL #9 LT FL #1 LT FL #3 LT FL #4 LT FL #6/#7 FL #11 FL #1 (removed?) ST-LS #4 LT LS #3 (removed?) LT LS #6 LT LS #7 ER #1 ER #2 ER #3 ER #4 ER #6 ER #7 ER #8 ER #9	BPS	LT MH #1 LT MH #8 New MH #6 LT EQ #8 LT FL#8 LT-LS #1 LT LS #4 ER #5 ST WF #7 WF LT WF #3 IS #2 (removed?) IS #4 IS #6

Table 2. 2010 Action Plan

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
ST MH #1 —Continue to involve the public in updating the Natural Hazard Mitigation Plan. (education & outreach) <i>Comment:</i> If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number			
ST MH #2 — Form a committee to identify and coordinate critical transportation (street and highway) networks. (mapping, asset management) <i>Comment:</i> There is no committee, but we have identified emergency transportation routes for key facilities. If new facilities are built, transportation routes would be re-evaluated.	✓		
ST MH #3 — Coordinate emergency standard operating procedures and plans between disaster responder organizations in the Portland metro region, to coordinate and expedite decision making during emergencies. (planning) <i>Comment:</i> Regional Multi-Agency Coordination (MAC) on operations. Internally deconflicted the County Basic Emergency Operations Plan (BEOP) with the City BEOP. PBEM reviews other bureaus' emergency procedures.	✓		
ST MH #4 — Develop a multiple-agency multi-hazard evacuation plan (EQ, flood, fire and landslide at a minimum).	✓		

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: Evacuation Plan developed. Certain areas of highest risk have individualized plans (Linnton).</i>			
ST MH #5 — Acquire Light Detection and Ranging (LiDAR) images of the Portland Metro area to facilitate natural hazard area risk assessment and vulnerability analysis. (mapping) (NFIP Compliance)	✓		
<i>Comment: Acquisition complete. Analysis in progress.</i>			
ST MH #6 — Use findings from Portland’s Risk Assessment (HAZUS-MH) to enhance existing debris removal plan. HAZUS-MH will need to be updated. (existing GIS Mapping)	✓		
<i>Comment: The 2003 HAZUS analysis was used to update Metro’s debris removal plan from the 1990’s in 2013. Debris modelling is being updated regionally. A new HAZUS analysis is being completed as part of the 2016 plan update.</i>			
ST MH #7 — Create a mitigation mapping committee to index and maintain GIS mapped inventory and develop prioritized list of critical facilities, residential and commercial buildings within known hazard areas such as earthquake, erosion, the 100-year and 500-year floodplains, invasive plant species, landslide and wildfire areas. (NFIP Compliance) Identify parameters and methods for new maps as needed to meet multi-hazard mitigation goals and to improve communication with the public.	✓		
<i>Comment: CGIS maintains inventory in Portland Maps. No such committee exists. Much of this will be accomplished through the NHMP update. Parks, BES data, PBOT erosion data, and others are included. PBEM also promotes the Map Your Neighborhood initiative.</i>			
ST MH #8 — Partner with utilities as they ensure continuity of service to the City and the Columbia South Shore Well field to provide for redundancy in case of primary power outage. (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST MH #9 — Develop a city employee emergency response plan to assure that city employees know what is expected of them to continue City operations. (education, outreach)	✓		
<i>Comment: All bureaus have submitted Continuity of Operations Plans (COOP) and recognize accountability requirements. PBEM is hiring a COOP planner. The mayor sends out emails informing employees what to do in an emergency.</i>			
ST MH #10 — Develop educational materials (television and print media) for residents that identify and define their risk to multi hazards: define and offer mitigation measures that residents can take home or share, determine method of distribution of the educational materials and coordinate with the media to reduce conveyance of misinformation. (education, outreach)	✓		
<i>Comment: PBEM hired a comm. outreach representative, supports preparedness campaigns, promotes preparedness materials, and has offered seismic strengthening programs. Public Information Officer (PIO) works with local news (KOIN) on post-disaster collaboration.</i>			
ST MH #11 — Implement actions in the 2005 Portland watershed management Plan (PWMP) (planning) (NFIP Compliance)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<p>LT MH #1— Revise Portland’s Comprehensive Plan to address and implement Citywide policies, land use improvements and mapping changes to natural hazards including, but not limited to, earthquakes, erosion, floods, invasive plants, landslides, volcano, severe weather and wildfires. (mapping, planning) (NFIP Compliance)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT MH #3— Increase the responsiveness of the emergency permitting procedures for post-hazard event periods through development of a procedural plan and the purchase of a mobile permitting van. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT MH #6— Promote the development of TriMet communications and dispatch capability to immediately implement changes to transit routes and service due to disruption of streets, roads, bridges, rail transit tracks and the information technology that provides connectivity. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT MH #8— Review and amend City Code and other compliance documentation to require that all facilities that store or handle hazardous materials (including large tanks) and which are located in the 500-year floodplain, landslide, or other hazard areas, develop a hazardous materials inventory statement. This statement will be made available for Fire Bureau review. Require that these storage tanks are either adequately protected or relocated outside of the 500 year floodplain, landslide, or other hazard areas. (asset management) (NFIP Compliance)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT MH #9— Identify and pursue funding opportunities from outside agencies to fund and implement identified mitigation projects and activities. (education, outreach)</p>	✓		
<p><i>Comment: FHA grant funding for PBEM/PBOT transportation planner. PDM 13 grant for NHMP update, HMP grant for seismic retrofitting of private residences, PDM 15 grant application for seismic retrofit of private residences. PBEM annually applies for and receives Emergency Management Performance Grants (EMPG), Urban Areas Security Initiative (UASI) grants, and others on a regular basis. *Note: PBEM did not receive the UASI grant in 2013.</i></p>			
<p>LT MH #10— Assess the stability of levees in the Columbia Corridor Area and develop appropriate emergency plans to address potential levee failure and associated hazards. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT MH #11— Support development of a multiple-agency plan for Marine Drive closure coordination. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<p>LT EQ #11— Work with local jurisdictions to assess the capacity of landfill to accommodate earthquake debris: develop coordination plans for disposal of debris in the aftermath of an earthquake. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>New MH #1— Cross reference and incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement and land use plans, to demonstrate multiple bureau benefits and strengthen eligibility from multiple funding sources. This action is also identified in LTFL#8, IS#94 & SW#117. (planning)</p>	✓		
<p><i>Comment: 2010 Natural Hazard Mitigation Plan components incorporated into Climate Action Plan and Comp. Plan update. PBEM regularly provides comments on citywide planning efforts and requests comments or participation from other bureaus on PBEM planning activities</i></p>			
<p>New MH #2— Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities and prioritize mitigation actions to protect the threatened population. (NFIP Compliance)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>New Reworded MH— Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas. (planning) (NFIP Compliance)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>New MH #3— Develop and incorporate building ordinances commensurate with building codes to reflect survivability from all hazards to ensure occupant safety. (NFIP Compliance)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>New MH #4— Update the Infrastructure Master Plan and System Vulnerability Assessment, Sewer Failure Response Plan. (asset management, planning)</p>	✓		
<p><i>Comment: The Infrastructure Master Plan was updated in 2014 and was renamed the "Citywide Systems Plan". The Sewer Failure Response Plan was updated in 2012 to comply with NPDES permit requirements, and named the Sewer Release Response Plan (SRRP).</i></p>			
<p>New MH #5— Partner with agencies to develop a west side operations center to be used during an emergency if the east side ECC and other City facilities become inoperable.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>New MH #6— Promote 09 Climate Action Plan action items with similarities to adaptation planning and mitigation actions. (planning)</p>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST EQ #2— Assess existing earthquake related mitigation plans and vulnerability studies to identify areas of conflict, duplication or gaps between studies & secondary hazards of earthquake. (planning)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST EQ #3— Update the vulnerability analysis of Columbia Boulevard Wastewater Treatment Plant (CBWTP0 Tryon Creek Wastewater Treatment Plant (TCWTP) and wastewater pump stations. (asset management, planning)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST EQ #4—Prioritize the return of power to treatment plants (Tryon Creek and Columbia Boulevard) and pump stations.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST EQ #8—Study the feasibility of mandatory or voluntary installation of seismic shutoff valves on natural gas meters at commercial and residential buildings.	✓		
<i>Comment: PBEM pursued this, but it did not come to fruition. Valves are expensive, and take time to turn back on after being shut off. It may be pursued at a state level. BPS and BDS have advocated for disclosure of seismic information upon sale of homes.</i>			
LT EQ #3—Develop a plan to strengthen sewer infrastructure in areas where street overlays and sewers have potential to collapse in a seismic event. (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT EQ #6—Assess the vulnerability of the water distribution system to seismic events: work toward hardening the system.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT EQ #8—Study development regulations and policies to ascertain if regulations can be made to limit development of high risk facilities in known areas of earthquake hazards.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
SW #2—Acquire an additional facility for storage of anti-icing materials and expand anti-icing vehicle inventory.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST SW #6—Insulate residential buildings that house at risk populations.	✓		

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<p><i>Comment: This action is being accomplished through different means. BPS created Clean Energy Works, Oregon which is now a non-profit organization that conducts energy audits and provides homeowners with low-cost energy efficient upgrades.</i></p>			
<p>ST SW #7—Prioritize existing building stock for active review of Title 29 (Dangerous Building Code) This needs to be updated with intern information or information sent from individuals that are on the team.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ST FL #1— A covenant is recorded with the deed of new development in the floodplain to ensure that space below the BFE is not converted to habitable space. This should be codified to improve compliance. (NFIP Compliance)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ST FL #2—Continue to co-fund improvements to river and stream gauges in the Portland metropolitan area with the United Geological Survey.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ST FL #4—Secure the agreements necessary to design and implement the redevelopment of Freeway Land Company site. (within the Lents Urban Renewal Area)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ST FL #5—Acquire outside funding to hire a consultant to lead the application process to maintain a Class 5 rating when the City seeks Community Rating System re-certification.</p>	✓		
<p><i>Comment: Recently completed reverification. Portland is likely to be a Class 6 Community follow an extremely rigorous reverification process. New, more robust guidelines in the 2013 CRS Coordinators' Manual made it impossible to retain Class 5 status.</i></p>			
<p>ST FL #6—Support Multnomah County Drainage District (MCDD) in the continued calibration and update of hydraulic models for conveyance and internal flood impacts to the four floodplains managed by MCDD #1.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ST FL #8—Identify funding for the design and construction of the Springwater Wetlands Complex, a 30-acre floodplain wetland restoration project in the Lents area of Johnson Creek.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ST FL #9—Secure funding to implement the passive flood management projects that are recommended in the Johnson Creek Restoration Plan & other watershed management plans. Coordinate with Portland Development Commission’s urban renewal efforts in Lents and with other partners in other parts of the watershed.</p>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST FL #10 —Improve definitions and refine standards for stormwater retention in the Storm water Management Manual.	✓		
<i>Comment: New Stormwater Management guidelines have just been released, with clarifying definitions and standards.</i>			
LT FL #1 —Increase funding for the Johnson Creek Willing Seller Program; establish willing seller programs in other watersheds where flood hazard and priority restoration areas coexist. (NFIP Compliance)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT FL #3 —Develop a plan for addressing flooding in the Holgate Lake area. (planning) (NFIP Compliance)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT FL #4 —Improve hydraulic bottleneck that prevents discharge of chlorinated effluent to the Willamette River during high river levels. (NFIP Compliance)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT FL #5 —As Waterfront Park remodeling is designed, ensure that Portland’s downtown property and critical facilities remain protected from floodwaters. (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT FL #6/#7 —Partner with Army Corps of Engineers to conduct modeling of the Willamette River upstream of Portland to identify areas that, if acquired or restored, would contribute to mitigate of peak flows in Portland or result in significant reduction of flood damages. (NFIP Compliance)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT FL #8 —Develop goals, policies and implementation measures to manage the amount of new impervious surface and remove existing impervious surfaces where appropriate. These goals, policies and measures may be at the citywide, watershed, or sub-watershed level. (planning) (NFIP Compliance)	✓		
<i>Comment: Draft Comprehensive Plan contains goals and policies, and updated CAP and new Climate Change Preparation Strategy include objectives and actions to limit and reduce impervious area. BES would lead implementation measures to actually remove pavement.</i>			
LT FL #9 —Upgrade trestles that carry the main conduits of the water delivery system. (Sandy River Crossing interties completed) (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
FL #10 —Create redundancy in the water delivery system at the three Sandy River crossings by burying conduits under the river (in progress).			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
<p>LT FL #11—Provide funding for and participate in development of a flood inundation model for the managed floodplains and downtown sea wall. (mapping) (NFIP Compliance)</p>			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
<p>LT FL #12—Install a river gauge in the vicinity of the bridge over Johnson Creek at 108th. The gauge should be able to send data to remote monitoring sites.</p>	✓		
<i>Comment: The bridge was removed as part of the Foster Floodplain Natural Area construction, which created an additional 120 acre feet of flood storage along SE Foster Rd. We have installed a crest gage however to determine flood levels during over-bank events.</i>			
<p>LT FL #13—Install one-way valves on the outlet pipes of the storm inlets on SE Foster Road between 101st and 112th.</p>	✓		
<i>Comment: These outlets now go to a stormwater facility that is part of FFNA.</i>			
<p>FL #1—Complete update to the Johnson Creek Restoration Plan. Develop individual plans for each subwatershed to address the sources of excess stormwater runoff that exacerbates flooding. (NFIP Compliance)</p>			✓
<i>Comment: This action was determined to be redundant with ST MH #11</i>			
<p>FL #2—Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100- year floodplain using survey elevation data. (NFIP Compliance)</p>			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
<p>ST-LS #1—Continue to maintain and Improve internal City communications to facilitate coordination of landslide mitigation activities. (education, outreach)</p>			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
<p>ST-LS #3—Mitigate Portland’s water supply infrastructure from landslide hazards. (asset management)</p>			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
<p>ST-LS #4—Initiate more operations and maintenance pilot projects along roads that inform about the development of standards for managing stormwater in ditches in landslide prone areas. (education, outreach)</p>			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
<p>LT-LS #1—Develop a comprehensive landslide map for the City of Portland to identify hazard areas and to improve communications with the public. (mapping)</p>			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<p>New LT LS #3—Evaluate the role of drainage systems in the West Hills, including pipes, streams and drainage ways and options for protecting and improving their functions and increasing their resiliency. (planning)</p>			✓
<p><i>Comment: This action was determined to be redundant with ST MH #11</i></p>			
<p>LT LS #4—Review the effectiveness of existing regulations related to development in landslide hazard areas. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT-LS #6—Employ alternative construction methods such as trenchless construction on City projects to reduce the impact that development can have in landslide prone areas</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>LT LS #7—Continue development of standards for small pump stations as an alternative to gravity sewers in accessible or high risk areas.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ER #1—Develop recommendations for high and low ranking streamside plants that provide more erosion control, such as reducing erosion from high water and wave actions.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ER #2—Implement projects that retain native vegetation, increase vegetation diversity and increase the complexity of the vegetation strata (having three vegetation strata: herbs, shrubs, trees).</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ER #3—Implement policies to increase the extent of coverage of the Greenway zones along the rivers and further limit proposed activities within these areas.</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ER #4—Develop standards for soil backfill in vegetated areas, especially sloped areas. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ER #5—Establish regulations that prevent installation of slopes steeper than 3:1 and prohibit development on slopes steeper than 3:1. (planning)</p>			
<p><i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i></p>			
<p>ER #6—Implement projects that layback and/or regrade riverbank slopes and secure wetland sod mats composed of native emergent/grasses, etc.</p>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ER #7 —Construct and install bio-engineered slope protective measures to reduce or eliminate erosion			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ER #8 —Implement projects that increase large wood structures that act to soften the effect of wave action on shorelines as well as provide habitat for migrating salmonids.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ER #9 —Secure large wood [boles w/ attached root wads] or log rafts to reduce high wave action that can result in erosion.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #1 —Consolidate unassigned and/or unmanaged vegetated areas owned by the City under a single land management umbrella. (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #2 —Procure funding for management of vegetated natural areas with high wildfire danger, including public and private properties.	✓		
<i>Comment: Parks does not seek funding from outside sources, but this is a typical management practice and is integral to Parks SOPs and management/planning documents.</i>			
ST WF #4 —Provide wildfire management training to staff. (education, outreach)	✓		
<i>Comment: Each year PF&R provides seasonal wildland training to all line personnel by reviewing and exercising procedures. In 2016, PF&R will conduct a spring Training Block that all line staff will complete, with basic state level hands-on wildland training.</i>			
ST WF #5 —Amend the Portland Plant List and other related City plant lists and landscaping guides to include/identify fire resistant native plants and planting strategies that could be encouraged or required in local landscaping. (planning)	✓		
<i>Comment: The Portland Plant List was updated to provide information about fire resistant native plants. Other landscaping and tree guides are maintained by BDS and PP&R.</i>			
ST WF #6 —Integrate, as appropriate, fire prevention goals and provisions into City policies, plans and codes. Identify and address ambiguities or conflicts among city requirements. (planning)	✓		
<i>Comment: The draft Comprehensive Plan includes policies and map changes to reduce future risks and impacts from natural hazards, including wildfire. The draft plan also includes new urban forest related policies that recognize the need to manage for wildfire.</i>			
ST WF #7 —Identify conditions of approval and mitigation strategies that could be applied to new development or redevelopment in high risk areas.			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #9—Improve the system for identifying new construction in areas subject to wildfires and communicating this information to the affected land owners. (planning)	✓		
<i>Comment: It is not clear what exactly this strategy means. It seems to imply a new mapping tool or interface. BTS upgraded the online mapping platform at PortlandMaps.com, which shows fire risk by parcel.</i>			
ST WF #10—Conduct systematic reviews of Portland’s large, publicly owned, wildland tracts regarding fire safety and ecological health to ensure informed land management decisions. (asset management)	✓		
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #11—Adopt the national “Fire Danger Rating System” and install the signs at key points in the City.			
<i>Comment: This is part of Parks' standard operating procedures and planning documents.</i>			
ST WF #12—Implement a neighborhood wildland interface disaster planning program. (education, outreach)	✓		
<i>Comment: “Ready, Set, Go!” was developed and managed by the International Association of Fire Chiefs. We adopted the program last year, and have information on our website and handouts for citizens to learn how to protect themselves.</i>			
ST WF #13—Review and potentially refine City contract specifications for machinery operations during “Red Flag” weather conditions. (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #14—Convene a standing wildland interface fire technical group. (planning)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #15—Index City wildfire mitigation plans and activities. (asset management)	✓		
<i>Comment: The 2011 Multnomah County CWPP indexes recommendations from the 2010 NHMP, the 2009 Wildfire Readiness Assessment Gap Analysis Report, and the Forested and the 2005 Wildland Interface Areas Protection Annex recommendations into one comprehensive list.</i>			
WF—Develop and implement protocol for defining and mapping Wildland Urban Interface Zones and develop recommended policies, regulations and landscape options for incorporation into City plans and programs. (planning)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
ST WF #16—Identify water grid engineering requirements for firefighting in wildfire areas. (asset management)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT WF #2—Review the feasibility of adopting portions of nationally recognized wildfire interface codes to strengthen building standards in wildfire risk areas.			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT WF #3—Design and conduct a study to determine the effectiveness of maintenance agreements that are established when new land divisions are approved to manage vegetation in open space tracts.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT WF #4—Complete an assessment to characterize high priority wildfire risk areas and recommend specific mitigation strategies.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
LT WF #5—Explore avenues for funding wildfire interface home construction upgrades to low income homeowners.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
WF—Act upon all Mitigation Actions outlined in the Wildfire GAP Analysis Report			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
IS #1—Update Invasive Species Plants List by consolidating nuisance and prohibited plant lists into one “Nuisance Plants List” and assigning priority ranks to the Nuisance Plants List.	✓		
<i>Comment: Completed in 2010</i>			
IS #2—Clarify zoning regulations to require removal of plants on the Nuisance Plants List in the Environmental, Greenway and Pleasant Valley Natural Resources Overlay Zones and the Columbia South Shore and Johnson Creek Basin Plan Districts.			✓
<i>Comment: There is no additional plan to require removal of all nuisance plants in the specific areas identified in the action.</i>			
IS #3—Initiate a process to ensure the Erosion Control Manual be made consistent with City goals to control and eradicate invasive plants. (planning)	✓		
<i>Comment: The Erosion Control Manual was updated in 2010. In this update, invasive species were called out as specifically prohibited.</i>			
IS #4—Initiate a process to ensure the Tree and Landscaping Manual, the Recommended Street Tree List and the Stormwater Management Manual be made consistent with City goals to control and eradicate invasive plants. (planning)			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
IS #5—Coordinate with the Portland Plan project to help ensure that invasive species are addressed in the Comprehensive Plan update and Portland Plan work plan. (planning)	✓		
<i>Comment: The draft Comprehensive Plan contains policies to manage and prevent the spread of invasive plants.</i>			
IS #6—Research the feasibility of establishing a local noxious or invasive weed law.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			

Action Item	Completed	Carry Over to Plan Update	Removed; No Longer Feasible
LT V #1—Work with the state and other impacted jurisdictions to implement and update the various volcano Inter-Agency Coordination Plans.			
<i>Comment: If removed or no longer feasible, please provide reason, if item is to be carried over, please insert new action number</i>			
V—Work with the state and other impacted jurisdictions to implement and update the various volcano Inter-Agency Coordination Plans.			✓
<i>Comment: This action was determined to be redundant with LT V #1</i>			

2016 NHMP ACTION PLAN TABLE

Table 3. 2016 NHMP Action Plan Table

Hazards Addressed	New or Existing Assets	Funding Options	Timeframe	Objectives Met	In Previous Plan? (# from previous plan)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			

Hazards Addressed	New or Existing Assets	Funding Options	Timeframe	Objectives Met	In Previous Plan? (# from previous plan)
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
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Action # —Description of Action					
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Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			

Hazards Addressed	New or Existing Assets	Funding Options	Timeframe	Objectives Met	In Previous Plan? (# from previous plan)
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
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Action # —Description of Action					
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Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)
Action # —Description of Action					
Lead Agency: Insert Lead Agency		Partner Agencies: Insert Partner Agencies			
Action Source: Insert Action Source		Performance Metric: Insert Performance Metric			
Insert Hazard(s)	New/Existing/Both	Staff Time/ CIP/FMA/Etc.	Insert Timeframe	###	Yes/No (Action No.)

2016 NHMP ACTION PLAN PRIORITIZATION

Table 4. 2016 NHMP Action Plan Prioritization

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is project Grant Eligible?	Can Project be Funded under Existing Programs/Budgets?	Implementation Priority (High, Med., Low)	Grant Pursuit Priority (High, Med., Low)
Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)
Please provide an <u>explanation</u> for any <u>actions noted with an E</u> . <i>Note: This will be used for tracking purposes only, and will not be included in the final plan document.</i>				Please identify groups and provide a brief explanation of why this action is marked with an E.				
Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)
Please provide an <u>explanation</u> for any <u>actions noted with an E</u> . <i>Note: This will be used for tracking purposes only, and will not be included in the final plan document.</i>				Please identify groups and provide a brief explanation of why this action is marked with an E.				
Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)
Please provide an <u>explanation</u> for any <u>actions noted with an E</u> . <i>Note: This will be used for tracking purposes only, and will not be included in the final plan document.</i>				Please identify groups and provide a brief explanation of why this action is marked with an E.				
Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)
Please provide an <u>explanation</u> for any <u>actions noted with an E</u> . <i>Note: This will be used for tracking purposes only, and will not be included in the final plan document.</i>				Please identify groups and provide a brief explanation of why this action is marked with an E.				
Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)
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Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)
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Action #	#	High/ Medium/ Low	High/ Medium/ Low	Yes/No	Yes/No	Yes/No	High/ Medium/ Low (-E)	High/ Medium/ Low (-E)

NOTES ON WHY STEERING COMMITTEE RECOMMENDATIONS WERE NOT SELECTED OR ARE NOT FEASIBLE

- Please insert information as appropriate – PLEASE BE SURE TO INCLUDE THE ACTION NUMBER

DRAFT

1. BUREAU MITIGATION BEST PRACTICES CATALOG

This document is a companion document to Portland_NHMP2016_BureauActionSelectionInstructions.docx. and Portland_NHMP2016_BureauActions.docx

BACKGROUND INFORMATION

Risk is defined as being a function of the:

- Hazard
- Exposure
- Vulnerability and
- Capability.

Risk can be reduced through mitigation by manipulating the hazard, reducing exposure to the hazard, reducing the vulnerability and/or increasing capability. And, where mitigation is not yet possible, the risk can be reduced through preparation, response or/and recovery.

Over the course of the 2016 NHMP planning process, the following catalogs were developed from best practices, steering committee recommendations and stakeholder input. These catalogs are not meant to be exhaustive, but to inspire thought. It is expected that the City of Portland, in collaboration with stakeholders, will take these ideas and concepts and look for specific ways to apply them for their own particular needs/situation. These actions should be refined to add additional specificity and clarity as needed.

You will notice that the City of Portland, its residents and its businesses are already engaged in many of these activities. In addition to identifying new actions, Bureaus may also want to select actions that continue existing plans and programs. In general in selecting actions, the City of Portland and its stakeholders should capitalize on strengths and look for opportunities to overcome obstacles and weaknesses.

STEERING COMMITTEE TOP-RATED ACTIONS AND CEI HUB REPORT RECOMMENDATIONS

The following actions were selected as top-rated actions by the steering committee and/or were recommendations developed from the Critical Energy Infrastructure (CEI) Hub report. We would like each Bureau to review these actions and strongly consider selecting them, as appropriate,

given each Bureau's authority and capabilities. *If you know a reason why a steering committee action is not feasible or was not selected, please provide an explanation at the end of the bureau action document.*

Hazard (source)	Refined Action	Total Votes
All Hazards (SC-1)	For each hazard of concern, develop a simple report card that identifies the risk in each category and the progress made on identified performance metrics. Include a sheet with "plain talk" language explaining any references to government reports and emergency codes. Include this information in the annual progress report. Share the results annually in several very public ways (e.g. press release, community group networks, posted on website). Develop a system to ensure that members of the public have received the information.	11
All Hazards (SC-3)	Fund disability community-based organization to build resiliency skills and capacity of people with disabilities to be engaged as a part of a resilient community response	5
All Hazards (SC-4)	Develop an inventory of critical facilities that includes those facilities critical to underserved populations and other community groups. Once developed, keep this inventory up to date.	5
All Hazards (SC-210)	Prior to and during implementation, review all actions for negative externalities and to ensure vulnerable populations are protected from displacement or other disproportionate burdens.	Note – not included in voting
Dam Failure (SC-5)	Collaborate with Multnomah County Drainage District to get flooding impact studies from levy failure and develop a risk assessment using the updated general building stock, critical facility and demographic information developed for the hazard mitigation plan.	4
Dam Failure (SC-8)	Continue to monitor risk from Mt. Tabor reservoirs. Re-evaluate the proposal to retain 85% capacity, and consider reflecting pools instead.	3
Dam Failure (SC-10)	Collaborate with Clackamas County to get dam inundation areas from upstream dams that might affect Portland and develop a risk assessment using the updated general building stock, critical facility and demographic information developed for the hazard mitigation plan.	2
Drought (SC-12)	Promote drought-resistant landscaping and planting that supports native fauna including pollinator insects and migratory birds.	5

Hazard (source)	Refined Action	Total Votes
Earthquake (SC-13)	Expand ATC-20 trainings and certifications to increase pool of damage assessment team members.	6
Earthquake (SC-14)	Lobby for increased funding for seismic retrofits and the creation of a statewide committee on CEI hub partial or complete relocation. (Office of Government Relations)	16
Earthquake (SC-16)	Ensure that every Bureau has inventoried critical assets and reviewed critical infrastructure vulnerability and has identified a 50-year plan to strengthen, retrofit, relocate or otherwise increase resiliency. Consider ways to promote city-wide collaboration and prioritization of resiliency efforts.	16
Earthquake (SC-18)	Collaborate with PSU to identify buildings (public and other institutions) that exceed life safety standards and are likely to be useable for government functions and other purposes after various earthquake events.	6
Earthquake (SC-23)	Appoint and fund a City of Portland Seismic Resiliency Officer	9
Earthquake (SC-24)	<p>Develop incentives and regulations that promote, encourage and/or require seismic retrofits of private property (such as multi-family, masonry structures).</p> <p>Potential partner: Home Depot</p>	16
Earthquake (SC-27)	<p>Perform an in depth risk assessment of the transportation network to develop and prioritize mitigation projects to ensure connectivity after an event.</p> <p>Potential partners: PBOT, TSA, Tri-Met and Boat owners/organizations</p>	16
Earthquake (SC-35)	Develop a program with a steady source of funding to provide grants for home retrofits. Devote a certain percentage of available funding to low income homeowners.	6
Earthquake (SC-40)	Encourage and expand personal, family and business preparedness plans and programs.	6
Earthquake (SC-42)	Retrofit the water conveyance system.	11

Hazard (source)	Refined Action	Total Votes
Earthquake (SC-49)	Increase taxes on businesses in high risk areas (Linnton) that are not working to reduce the risk to neighbors and the environment.	7
Earthquake (SC-50)	Appoint a CEI Hub Disaster Resiliency Workgroup to include citizens, business leaders that contribute to the high risk, elected officials and experts. White Paper Report to be made public and to include timelines and plans for change that goes into the “Report Card” and is managed, measured and reported annually.	6
Earthquake (SC-51)	Adopt higher standards for all buildings and reduce height limits.	7
Earthquake (SC-54)	Review alternatives to increase the resilience of the CEI hub and other energy infrastructure. Alternatives may include an update of zoning or building codes, relocation of tank farms out of vulnerable areas, seismic strengthening requirements etc.	12
Earthquake (SC-55)	Develop a study to evaluate how capped sediments behave in major earthquakes and whether there is the potential for toxic sediments below to be released. If such potential exists, promote full removal of sediments.	10
Earthquake (SC-62)	Require seismic upgrading of EOC, fire, police stations by XX date.	7
Earthquake (SC-64)	Incorporate the recommendations of the Unreinforced Masonry Work Group into the hazard mitigation plan. Ensure work group recommendations are screened using the equity review tool.	12
Earthquake (SC-66)	Require seismic upgrading of public and private soft first story buildings by XX date.	6
Earthquake (SC-67)	Review construction plans for all bridges to determine their susceptibility to collapse and retrofit problem bridges. Work with bridge owners to secure funding and prioritize retrofits/upgrades. Potential Partners: PBOT, ODOT, County	11
Earthquake (SC-71)	Require all new schools and other government buildings to meet OC IV so they can be used as an earthquake emergency shelter. Require strategic strengthening of portions of existing schools. Develop a prioritization strategy for these improvements using an equity assessment.	18

Hazard (source)	Refined Action	Total Votes
Earthquake (SC-79)	Identify ways to encourage, promote or require U.S. Resiliency Council Certification (e.g. tax incentives, minimum standards, requirement for new public buildings).	7
Flood (SC-81)	Make information available about floodplains (10, 25, 50 and 500) when applying for permits (BDS and BES partnership).	4
Flood (SC-85)	Develop and implement a flood emergency warning text alert system that sends notice to cell phones in identified flood evacuation areas.	4
Flood (SC-87)	Clarify rules and responsibilities within Bureaus during a flood and partner with all Portland Bureaus to identify nonessential staff that can be trained to become dispatch operators so that essential “boots on the ground” personnel can be free to perform recovery actions. (Strengthen cross-training programs)	6
Flood (SC-91)	Expand holistic stormwater management program requiring green infrastructure such as ecoroofs where needed to improve hydraulic system capacity.	12
Landslide (SC-95)	Identify transportation routes likely to be impacted by landslides and identify alternate routes. Communicate this information to the public. Lead Agencies: PBOT, BES and PBEM	7
Landslide (SC-99)	Update landslide chapter in 2017 when new DOGAMI data can be included.	3
Landslide (SC-100)	Provide notice to property owners and other residents, including renters and transient populations) of location in high landslide risk areas. Consider mandatory renter disclosure. Consider posting signage. Potential Partners: DOGAMI and PSU	3
Landslide (SC-102)	Encourage property owners and developers to actively manage hillsides and landslide hazard areas to reduce risk from landslides. Develop a brochure describing risk and potential mitigation techniques. Incorporate landslide risk into invasive species management plans.	7

Hazard (source)	Refined Action	Total Votes
	Lead Agencies: BDS and BES	
Landslide (SC-103)	Perform an assessment of drainage and erosion conditions in identified risk areas.	3
Landslide (SC-105)	Examine zoning and building codes and provide recommendations for increasing or decreasing permeable surfaces in landslide risk areas.	4
Landslide (SC-106)	Investigate the feasibility of expanding requirements for ecoroofs to include high landslide risk areas.	6
Landslide (SC-107)	Incorporate the retrofitting of existing infrastructure into the stormwater management plan.	3
Landslide (SC-112)	Adopt higher regulatory standards or rezone for new development within unstable slope areas.	5
Landslide (SC-123)	Consider adding a liability or risk clause to agreements with developers that develop in high risk areas and areas that would be impacted by landslides. Ensure that any actions are reviewed for equity considerations.	8
Severe Weather (SC-126)	<p>Improve public warning and information systems for severe weather events. Ensure that communication is easy to understand, gives clear direction, timely, is available in multiple languages and reaches all populations.</p> <p>Potential Partners: County, disabled population, families and organizations that serve them.</p>	7
Severe Weather (SC-127)	Coordinate and clarify pre- and post-severe weather event responsibilities within and among the Bureaus.	2
Severe Weather (SC-130)	Support redundant public transit systems that are reliable and prepared for severe weather.	2
Severe Weather (SC-134)	Overlay tree database with soils that area likely to saturate. Inform property owners/residents of risk and warning signs and provide information on possible mitigation measures.	3

Hazard (source)	Refined Action	Total Votes
Severe Weather (SC-137)	Identify ways to increase ice storm/snow response capabilities.	3
Severe Weather (SC-141)	Continue to fund and utilize the LENST text based warning system for severe weather notifications.	2
Severe Weather (SC-147)	<p>Partner with Multnomah County to develop a more robust sheltering plan. Develop an established protocol for partnering with schools that includes a reunification plan. Provide more public outreach and information on cooling and heating shelters and when they are open. Ensure plans and program meet the needs for all populations.</p> <p>Potential Partners: County, disabled population, families and organizations that serve them</p>	8
Space Weather (SC-151)	Continue to research best available science and data for space weather and potential impacts to the City of Portland.	2
Volcanic Hazards (SC-154)	Develop a partnership to use Wireless Emergency Alerts (WEA), Emergency Alert System (EAS) or Community Emergency Notification System (CENS) on volcano/ash fall alerts and awareness of evacuation procedures (PBEM and OEM)	1
Wildfire (SC-160)	Identify facilities with volatile/hazardous materials from high risk wildfire areas (e.g., hazardous chemicals that can spread the fire, cause additional serious health and environment concerns, trigger a chain reaction with other facilities due to the spread of the chemicals and/or the spreading fire resulting from the chemical release) and consider transfer, relocation or other mitigation efforts.	8
Wildfire (SC-161)	Identify invasive species that are fire hazards (e.g., scotch broom). Educate the public on these species and work to eradicate/greatly reduce them, especially in high risk areas	4
Wildfire (SC-163)	Require defensible spaces and water turrets around structures in wildfire risk areas.	6
Wildfire (SC-165)	Identify and publish a list of plants that are severe fire hazards.	3

Hazard (source)	Refined Action	Total Votes
Wildfire (SC-173)	Increase funding for Rangers outreach, surveys, patrols in general to let people know about smoking/campfire risk (especially in forest park)	6
Wildfire (SC-180)	Continue to research ways to balance the needs between fire safety flow requirements and water quality requirements.	3
Wildfire (SC-181)	Strengthen site and building design standards in wildfire risk areas.	6
Wildfire (SC-191)	Partner with the Forest Park Conservancy and individual land owners to develop a fire risk reduction plan for Forest Park.	3
Wildfire (SC-206)	Provide funding to better maintain fire access roads in Forest Park for response and evacuation needs as well as increased daily access for disabled/mobility challenged populations	4
All Hazards (CEI Hub-1)	CEI Hub Disaster Resiliency Workgroup – see report for more details	N/A
All Hazards (CEI Hub-2)	Update/enhance CEI Hub Risk Assessment – see report for more details	N/A
All Hazards (CEI Hub-3)	Regulatory Amendment – see report for more details	N/A
All Hazards (CEI Hub-4)	Emergency Response/Recovery Regulatory Waivers – see report for more details	N/A
All Hazards (CEI Hub-5)	Planning – see report for more details	N/A
All Hazards (CEI Hub-6)	Back-up power – see report for more details	N/A

Hazard (source)	Refined Action	Total Votes
All Hazards (CEI Hub-7)	Training and exercises – see report for more details	N/A
All Hazards (CEI Hub-8)	Facility retrofits– see report for more details	N/A
All Hazards (CEI Hub-9)	Land use repurposing – see report for more details	N/A

MITIGATION BEST PRACTICES AND PLANNING PROCESS RECOMMENDED ACTIONS

The following actions were developed from best practices and other stakeholder input.

The text is indicative of the source of the action:

- Regular text – general mitigation best practice
- *Italicized text* – identified through the steering committee planning process
- Underlined text – identified through public process planning for real meetings

All Hazards

Risk Reduction Measures	Manipulate Hazard	Hazard Category		
		Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	None	None	<ul style="list-style-type: none"> • Apply for permits as required and follow established building codes • Perform a vulnerability check on personal property 	<ul style="list-style-type: none"> • Educate yourself on risk reductions methods • Educate yourself on early warning procedures • Purchase insurance for your home and valuables • Volunteer on community mitigation projects. • Develop household mitigation plan, such as creating a retrofit savings account, communication

Risk Reduction Measures		<i>Hazard Category</i>		
		Manipulate Hazard	Reduce Exposure	Reduce Vulnerability
				<p>ALL HAZARDS</p> <p>capability with outside, 2 week self-sufficiency during an event</p> <ul style="list-style-type: none"> • Prepare a family post-disaster action plan • Get to know your neighbors • Participate in perishable data capture programs
Private (Business) Scale	None	None	<ul style="list-style-type: none"> • Establish/participate in a business-to-business mitigation mentoring program. • Perform a vulnerability check on property 	<ul style="list-style-type: none"> • Educate your employees on the probable impacts from hazard events • Develop a Continuity of Operations Plan • Participate in perishable data capture programs
Government Scale	None	<ul style="list-style-type: none"> • Relocate critical facilities out of known hazard areas • Prohibit or limit public expenditures for capital improvements in known hazard areas • Acquire safe sites for public facilities (e.g., schools, police/fire stations, etc.) • Prohibit new facilities for persons with special needs/mobility concerns in hazard areas. • Prohibit animal shelters in known hazard areas 	<ul style="list-style-type: none"> • Retrofit critical facilities within known hazard areas. • Organize a managed retreat from very high-risk areas. • Promote open space uses in identified high hazard areas via techniques such as: PUD's, easements, setbacks, greenways, sensitive area tracks • Acquire property in high hazard areas for use as open space • Offer expanded development rights to developers/businesses for performing mitigation retrofits • Incorporate mitigation retrofits for public facilities into the annual capital improvements program. • Installing quick-connect emergency generator hook-ups for critical facilities 	<ul style="list-style-type: none"> • Develop an all hazards public education campaign and resource center • Promote the purchase of insurance in known hazard areas • Designate high-risk zones as special assessment districts (to fund necessary hazard mitigation projects) • Incorporate a stand-alone element for hazard mitigation into the local comprehensive (land use) plan. • Develop a post-disaster reconstruction plan to facilitate decision making following a hazard event. • Involve citizens in comprehensive planning activities that identify and mitigate hazards • Adopt a post-disaster recovery ordinance based on a plan to regulate repair activity, generally depending on property location. • Adopt the International Building Code (IBC) and International Residential Code (IRC) • Increase the local Building Code Effectiveness Grading Schedule (BCEGS) classification through higher building code standards and enforcement practices.

Risk Reduction Measures		Hazard Category		
		Manipulate Hazard	Reduce Exposure	Reduce Vulnerability
			<ul style="list-style-type: none"> • Continue mitigation programs started by some bureaus (water/BES) and incorporate those programs into the hazard mitigation plan • Replicate mitigation best practices developed by some bureaus in bureaus that do not have a strategy for incorporating mitigation into standard operating procedures • Follow through with new/stronger Comprehensive Plan policies that set the stage for updating regulations and enhancing investments (implement these policies) • Continue to develop and institutionalize an asset management approach to budgeting and prioritizing infrastructure upgrades • Incorporate all hazard risk information into codes and policies and ensure that permits meet regulations for risk aversion and update as needed (especially environmental overlay zones) • Continue to support, incorporate and participate in projects that increase regional and local 	<ul style="list-style-type: none"> • Identify a funding mechanism for a local match to Federal funds that can fund private mitigation practices. • Identify and strengthen facilities so that they can function as public shelters • Provide hazard vulnerability checklists for homeowners to conduct their own inspections • Establish a technical assistance program for residents to access data or resources for mitigation purposes • Develop mutual aid agreements with other local governments/organizations • Warehouse critical infrastructure components such as pipe, power line, and road repair material • Develop a Continuity of Government Plan • Provide technical information and guidance during permitting and development process • Form a citizen plan implementation steering committee to monitor progress of local mitigation actions. Include a mix of representatives from neighborhoods, local businesses, and local government. • Continue to collect and update data on population, building stock, etc. and look for opportunities to capture and incorporate missing hazard-related data • Continue to utilize subject matter expertise (e.g. keep CFMs on staff, partner with Cascade Volcano Observatory) in order to inform residents, businesses and other city staff of hazard risk and mitigation opportunities and gaps • Continue to work on engaging the public in hazard mitigation. Capitalize on civic, city and neighborhood pride. Use this messaging in framing mitigation.

<i>Hazard Category</i>				
ALL HAZARDS				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
			<p><i>understanding of climate change and its impacts</i></p> <ul style="list-style-type: none"> • <i>Seek input from emergency responders on land use and development codes and regulation</i> • <i>Ensure that relocation programs are implemented equitably.</i> 	<ul style="list-style-type: none"> • <i>Continue to seek/develop unique funding opportunities for mitigation projects and to seek grant opportunities whenever they are available.</i> • <i>Partner with creative industries that excel at education and marketing ideas and concepts to the general public</i> • <i>Continue to retain and hire City staff that is competent and cares about mitigation</i> • <i>Establish a program to systematically review and update regulations that address hazard risk</i> • <i>Establish a process to coordinate/ partner with local, state and federal agencies to maintain up-to-date hazard data, maps, and assessments.</i> • <i>Continue to build on strong community engagement standards</i> • <i>Continue to develop and expand the NET program and engage NET volunteers</i> • <i>Integrate the hazard mitigation plan with existing plans and programs such as CRS, climate action plan, Comprehensive Plan etc.)</i> • <i>Develop a bureau-wide mitigation working group for greater collaboration and information sharing</i> • <i>Develop and implement successful, effective, institutionalized systems, especially for equitable mitigation</i> • <i>Continue to seek ways to meaningfully engage non-English speaking and other underserved populations</i> • <i>Seek ways to promote the mitigation of private property.</i> • <i>Incorporate mitigation priorities into goals/missions of applicable bureaus</i> • <i>Seek novel ways to influence traditional processes</i>

Risk Reduction Measures	<i>Hazard Category</i>			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
				<p>ALL HAZARDS</p> <ul style="list-style-type: none"> • <i>Maintain existing hazard databases and establish a program for collection of perishable data after hazard events</i> • <i>Seek opportunities to incorporate psychological preparedness and education into preparedness and mitigation related programs</i> • <i>Emphasize the need for endurance in post-disaster planning (e.g. more than 72 hours preparation)</i> • <i>Develop strategy to overcome risk from existing development patterns and seek opportunities to incentivize mitigation of private property</i> • <i>Utilize the natural features and resources of the planning area in planning for and mitigation from natural hazards</i> • <i>Focus on developing strategies that capture opportunities associated with the growing population and growth in the region</i> • <i>Perform an extensive literature and internal review of mitigation processes and practices that have provided beneficial results. Look to other communities such as LA, New Zealand, Japan.</i> • <i>Develop a bumper stick that says “keep” Portland Prepared</i> • <i>Ensure each action is measureable, tracked and shared publicly</i> • <i>Utilize informed, local media to increase publicity about mitigation</i> • <i>Engage local celebrities in sharing the mitigation message (Portlandia's Fred Arnison and Carrie Brownstein, actors from Grimm, the Blazers, the Timbers!)</i> • <i>Establish equitable criteria for action development and prioritization of actions.</i> • <i>Give the City the “right of refusal” after a major event</i>

<i>Hazard Category</i>				
ALL HAZARDS				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
				<ul style="list-style-type: none"> • <i>Develop games/fun activities about preparing ahead and surviving a disasters</i> • <i>Develop a recovery plan for the City of Portland.</i> • <i>Develop one “elevator speech” item per bureau. One action item that cannot be accomplished without additional resources</i> • <i>Ensure all actions have an estimated timeframe for completion that is reviewed and updated during the progress reporting process</i> • <i>Institute a climate change education program for the public that discusses how climate change will impact risk and vulnerability to hazard events</i> • <i>Work with CIRC to educate bureaus and create standard assumptions and models, internal consistency in application of data</i> • <i>Develop a phone tree with local community organizations, such as IRCO.</i> • <i>Identify a list of pre-approved MWSEB contractors for response/recovery efforts</i> • <i>Align budgeting cycle with hazard mitigation priorities – when new funding is requested, require review of NHMP priorities</i> • <i>Provide authority for use of the Resilience Bond Model</i> • <i>Build resiliency of city/county information to bounce back/respond to increased customer service demands such as staffing and increased call/email volume.</i> • <i>Fund vulnerable immigrant/refugee organizations</i> • <i>Incorporation of making all action items accessible for safe harbor languages and disability community.</i> • <i>Search and rescue specific for disability community.</i> • <i>Shelter program specifically meeting needs of disability</i>

<i>Hazard Category</i>				
ALL HAZARDS				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
				<ul style="list-style-type: none"> • <i>Convene a working group to provide recommendations on a city-wide requirement for full disclosure of known natural hazard risk at time of property sale or transfer. Ensure the committee reviews and provides recommendations on unintended consequences such as lowering of property values in high risk areas and displacement of low income residents to these areas.</i> • <i>Provide notice to property owners and residents in identified dam inundation areas.</i> • <i>Develop an earthquake scenario and perform a risk assessment that assumes dam failure as a secondary hazard.</i>

Dam Failure

Risk Reduction Measures	Hazard Category			
	DAM FAILURE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	None	<ul style="list-style-type: none"> Relocate out of Dam Failure Inundation areas. 	<ul style="list-style-type: none"> Elevate your home to appropriate levels Flood-proof your home to appropriate levels 	<ul style="list-style-type: none"> Learn the evacuation routes for a dam failure event Educate yourself on early warning procedures. Purchase flood insurance
Private (Business) Scale	<ul style="list-style-type: none"> Remove privately owned Dams Strengthen privately owned Dams 	<ul style="list-style-type: none"> Replace earthen dams with hardened structures 	<ul style="list-style-type: none"> Flood proof facilities within Dam Failure Inundation areas Continue/ensure regularly scheduled engineering assessments of privately owned dams 	<ul style="list-style-type: none"> Develop and update Emergency Action Plans Educate employees on dam failure evacuation routes Educate employees on early warning procedures
Government Scale	<ul style="list-style-type: none"> Remove government owned Dams Strengthen government owned Dams 	<ul style="list-style-type: none"> Replace earthen dams with hardened structures 	<ul style="list-style-type: none"> Adopt higher regulatory floodplain standards in mapped Dam Failure/Inundation areas. Consider low density land uses within identified Dam Failure/Inundation areas. Continue/ensure regularly scheduled engineering assessments Create easements in impoundment and downstream inundation areas Study and evaluate impacts from climate change on dam operations 	<ul style="list-style-type: none"> Enhance Emergency Operations Plan to include a dam failure component. Institute monthly communications checks with dam operators. Maintain up to date communications list. Inform the public on risk reduction techniques and develop a communication plan Adopt real-estate disclosure requirements for the re-sale of property located within Dam Inundation areas. Establish early warning systems downstream of high hazard dams. Update evacuation routes and educate the public on those routes Promote the purchase of flood insurance in inundation areas <i>Update scenario based Dam Failure/Inundation area maps.</i> <i>Develop an earthquake scenario and perform a risk assessment that assumes dam failure as a secondary hazard.</i> <i>Provide notice to property owners and residents in identified dam inundation areas.</i>

Drought

Risk Reduction Measures	Hazard Category			
	DROUGHT			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	None	<ul style="list-style-type: none"> Install stored water/captured water techniques, such as rain barrels or down spout gardens Use permeable paving techniques whenever feasible 	<ul style="list-style-type: none"> Plant drought resistant landscapes Reduce water system losses (e.g. fix drips) Modify plumbing systems, i.e. water saving kits or grey water systems 	<ul style="list-style-type: none"> Practice active water conservation techniques
Private (Business) Scale	None	<ul style="list-style-type: none"> Install stored water/captured water techniques, such as rain barrels or down spout gardens Use permeable paving techniques whenever feasible. 	<ul style="list-style-type: none"> Plant drought resistant landscapes Reduce private water system losses Identify alternate water supply sources Plant drought-resistant crop varieties Develop and implement grey water systems 	<ul style="list-style-type: none"> Practice active water conservation techniques Develop a water conservation plan
Govt Scale	<ul style="list-style-type: none"> Promote groundwater recharge through stormwater management Implement cloud seeding techniques during dry season. 	<ul style="list-style-type: none"> Identify and create ground water back up sources Create/identify new impounded water supply points Use permeable paving techniques whenever feasible 	<ul style="list-style-type: none"> Plant drought resistant landscapes on community owned facilities Distribute water saving kits to community members Implement storm water retention in regions ideally suited for groundwater recharges Reduce water system losses through regular maintenance Design water delivery systems to accommodate drought events <i>Integrate water conservation and green infrastructure into all applicable regulations/programs</i> 	<ul style="list-style-type: none"> Identify alternative water supplies for time of drought Develop a drought contingency plan Develop criteria triggers for drought related actions Improve accuracy of water supply forecasts Modify rate structures to influence active water conservation techniques Consider providing incentives to property owners that utilize drought resistant landscapes in the design of their home Develop/Implement drought education/notification systems and communication plan Emphasize droughts relationship to other hazards in hazard awareness messaging Increase capability to enforce water restrictions when such restrictions are in place. <i>Update/establish requirements on impervious surfaces</i>

Risk Reduction Measures	<i>Hazard Category</i>			
	DROUGHT			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
				<ul style="list-style-type: none"> Expand green stormwater infrastructure program and integrate water conservation into messaging – partner with Willamette Week Hydro Hogs lists to increase awareness.

Earthquake

Risk Reduction Measures	Hazard Category			
	EARTHQUAKE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual Scale)	None	<ul style="list-style-type: none"> Locate outside of hazard area (off soft soils and other seismically induced ground failure areas) <i>Remove buildings and do not build new buildings within 100 yards of an active fault (slip rate > 2 mm a year).</i> 	<ul style="list-style-type: none"> Retrofit structure (e.g. anchor house structure to foundation) Secure household items that can cause injury or damage such as water heaters, bookcases, and other appliances Build to higher design standards <i>Install automatic earthquake gas shutoffs</i> 	<ul style="list-style-type: none"> Practice "drop, cover and hold" Participate in drills such as the Great Shakeout Purchase earthquake insurance
Private (Business Scale)	None	<ul style="list-style-type: none"> Locate/relocate mission critical functions outside hazard area where possible (off soft soils and other seismically induced ground failure areas) <i>Remove buildings and do not build new buildings within 100 yards of an active fault (slip rate > 2 mm a year).</i> <i>Do not build critical facilities (Occupancy Class III and IV) on soft soil sites (SE and SF sites).</i> <i>Do not build critical facilities (Occupancy Class III and IV) on sites with potential for seismic induced ground failure</i> 	<ul style="list-style-type: none"> Build redundancy for critical functions/facilities Retrofit critical buildings/areas housing mission critical functions Perform non-structural assessments and mitigation activities (e.g. anchor bookcases to the wall) Anchor rooftop-mounted equipment (i.e., HVAC units, satellite dishes, etc.). <i>Install automatic earthquake gas shutoffs</i> <i>Retrofit older office buildings to at least life-safety standards</i> <i>Perform non-structural assessments of building contents</i> <i>Pursue other non-structural mitigation including ceilings, troffer light fixtures, partition bracing, elevator rails, brick veneer, hollow clay tile around stairwells, etc.</i> 	<ul style="list-style-type: none"> Adopt higher standard for new construction -- Consider "performance based design" when building new structures Increase capability by having cash reserves for reconstruction Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility Participate in drills such as the Great Shakeout <i>Purchase earthquake insurance</i>

Risk Reduction Measures	Hazard Category			
	EARTHQUAKE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
		<i>(lateral spreading, liquefaction, landslide).</i>		
\Government Scale	None	<ul style="list-style-type: none"> Locate critical facilities or functions outside of hazard area where possible (off soft soils and other seismically induced ground failure areas) <i>Remove buildings and do not build new buildings within 100 yards of an active fault (slip rate > 2 mm a year).</i> <i>Do not build critical facilities (Occupancy Class III and IV) on soft soil sites (SE and SF sites) or on sites with potential for seismic induced ground failure (lateral spreading, liquefaction, landslide).</i> 	<ul style="list-style-type: none"> Harden infrastructure Provide redundancy for critical functions Encourage mitigation of private property Perform non-structural assessments and mitigation activities (e.g. anchor bookcases to the wall) Require bracing of generators, elevators, and other vital equipment in hospitals. Use flexible piping (earthquake resistant) when extending water, sewer, or natural gas service. Install shutoff valves and emergency connector hoses where water mains cross fault lines. Anchor rooftop-mounted equipment (i.e., HVAC units, satellite dishes, etc.). Include retrofitting/replacement of critical system elements in Capital Improvements Plan (CIP) <i>Review construction plans for all bridges to determine their susceptibility to collapse and retrofit problem bridges. Work with bridge owners to secure funding and prioritize retrofits/upgrades.</i> <i>Ensure that best available data and science is used in the siting and development of City buildings.</i> <i>Require all newly built City buildings to exceed life safety standards.</i> 	<ul style="list-style-type: none"> Produce more accurate hazard maps (e.g. liquefaction and soils maps) Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities (e.g. older structures, unreinforced masonry) Develop a debris management plan Participate in drills such as the Great Shakeout Communicate earthquake secondary hazards to public (e.g. landslides, dam failure, fires, hazardous material spills) Assess emergency response routes and determine back-up options in case of damage or disruption Educate K-12, residents, developers and businesses on earthquake safety and building codes. Require/encourage rapid damage assessment training for City staff Develop and distribute guidelines or pass ordinances that require developers and building owners to locate lifelines, buildings, critical facilities, and hazardous materials out of areas subject to significant seismic hazards. Support financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures. Use Hazus to quantitatively estimate potential losses from an earthquake Establish a school survey procedure and guidance document to inventory structural and

Risk Reduction Measures	Hazard Category			
	EARTHQUAKE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
			<ul style="list-style-type: none"> • <i>Incentivize or require retrofitting of infrastructure in the CEI hub until complete or partial relocation can be obtained.</i> • <i>Partner with identified high potential loss facilities to encourage individual assessments of seismic risk. Identify and share risk with nearby residential communities.</i> • <i>Update residential building code so that it includes higher seismic standards for new or substantially improved buildings.</i> • <i>Perform non-structural assessments of building contents. Pursue other non-structural mitigation including ceilings, troffer light fixtures, partition bracing, elevator rails, brick veneer, hollow clay tile around stairwells, etc.</i> • <i>Develop a non-structural, technical assistance information program and tool kit.</i> • <i>Support financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures.</i> • <i>Install automatic earthquake gas shutoffs in public buildings and require automatic shutoffs in public buildings.</i> • <i>Retrofit older office buildings to at least life-safety standards</i> • <i>Require seismic upgrading of hospitals including phased nonstructural mitigation by XX date.</i> • <i>Require seismic upgrading of school buildings by XX date.</i> 	<p>non-structural hazards in and around school buildings</p> <ul style="list-style-type: none"> • <i>Use rapid visual screening to quickly inspect a building and identify disaster damage or potential seismic structural and non-structural weaknesses to prioritize retrofit efforts, inventory high-risk structures and critical facilities, or assess post-disaster risk to determine if buildings are safe to re-occupy</i> • <i>Develop a technical assistance information program for homeowners.</i> • <i>Create a seismic safety committee to provide policy recommendations, evaluate and recommend changes in seismic safety standards, and give an annual assessment of local and statewide implementation of seismic safety improvements</i> • <i>Develop an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage.</i> • <i>Research, develop and implement innovative approaches to implement the recent fossil fuel legislation using established jurisdictional authority (e.g. zoning)</i> • <i>Incorporate the updated liquefaction, lateral spreading and landslide data developed by the Portland Water Bureau into BDS development and design standards.</i> • <i>Develop and maintain a rapid damage assessment program that creates a tiered system of certification so that there can be two trained but uncertified assistants for each certified staff member.</i> • <i>Expand the BDS tie down training program and include information/training on other retrofit activities.</i> • <i>Develop and implement a plan for a system of fuel hubs and stockpiles. Involve public and</i>

Risk Reduction Measures	Hazard Category			
	EARTHQUAKE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
			<ul style="list-style-type: none"> Require seismic upgrading of public and private non-ductile concrete buildings by XX date. Seismically retrofit housing bureau buildings on the Unreinforced Masonry (URM) list or constructed prior to 1994 Update residential building code so that it includes higher seismic standards for new or substantially improved buildings. Initiate triggers guiding improvements such as: < 50% substantial damage/improvements or passive trigger programs for mandatory seismic strengthening Require higher standards for new construction of Occupancy Category II (and certain I?) buildings. Perform a sediment seismic stability analysis for Hayden Island and develop appropriate mitigation items 	<p>private stakeholders that provide essential services in this planning process.</p> <ul style="list-style-type: none"> Research and develop a plan to ensure adequate sanitation if sewer systems are knocked offline by an event. Develop a post-event communication plan. Develop a post-disaster recovery plan based on a seismic event. Develop method for communities to report mitigation priorities directly to the city. Ensure that response plans have identified adequate food resources. Partner with food producers and distributors to develop memorandums of understanding and/or responsibilities. Develop a phased sheltering plan. Provide resources for businesses to help them identify ways to mitigate for natural hazards. Assess opportunities for “alternative” evacuation routes, e.g. foot and bicycle paths, helicopter pads Identify post-earthquake evacuation routes and prioritize retrofitting of structures along those routes. Develop a response plan for fire boats. Explore utilizing the waterways as a post event transportation system. Assess potential fire risks from Cascadia quake if it were to happen during dry months. Establish a basic needs check-list for all households and survey residents to determine the percent of households with sufficient supplies. Adopt the mitigation plan and seek pledges from elected officials to implement and provide funding for identified actions.

Risk Reduction Measures	<i>Hazard Category</i>			
	EARTHQUAKE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
				<ul style="list-style-type: none"> • <i>Develop an instructional video for non-structural mitigation.</i> • <i>Explore capability to have portable temporary bridge to cross Willamette.</i> • <i>Perform geotechnical assessment of subsurface</i> • <i>Capitalize on recent publicity regarding earthquake risk in the PNW</i> • <i>Determine a practical method to track buildings that are brought up to current seismic codes due to retrofit or permit requirement</i> • <i>Institute legislation that allows for rent controls after a certain percentage of housing stock is lost (e.g. post disaster)</i> • <i>Appoint an earthquake administrator – similar to a flood administrator</i> • <i>Institute bridge tolls to fund seismic retrofits</i>

Flood

<i>Hazard Category</i>				
FLOOD				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	<ul style="list-style-type: none"> Clear stormwater drains and culverts 	<ul style="list-style-type: none"> Locate outside of hazard area Elevate utilities above Base Flood Elevation (BFE) Institute low impact development techniques on property 	<ul style="list-style-type: none"> Retrofit structure (elevate house above BFE) Elevate items within house above BFE Build new homes above BFE Floodproof non-residential structures 	<ul style="list-style-type: none"> Comply with National Flood Insurance Program (NFIP) Purchase flood insurance
Private (Business) Scale	<ul style="list-style-type: none"> Clear stormwater drains and culverts 	<ul style="list-style-type: none"> Locate business critical facilities or functions outside hazard area Institute low impact development techniques on property 	<ul style="list-style-type: none"> Build redundancy for critical functions/ retrofit critical buildings Provide flood-proofing measures when new critical infrastructure must be located in floodplains 	<ul style="list-style-type: none"> Increase capability by having cash reserves for reconstruction Support and implement hazard disclosure for the sale/re-sale of property in identified risk zones Solicit 'cost-sharing" through partnerships with public sector stakeholders on projects with multiple benefits
Government Scale	<ul style="list-style-type: none"> Develop an adopt a "stormdrain" program Dredge, construct levees, provide retention areas Invest in structural flood control: levees, dams, channelization, revetments Construct regional stormwater control facilities 	<ul style="list-style-type: none"> Acquire or relocate identified repetitive loss properties Adopt land development techniques such as density transfers or clustering Institute low impact development techniques on property Adopt sediment and erosion control regulations Adopt zoning and erosion overlay districts 	<ul style="list-style-type: none"> Adopt appropriate regulatory standards such as cumulative substantial improvement/damage, freeboard, lower substantial damage threshold, compensatory storage Develop and implement stormwater management regulations and master planning Adopt "no-adverse impact" floodplain management policies that strive to not increase the flood risk on down-stream communities Perform regular inspections/assessments of locally owned or maintained flood control infrastructure Replace undersized culverts Provide permanent protection for pump stations at risk of flooding 	<ul style="list-style-type: none"> Join Community Rating System (CRS) program or maintain/improve class Provide training for staff and decision-makers in floodplain management (e.g. maintain certified floodplain managers on staff) Create a building and elevation inventory of structures in the floodplain Develop a Flood Task Force Prestage flood response equipment before events Integrate floodplain management policies into other planning mechanisms within the planning area Develop framework/continue efforts for cooperation between agencies/districts in flood mitigation activities (e.g. sand and sand bag deployment)

Hazard Category				
FLOOD				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
	<ul style="list-style-type: none"> • Harden areas with significant erosion concerns • Promote/retain natural vegetation in areas with significant erosion concerns 	<ul style="list-style-type: none"> • Prohibit any fill in floodplain areas • Encourage the use of porous pavement, vegetative buffers, and islands in large parking areas. • Use stream restoration to ensure adequate drainage and diversion of stormwater. • <i>Relocate (through willing seller) existing development in floodplain</i> 	<ul style="list-style-type: none"> • Identify/mitigate drainage issues resulting in ponding • Enhance road drainage programs or elevate/relocate roads subject to frequent flooding • Ensure permitting process is consistent with the adopted floodplain management ordinance • Develop an erosion protection program for high hazard areas • Construct open foundation systems on buildings to minimize scour • Construct deep foundations in erosion hazard areas • Establish a green infrastructure program • Use subdivision design standards to require elevation data collection during platting and to have buildable space on lots above the base flood elevation • Require tie downs of propane tanks • Require a drainage study with new development • Design a “natural runoff” or “zero discharge” policy for stormwater in subdivision design • Require and maintaining FEMA elevation certificates for all new and improved buildings located in floodplains • Extend the freeboard requirement past the mapped floodplain to include an equivalent land elevation • Include requirements in the local floodplain ordinance for homeowners to sign non-conversion agreements for areas below base flood elevation. 	<ul style="list-style-type: none"> • Retain good standing in National Flood Insurance Program • Participate in information sharing with other agencies (e.g. USACE, NWS) • Identify and mitigate sources of nuisance flooding • Review and update floodplain damage prevention ordinances • Identify debris collection sites • Require/encourage rapid damage assessment training for staff • Map locations of storm drains, catch basins and dry wells so that they may be located and cleared • Identify and map erosion hazard areas • Develop a tracking program for erosion hazards and their impacts on the community • Pass and enforce an ordinance that regulates dumping in streams and ditches • Develop a stormwater committee • Form a regional watershed council • Incorporate digital floodplain and topographic data into GIS systems, in conjunction with Hazus, to assess risk • Conduct NFIP community workshops to provide information and incentives for property owners to acquire flood insurance. • Increase drainage or absorption capacities with detention and retention basins, relief drains, spillways, drain widening/dredging or rerouting, logjam and debris removal, extra culverts, bridge modification, dike setbacks,

<i>Hazard Category</i>				
FLOOD				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
			<ul style="list-style-type: none"> • Offer incentives for building above the required freeboard minimum (code plus). • Inspect bridges and identify if any repairs or retrofits are needed to prevent scour • Floodproof critical facilities and infrastructure located in flood hazard areas • Require all critical facilities to meet requirements of Executive Order 11988 and be built 1 foot above the 500-year flood elevation • <i>Continue to improve and expand floodplain development regulations to meet higher standards</i> • <i>Develop maps that include information on climate change risk</i> • <i>Designate flood storage/conveyance areas</i> • <i>Expand the willing-seller program to a city-wide program</i> • <i>Consider implementing/providing information on flood-resilient building design (allowing and designing for first floors to flood)</i> • <i>Promote and provide publicly accessible information on landscaping techniques that reduce water run-off.</i> • <i>Continue to develop and implement a public education campaign regarding low impact development. Reach out to community leaders and faith based organizations (possibly as pilot projects, signage about projects etc.)</i> • <i>Continue to improve and publicize the stormwater retention program.</i> 	<p>flood gates and pumps, or channel redirection</p> <ul style="list-style-type: none"> • <i>Produce more accurate flood hazard maps or identify areas for further study. Incorporate updated information from FEMA when available.</i> • <i>Convert hard copy first finished floor elevations for structures located in the floodplain into a digital database</i> • <i>Identify potential risk from flooding/channel migration downstream on Johnson Creek toward city boundary</i> • <i>Review and revise current approach to fill relocation projects to include an area specific “mitigation bank” so that the area is expanded beyond the tax lot (BDS and BES partnership)</i> • <i>Develop a system to communicate safe areas for traffic during a flood, and set up easy systems for citizens to report areas of standing water and dangerous roads (BES, PBEM and PBOT partnership)</i> • <i>Develop standard operating procedures that increase communication between PBOT and other agencies to report on flooded road status.</i> • <i>Develop a system to warn underground garages when a flood event is likely so that cars can be moved. Work with owners and operators to identify flood proofing strategies to reduce contaminated runoff from flooded garages.</i> • <i>Implement flood training exercises for pertinent Bureaus. Include exercises for</i>

<i>Hazard Category</i>				
FLOOD				
Risk Reduction Measures	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
			<ul style="list-style-type: none"> • <i>Improve effectiveness of development restrictions in the floodplain</i> • <i>Fix Foster Rd flooding problem</i> 	<p><i>high frequency, low impact events, such as the 10 year flood.</i></p> <ul style="list-style-type: none"> • <i>Enhance the flood risk assessment by incorporating waterfront planning exercises and climate change models (BES and BPS)</i> • <i>Reevaluate the willing seller program using an equity lens. Ensure that the program benefits both homeowners and renters.</i>

Landslide

Risk Reduction Measures	Hazard Category			
	LANDSLIDE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	<ul style="list-style-type: none"> Stabilize slope (de-water, armor toe) Reduce weight on top of slope Minimize vegetation removal and the addition Install rip rap boulders of geotextile fabric Using bioengineered bank stabilization techniques. Use a rock splash pad to direct run off and minimize the potential for erosion 	<ul style="list-style-type: none"> Locate structures outside of hazard area (off unstable land and away from slide-run out area) 	<ul style="list-style-type: none"> Retrofit homes on steep slopes 	<ul style="list-style-type: none"> Sign up for warning systems Learn the warning signs that indicate a landslide may occur Educate yourself on risk reduction techniques for landslide hazards
Private (Business) Scale	<ul style="list-style-type: none"> Stabilize slope (de-water, armor toe) Reduce weight on top of slope Minimize vegetation removal and the addition of impervious surfaces Using bioengineered bank stabilization techniques. Use a rock splash pad to direct run off and minimize the potential fort erosion 	<ul style="list-style-type: none"> Locate structures outside of hazard area (off unstable land and away from slide-run out area) 	<ul style="list-style-type: none"> Retrofit at risk facilities 	<ul style="list-style-type: none"> Sign up for warning system and develop evacuation plan Increase capability by having cash reserves for reconstruction Educate your employees on the potential exposure to landslide hazards and your emergency response protocol
Government Scale	<ul style="list-style-type: none"> Monitor/review accumulated effects from piecemeal development on steep slopes Implement post-fire vegetation management plans Coordinate with resource management agencies to identify potential issues from resource extraction activities 	<ul style="list-style-type: none"> Acquire properties located in high risk landslide areas Adopt land use policies that prohibit the placement of habitable structures in high risk landslide areas Adopt land use policies that limit accumulated effects in landslide risk areas 	<ul style="list-style-type: none"> Adopt higher regulatory standards for new development within unstable slope areas Armor/retrofit critical infrastructure from the impact of landslides Post signage in landslide hazard areas Prohibit removal of natural vegetation from slopes 	<ul style="list-style-type: none"> Produce landslide hazard risk maps Enact tools to help manage development in hazard areas: better land controls, tax incentives, information, limit new impervious/pervious surfaces Collect and compile landslide event history database Develop plan/strategy for communicating risk to property owners/communities recently affected by wildfires

Risk Reduction Measures	Hazard Category			
	LANDSLIDE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
<ul style="list-style-type: none"> Using bioengineered bank stabilization techniques. Use a rock splash pad to direct run off and minimize the potential for erosion 			<ul style="list-style-type: none"> Assess vegetation in wildfire-prone areas to prevent landslides after fires (e.g., encourage plants with strong root systems). <i>Prohibit onsite infiltration of collected stormwater (offsite drainage) in landslide hazard areas</i> <i>Require geotechnical study for building/grading in landslide hazard area</i> <i>Incorporate landslide risk areas in comprehensive plan and increase regulations for risk reduction (see above)</i> <i>Evaluate disconnect downspouts program/stormwater disconnect program. Do not promote in landslide areas.</i> <i>Develop new stormwater systems to redirect drainage away from landslide hazard.</i> <i>Utilize landslide data in maintenance plans – roads, utilities, etc., For example, you can build a trench as a drain if used correctly – add as a standard evaluation.</i> <i>Revisit density, vegetation, stormwater control in zoning.</i> <i>Establish post-landslide disaster protocol.</i> 	<ul style="list-style-type: none"> Increase regulatory authority for post-fire mitigation enforcement Establish and communicate post-event repair responsibilities (e.g. roads that are impacted) Conduct geological/engineering studies of potential slide areas Notify property owners in high-risk areas Develop a brochure describing risk and potential mitigation techniques <i>Perform geotechnical assessment of subsurface</i> <i>Update/establish requirements on impervious surfaces</i> <i>Re-run HAZUS with new landslide areas (after DOGAMI study is completed)</i> <i>Appoint a landslide administrator – similar to a flood administrator</i> <i>Update landslide chapter in 2017 when new DOGAMI data can be included</i> <i>Correlate historical data on rainfall and landslide events to develop landslide warning thresholds.</i> <i>Develop an evacuation plan for the Linnton neighborhood that takes landslide risk into consideration.</i> <i>Explore the feasibility of providing a disaster response facility (not sure if this means police/fire) in Linnton.</i> <i>Explore the development of post-slide ordinances that regulate redevelopment.</i> <i>Strengthen land use regulations on landslide risk areas.</i>

Risk Reduction Measures	Hazard Category			
	LANDSLIDE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
			<p><i>Geoengineers on retainer for immediate assessment/safety evaluation. Determine level of hazard – 1, 2, 3? Is it time to evacuate?</i></p> <ul style="list-style-type: none"> • <i>Develop regulations regarding building and excavation in landslide hazard areas.</i> • <i>Create acquisition program for land/property in high risk areas</i> 	<ul style="list-style-type: none"> • <i>Charge an additional permitting fee for construction in high risk areas and set aside these monies for an acquisition program.</i> • <i>Expand the landslide related policies in the St. Johns neighborhood to be applicable city-wide.</i> • <i>Compile and update a landslide event history database.</i> • <i>Partner with DOGAMI to ensure city regulations have incorporated the best available data and science.</i> • <i>Perform an in-depth social vulnerability analysis of landslide risk.</i> • <i>Develop and implement a public outreach campaign that educates property owners about landslide risk and possible mitigation measures.</i> • <i>Modify the City Storm Water Manual to include specific guidance based on localized risks (e.g. reporting districts).</i> • <i>Assess fees or taxes for new development in known high-risk areas to offset costs of additional safety and response-oriented infrastructure.</i> • <i>Develop a landslide risk resource center.</i> • <i>Require landslide risk and history in property disclosure forms, transfer of deeds, and renters agreements</i> • <i>Seek funding to assist homeowners in mitigating risk from landslides. Develop quantitative risk ranking system to prioritize projects and report progress.</i>

Risk Reduction Measures	<i>Hazard Category</i>			
	LANDSLIDE			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
				<ul style="list-style-type: none"> • <i>Implement tax breaks for land owners that implement mitigation strategies in areas at risk for landslides.</i> • <i>Send a letter to each property owner identified on the water hog list to fix leaky water systems.</i>

Severe Weather

Risk Reduction Measures	Hazard Category			
	SEVERE STORM/WEATHER			
	Manipulate Hazard	Exposure	Vulnerability	Capability
Public (Individual) Scale	<ul style="list-style-type: none"> Increase tree plantings around buildings to shade parking lots and along public rights-of-way 	None	<ul style="list-style-type: none"> Insulate house Provide redundant heat and power Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program) Incorporate passive ventilation in the site design. Secure loose items (i.e., patio furniture) 	<ul style="list-style-type: none"> Trim or remove trees that could affect power lines Obtain a NOAA weather radio Obtain an emergency generator Identify locations of emergency shelters Participate in amateur radio groups Sign up for reverse 911 systems/other notification options Post address so as to be visible to first responders Teach school children about the dangers of lightning and how to take safety precautions.
Private (Business) Scale	<ul style="list-style-type: none"> Increase tree plantings around buildings to shade parking lots and along public rights-of-way. 	None	<ul style="list-style-type: none"> Relocate critical infrastructure, such as power lines, underground Install tree wire Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities Install and maintain surge protection on critical electronic equipment. Avoid placing flag poles or antennas near buildings 	<ul style="list-style-type: none"> Trim or remove trees that could affect power lines Create redundancy in critical systems Equip facilities with a NOAA weather radio Equip vital facilities with emergency power sources
Government Scale	<ul style="list-style-type: none"> Increase tree plantings around buildings to shade parking lots and along public rights-of-way. 	None	<ul style="list-style-type: none"> Trim trees back from power lines Designate snow routes and strengthen critical road sections and bridges Continue/expand participation in Storm Ready programs Continue to support/maintain/improve notification and warning systems Support/continue/formalize shelter agreements Ensure critical facilities have back-up power generation capabilities Install lightning protection devices on critical facilities and communications equipment Inspect/ensure facilities can withstand high winds 	<ul style="list-style-type: none"> Support/continue programs such as "Tree Watch" that proactively manage problem areas by use of selective removal of hazardous trees, tree replacement, etc. Establish and enforce building codes that require all roofs to withstand snow loads and wind speeds Improve communication alternatives/redundancy Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines Provide NOAA weather radios to the public Encourage coordination with amateur radio groups Identify/ear mark funding opportunities for generator purchases

Risk Reduction Measures	Hazard Category			
	SEVERE STORM/WEATHER			
	Manipulate Hazard	Exposure	Vulnerability	Capability
			<ul style="list-style-type: none"> • Encourage construction of guard rails where appropriate • Ensure critical facilities/shelters can easily transition to generator produced power • Stockpile response/preparedness supplies • Install and maintain surge protection on critical electronic equipment • Review building codes and structural policies to ensure they are adequate to protect older structures from wind damage • Use natural environmental features as wind buffers in site design • Incorporate inspection and management of hazardous trees into the drainage system maintenance process. • Preemptively test power line holes to determine if they are rotting • Use designed-failure mode for power line design to allow lines to fall or fail in small sections rather than as a complete system to enable faster restoration • Avoid placing flag poles or antennas near buildings • Convert traffic lights to mast arms 	<ul style="list-style-type: none"> • Develop evacuation/ emergency road plans and prioritize roads for response efforts • Encourage residents to sign-up for reverse 911 services or other notification services • Encourage/require residents to post addresses where they are visible to first responders • Include safety strategies for severe weather in driver education classes and materials. • Organize outreach to vulnerable populations, including establishing and promoting accessible heating centers in the community • <i>Develop and implement land use codes and policies to reduce the creation of and impacts from urban heat island effect</i> • <i>Update/establish requirements on impervious surfaces</i> • <i>Use current enthusiasm for earthquake preparedness to also encourage preparedness for severe weather.</i> • <i>Support transit providers by quickly communicating schedule changes and cancellations to the public.</i> • <i>Support and promote the development of COOPs for community groups. Include information on scaling based on the incident and certify those businesses meeting certain requirements.</i> • <i>Develop a resource center for severe weather information and tools.</i> • <i>Identify mechanisms to fund/administer tree maintenance programs.</i> • <i>Partner with appropriate agencies to identify mitigation strategies for Route 30.</i> • <i>Identify ways to address areas of the community where freezing fog and ice are more likely.</i> • <i>Develop on-call contracts for road and sidewalk sanding support.</i> • <i>Develop standard operating procedures to increase communication between schools and city emergency management, especially as it pertains to school closures.</i>

Risk Reduction Measures	Hazard Category			
	SEVERE STORM/WEATHER			
	Manipulate Hazard	Exposure	Vulnerability	Capability
				<ul style="list-style-type: none"> • <i>Develop standard operating procedures for coordinating warning and response activities for severe weather events (e.g. moving transient populations away from floodplains and simultaneously opening shelters).</i> • <i>Enhance outreach to populations more likely to be vulnerable to heat events. Provide information on locally available tools and resources.</i> • <i>Continue to research new technologies for urban heat island abatement (e.g. glazing).</i> • <i>Consider implementing/providing information on flood-resilient building design (allowing and designing for first floors to flood)</i> • <i>Develop a public outreach campaign focused on the nexus between heat waves, wildfires, stagnant air and poor air quality. Provide resources for mitigation.</i> • <i>Establish a certification program for shelter leaders and managers.</i> • <i>Partner with local businesses to explore opportunities for increasing access to air conditioned spaces during extreme heat or poor air quality events (e.g. free movie theatre admission).</i> • <i>Identify suitable locations for cooling shelters that can also be used in the event of poor air quality.</i> • <i>Partner with neighborhood organizations to improve Community Emergency Response Team (or equivalent program) awareness and membership in all languages and underserved areas.</i>

Space Weather

Risk Reduction Measures	<i>Hazard Category</i>			
	SPACE WEATHER			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	None	None	None	<ul style="list-style-type: none"> • Sign up for early warning systems and notifications
Private (Business) Scale	None	None	None	<ul style="list-style-type: none"> • Educate employees on impacts and emergency plans
Government Scale	None	None	None	<ul style="list-style-type: none"> • <i>Provide links and information to NOAA space weather warning system.</i> • <i>Develop system to alert businesses with vulnerable communications infrastructure.</i>

Volcanic Hazards

Risk Reduction Measures	Hazard Category			
	ASHFALL/DISTAL HAZARDS			
	Manipulate Hazard	Reduce Exposure	Reduce Vulnerability	Increase Capability
Public (Individual) Scale	None	<ul style="list-style-type: none"> Identify equipment/resources that may be negatively impacted by ashfall and develop plan to move indoors/protect 		<ul style="list-style-type: none"> Sign up for early warning systems and notifications
Private (Business) Scale	None	<ul style="list-style-type: none"> Identify equipment/resources that may be negatively impacted by ashfall and develop plan to move indoors/protect 	<ul style="list-style-type: none"> Build redundancy for critical facilities and functions 	<ul style="list-style-type: none"> Educate employees on impacts and emergency plans
Government Scale	None	<ul style="list-style-type: none"> Identify equipment/resources that may be negatively impacted by ashfall and develop plan to move indoors/protect 	<ul style="list-style-type: none"> Retrofit older building stock to be able to support accumulated ashfall loads 	<ul style="list-style-type: none"> Develop post-event cleanup plan Identify innovative ways to seek funding for private air conditioners. Continue to participate in and support updates of regional ash management plan. Research and develop lessons learned from Mt. St. Helens ash management response.

Wildfire

Risk Reduction Measures	Hazard Category			
	WILDFIRE			
	Manipulate Hazard	Exposure	Vulnerability	Capability
Public (Individual) Scale	<ul style="list-style-type: none"> Clear potential fuels on property: dry, overgrown underbrush, diseased trees 	<ul style="list-style-type: none"> Create and maintain defensible space around structures Reduce exposure --Locate outside of hazard area Mow regularly Stay clear of hazard areas during a wildfire event 	<ul style="list-style-type: none"> Create and maintain defensible space around structures, provide water on site. Use fire-retardant building materials Create defensible spaces around your home 	<ul style="list-style-type: none"> Employ "Firewise" techniques to safeguard your home Identify alternative water supplies for fire fighting Install/replace roofing material with non-combustible roofing materials Ensure that all fuel-burning equipment should be vented to the outside Install carbon monoxide monitors and alarms.
Private (Business) Scale	<ul style="list-style-type: none"> Clear potential fuels on property: dry underbrush, diseased trees 	<ul style="list-style-type: none"> Create and maintain defensible space around structures and infrastructure Reduce exposure -- Locate outside of hazard area 	<ul style="list-style-type: none"> Create and maintain defensible space around structures and infrastructure, provide water on site Use fire-retardant building materials 	<ul style="list-style-type: none"> Support "Firewise" community initiatives Create /establish stored water supplies to be utilized for fire fighting
Government Scale	<ul style="list-style-type: none"> Clear fuels (dry underbrush, diseased trees) on land that can trigger and maintain wildfires Implement "Best Management Practices" on public lands Partner with local communities to create fire breaks 	<ul style="list-style-type: none"> Create and maintain defensible space around structures and infrastructure Enhance building code to include use of fire resistant materials in high hazard areas Reduce exposure -- Locate outside of hazard area 	<ul style="list-style-type: none"> Create and maintain defensible space around structures and infrastructure Use fire-retardant building materials Develop/implement higher regulatory standards in wildfire hazard areas Develop/support biomass reclamation initiatives Increase regulatory requirements/code enforcement for fire risk reduction or incentivize higher standards Develop fire smart building code regulations Implement road side vegetation management best practices 	<ul style="list-style-type: none"> Seek alternative water supplies in urban wildland interface areas Become a "Firewise" community Utilize academia to study impacts/solutions to wildfire risk Create/implement/update wildfire protection plans Develop evacuation/ emergency road plans and prioritize roads for response efforts Provide public outreach to increase understanding of forest management practices Enhance/provide redundant communication infrastructure Require/encourage rapid damage assessment training Pre-plan responses to wildland urban interface areas Use zoning and/or a special wildfire overlay district to designate high-risk areas and

Risk Reduction Measures	Hazard Category			
	WILDFIRE			
	Manipulate Hazard	Exposure	Vulnerability	Capability
			<ul style="list-style-type: none"> • Conduct pre-construction building inspections that include fire prevention requirements and provide emphasis on a fire resistant structure • Develop programs to identify/install wildland fire water supply systems such as cisterns, ponds and dry hydrants • Involve fire protection agencies in determining guidelines and standards and in development and site plan review procedures • Enclose the foundations of homes and other buildings in wildfire-prone areas, rather than leaving them open and potentially exposing undersides to blown embers or other materials. • Prohibit wooden shingles/wood shake roofs on any new development in areas prone to wildfires. • Routinely inspect the functionality of fire hydrants • Use prescribed burning to reduce fuel loads that threaten public safety and property. • <i>Develop and implement invasive species management plans. Research best management practices and partner with local, regional organizations (e.g. colleges, fire districts, State)</i> • <i>Take advantage of allowances for City-specific building codes</i> 	<p>specify the conditions for the use and development of specific areas</p> <ul style="list-style-type: none"> • Develop a vegetation management plan • Work with insurance companies, utility providers, and others to include wildfire safety information in materials provided to area residents • <i>Develop regulations that specifically address urban wildfire interface zones</i> • <i>Update hazard maps using the newly developed LiDAR and vegetation class data</i> • <i>Plan for integration of defensible space and natural resource habitat management</i> • <i>Educate the public on wildfire risk and promote wildfire risk reduction measures.</i> • <i>Expand and improve public education and information programs about fire prevention, especially fireworks.</i> • <i>Educate the public and disseminate information about the evacuation routes.</i> • <i>Create wildfire evacuation route signs</i> • <i>Analyze and identify the locations of fire stations/boats and response times of firefighters in communities. See where there are major gaps and lack of fire support- take in to account the use of bridges and other transit routes that may be compromised.</i> • <i>Explore the feasibility of establishing a fire station and/or hazmat response team in or near Linnton.</i> • <i>Identify ways to enhance fire prevention and incorporate forest health (e.g. prescribed burns).</i> • <i>Promote and support the FireWise program in appropriate neighborhoods.</i> • <i>Continue increased patrols in watersheds and continue to help fund water towers.</i>

Risk Reduction Measures	Hazard Category			
	WILDFIRE			
	Manipulate Hazard	Exposure	Vulnerability	Capability
			<p><i>that restrict building materials (more stringent than State)</i></p> <ul style="list-style-type: none"> • <i>Partner with regional stakeholders to identify critical facilities that are in hazard risk areas. Review and prioritize mitigation activities, such as the creation of defensible space.</i> • <i>Develop guidelines regarding the construction of critical facilities in wildfire risk areas (disclose the risk, educate the company interested, regulate the land)</i> • <i>Analyze and identify wildfire evacuation routes in different neighborhoods and areas. Take into account bridges, transportation routes and disability access.</i> • <i>Retrofit fire and police stations in order to strengthen their current capabilities and ensure the safety of these emergency responders during a disaster. Where possible, strengthen facilities to higher than life safety standards.</i> • <i>Promote drought tolerant, fire resistant plants and the backyard habitat program.</i> 	<ul style="list-style-type: none"> • <i>Continue to identify and seek solutions for problem areas along the Pacifica Crest Trail.</i> • <i>Continue to require water bureau staff in the watershed to carry small fire fighting capabilities when risk level is at 3 or above.</i> • <i>Develop a secondary improved access from Lolo Pass for wildfire fighting Bull Run Watershed.</i> • <i>Develop a protocol for the use of in town reservoir water for emergency water supplies in the event of an urban fire.</i> • <i>Evaluate urban and wildfire risk from Cascadia Subduction Zone event and develop strategy to reduce risks.</i> • <i>Use Mt. Tabor reservoir for firefighting after earthquake</i> • <i>Fill Mt. Tabor reservoir with petroleum</i>