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YAKIMA COUNTY

Yakima County Multi-Jurisdictional Hazard Mitigation Plan 2015

EXECUTIVE SUMMARY

1.0 Authority

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 *et seq*, reinforced the need and requirement for mitigation plans, linking flood mitigation assistance programs to State, Tribal and Local Mitigation Plans.

After a presidential major disaster declaration, mitigation funding becomes available. The amount is based on a percentage of the total federal grants awarded under the Public Assistance and Individuals and Households Programs for the entire disaster. Projects are funded with a combination of federal, state, and local funds. Information on this program and application process is disseminated at public briefings and by other means.

Section 322 of the amended Stafford Act essentially states that as a condition of receiving a disaster loan or grant:
"The state **and** local government(s) shall agree that natural hazards in the areas affected shall be evaluated and appropriate action taken to mitigate such hazards, including safe land-use and construction practices. For disasters declared after November 1, 2004, all potential applicants (sub-grantees) must have either their own, or be included in a regional, locally adopted and FEMA approved all hazard mitigation plan in order to be eligible to apply for mitigation grant funds."

The regulations governing the mitigation planning requirements for local mitigation plans are published under 44 CFR §201.6. Under 44 CFR §201.6, local governments must have a FEMA-approved Local Mitigation Plan in order to apply for and/or receive project grants under the following hazard mitigation assistance programs:

- Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) provides funds to States, Territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Presidential major disaster declaration.

- Pre-Disaster Mitigation (PDM)

- Flood Mitigation Assistance (FMA)

The Pre-Disaster Mitigation (PDM) Program and Flood Mitigation Assistance (FMA) programs provide funds annually to States, Territories, Indian Tribal governments, and local governments. Although the statutory origins of the programs differ, both share the common goal of reducing the risk of loss of life and property due to natural hazards.

2.0 Plan Updates

FEMA's Local Mitigation Planning Handbook, March 2013

"A community must review and revise an existing plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities and resubmit for approval within 5 years to continue to be eligible for FEMA mitigation project grant funding."

NOTE: No other jurisdictions participated in the planning process as their annexes are empty. Also the County Steering Committee was made up of principally county employees. The county solicited feedback from the cities and other jurisdictions similar to our CEMP process. Consequently, the Steering Committee classifies this as a single jurisdiction plan for the unincorporated county, or base plan, that can morph into a multiple jurisdiction plan as other entities build out their annexes.

REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)
ELEMENT A. PLANNING PROCESS	
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 5 1.0, 5-1 Section 7 Table 1, 7-1
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(c)(2))	Part One: Section 1: 1.0, pages 1-2 thru 1-4
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 7 Table 2, 7-4
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 4 6.0, pages 4-7 and 4-8
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 5 1.0, pages 5-1 and 5-2; page 5-5
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4) (i))	Section 5 2.0, pages 5-6 thru 5-10
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT	
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Part Two Tabs 1- 15 and Appendix C
B2. Does the Plan include information on previous occurrences of hazard events and	Part Two

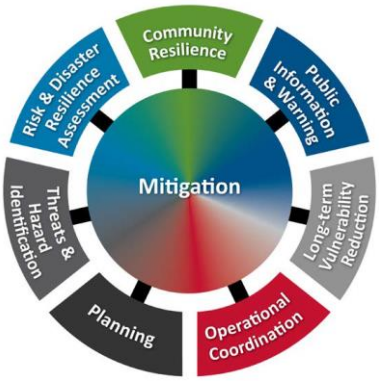
REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)
on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Tabs 1- 15
B3. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Part Two Tab 6, pages 40-42
ELEMENT C. MITIGATION STRATEGY	
C1. Does the Plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Attachment One: CEMP Section Two Mitigation
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3))	Part Two Tab 6, pages 40-42
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3) (i))	Part One: Table One, pages 4-11 thru 4-13
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3) (ii))	Part Two Tabs 1-15
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3) (iv)); (Requirement §201.6(c)(3) (iii))	Part Two Tabs 1-15
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4) (ii))	Part Two Tabs 1-15
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates)	
D1. Was the Plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Preface and Table of Contents Introduction Pages 1-13 thru 1-16 Part Two: Additional hazards addressed.
D2. Was the Plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 5 2.0, pages 5-6 thru 5-10
D3. Was the Plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 6 3.0, Pages 6.3 thru Table One
ELEMENT E. PLAN ADOPTION	
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Executive Summary 4.0, 1 -5 page v

REGULATION CHECKLIST Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Executive Summary 4.0, 1 -5 page v

3.0 Integration of FEMA Guidance

Reference: FEMA's Local Mitigation Planning Handbook, March 2013

The mitigation plan belongs to the local community. While FEMA has the authority to approve plans in order for local governments to apply for mitigation project funding, there is no required format for the plan's organization. When developing the mitigation plan, keep the following guiding principles in mind:



Focus on the mitigation strategy. The mitigation strategy is the plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.

Process is as important as the plan itself. In mitigation planning, as with most other planning efforts, the plan is only as good as the process and people involved in its development. The plan should also serve as the written record, or documentation, of the planning process.

This is your community's plan. To have value, the plan must represent the current needs and values of the community and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your community's purpose and people.

The suggested mitigation actions are summarized into four types: (1) Local Planning and Regulations, (2) Structure and Infrastructure Projects, (3) Natural Systems Protection, and (4) Education and Awareness Programs. Examples of activities that can be used to accomplish each mitigation goal are identified, as well as the relevant FEMA publications or resources, if applicable.

FEMA recognizes that local governance structures vary, and that the authority to implement mitigation strategies (*e.g.*, land use planning and zoning, building code enforcement, infrastructure improvements, floodplain management, *etc.*) may not reside within a single governmental entity. In addition, certain FEMA hazard mitigation assistance programs accept applications from private, nonprofit organizations and other quasi-governmental entities that do not necessarily align with traditional geopolitical boundaries. To ensure these potential sub-applicants to FEMA mitigation assistance programs meet the eligibility requirements for mitigation plans under 44 CFR §201.6, FEMA has identified procedures for several of these entities.

4.0 State and FEMA Plan Review

1. Submitting the Plan

   - Once the planning team is confident the plan meets the required elements and includes all supporting documentation, forward the plan to your SHMO or State Mitigation Planner. It is critical that all supporting documentation related to the planning process and other components of the plan are included in the initial submittal. Incomplete plan submittals can delay plan approval. The State will review the plan and work with you on any required revisions for approval.

   - Once the State is satisfied that the plan meets the requirements, the SHMO will forward the plan to the FEMA Regional Office for review and approval. FEMA will conduct its review within 45 days, if possible, and provide a completed Local Mitigation Plan Review Tool to the State. The FEMA Regional Office and the State may contact you to discuss additional revisions to the plan to ensure that it meets the Federal regulation. Once FEMA determines the plan meets the regulation, FEMA will notify the SHMO that the plan is approvable pending adoption (APA), or approved if the community has already adopted the mitigation plan.

2. Approval Pending Adoption

   - To avoid repeated attempts to adopt the plan prior to FEMA approval, many communities obtain a notice from FEMA that the plan is APA before adopting the plan. As a time-saving measure, communities are encouraged to submit the final draft of the mitigation plan to the State and FEMA for review prior to formal adoption by the elected officials or other authorized governing body. If FEMA determines the plan is not approvable and requires revisions, the community will be able to make revisions before initiating the plan adoption process, therefore avoiding unnecessary delays in plan approval.

3. Plan Approval

   - Upon receiving the record of adoption from the State, FEMA will issue an official approval letter stating which jurisdictions have adopted and are approved and eligible for FEMA Hazard Mitigation Assistance programs. The approval letter will include the expiration date 5 years from the date of the letter. Attached to the approval letter will be a final Local Mitigation Plan Review Tool that provides feedback on the strengths of the plan, recommendations for plan improvements during future plan updates, and suggestions for implementing the mitigation strategy.

4. Local Adoption of the Plan

   Adoption by the local governing body demonstrates the community's commitment to implementing the mitigation strategy and authorizes responsible agencies to execute their actions. The final plan is not approved until the community adopts the plan and FEMA receives documentation of formal adoption by the governing body of the jurisdiction(s) requesting approval. The governing bodies are typically the Town Board, City Council, County Commissioners, and/ or Board of Selectmen. While plan adoption usually occurs through a formal resolution, council minutes, consent agendas, or other forms of adoption are acceptable if allowed by local law.

5. Multi-Jurisdictional Adoption

   Each jurisdiction seeking plan approval must adopt the plan. If you choose to use the APA process, it is important to coordinate the adoptions of all the jurisdictions as soon as the plan receives APA status. The governing bodies may have different meeting schedules, which prevent all the jurisdictions from adopting at the same time. If possible, coordinate the adoptions and submit documentation to the State at the same time.

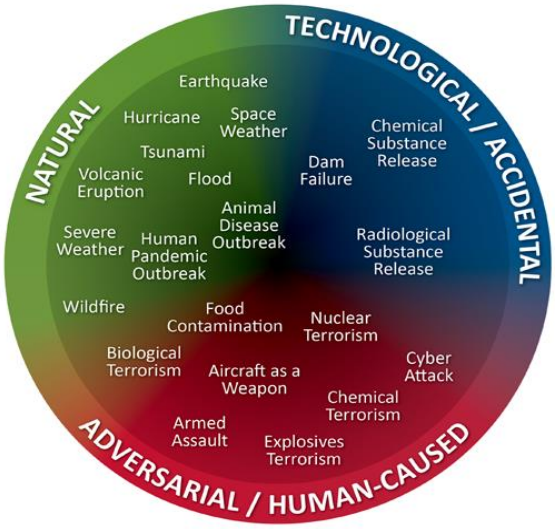
   At least one of the participating jurisdictions must adopt the plan within 1 year of FEMA's APA notice. FEMA will issue an official approval letter stating which jurisdictions have adopted the plan and are eligible for FEMA hazard mitigation assistance programs. The plan will expire 5 years from the date of FEMA's approval letter for the mitigation plan. The approval letter and date are generated with the first jurisdiction adopting the plan. The plan approval date remains the same regardless of when other participating jurisdictions adopt the plan. It is important to coordinate the adoption process to ensure that all participants are covered by the plan for the full 5 years. Plan updates follow the same adoption process.

5.0 Rationale

The Yakima County Multi-Jurisdictional Hazard Mitigation Plan includes resources and information to assist county residents, public and private sector organizations, and others interested in participating in planning for natural and technological hazards. The mitigation plan provides a list of activities that may assist Yakima County in reducing risk and preventing loss from future hazard events. The action items address multi-hazard issues, as well as activities for flood, landslide, severe winter storm, windstorm, wildfire, earthquake, volcanic eruption and hazardous materials. Yakima County referenced the *2013 Washington State Enhanced State Hazard Mitigation Plan* for state-wide hazards.

For purposes of the Yakima HMP, these are identified threats and hazards:

Avalanche
Drought
Earthquake
Erosion
Extreme Temperatures
Flood
Hail
Hazardous Materials
Landslide
Lightning
Severe Winter Storm
Severe Wind Storm
Tornado
Volcanic Eruption
Wildland Fire



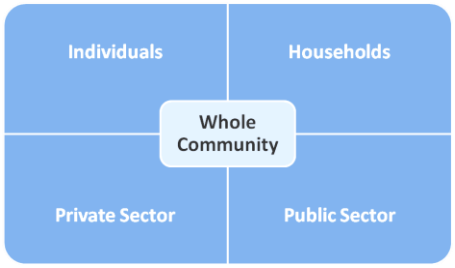
6.0 How is the Plan Organized?

The mitigation plan contains a five-year action plan matrix, background on the purpose and methodology used to develop the mitigation plan, a profile of Yakima County, sections on fifteen natural and technological that occur within the county, and several appendices. These sections are described in detail in Section 1, the plan introduction.

7.0 Who Participated in Developing the Plan?

The Yakima County Multi-Jurisdictional Hazard Mitigation Plan is the result of a collaborative effort between Yakima County cities/towns, citizens, public agencies, non-profit organizations, and the private sector. Public participation played a key role in development of goals and action items. Public forums were held to include Yakima County residents in plan development.

Yakima County follows the concept of the Whole Community for integrating our partners into the planning and execution of the HMP.



A Yakima County Hazard Mitigation Steering Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process for mitigation issues covering the entire county.

The choice of these county departments as the core group of committee members is based upon county-wide planning initiatives (e.g., Flood Control Zone District and Wildland Fire) which involve other jurisdictions as well as special districts.

This HMP Steering Committee/Technical Advisory Groups (TAGs)—Natural and Technological consist of the following participating departments:

1. <u>County Steering Committee</u>

Board of County Commissioners (BOCC)
Public Services Director
- Environmental Services
- Water Resources Division, Manager
- Transportation and Roads, County Engineer,
- Assistant Director
- Planning, Division Manager
- Building and Safety Division Bureau Chief/Fire Marshal

2. <u>Technical Advisory Groups (TAGs)</u>

Natural
- Flood Control Zone District
- Environmental/Natural Resources

Subdivision/Zoning

Technical
Building & Fire Safety
Building Official/Code Enforcement
GIS
Technology Services
Facilities Services
Hazardous Materials
Local Emergency Planning Committee (LEPC) Representative

3. Cities and Towns

The Yakima Valley Office of Emergency Management used the existing city/town emergency organization structure to facilitate the review, solicit public feedback and coordinate the promulgation of the Yakima County HMP. As per the agreement for emergency services, the OEM has established within each city and town an emergency structure consisting of the Mayor, City Manager/Administrator, City Attorney, City Clerk, Fire Chief, Police Chief, Public Works Director, School Superintendent, Code Enforcement and others selected by the Mayor/City Manager. OEM has created an Emergency Coordination Center for emergency/disaster response in each of the thirteen cities and towns. In addition to this group providing Direction and Control before, during, and after an emergency, OEM utilizes their role in the government structure to review emergency plans, coordinate training and exercises, and disseminating alert and warning.

As in the development of the Yakima County Comprehensive Emergency Management Program (CEMP), this existing emergency structure was instrumental in the process of reviewing and promulgation of the 2015 HMP. Critical information as to hazardous materials sites within the boundaries of their city or town is provided to the emergency response agencies, i.e., fire and law enforcement, and they will advise their elected or appointed leaders. Most recently, the severe weather events of early 2009 which resulted in the availability of federal assistance, the OEM provided jurisdictions with key information as provided by the State of Washington. The points of contact for the transfer of this information were these same key players in each jurisdiction.

4. Procedures for Additional Jurisdictions to the HMP

This procedure was developed by the Yakima Valley Office of Emergency Management in cooperation with the Washington State Emergency Management Division. This procedure has been incorporated into the plan as part of the 2015 plan update.

1. A jurisdiction not included in this update and wishing to join the plan contacts the Yakima Valley Office of Emergency Management with the request to become a participant of the plan.

2. The Yakima Valley Office of Emergency Management provides the jurisdiction with a copy of the approved plan, planning requirements and any other pertinent data.

3. The jurisdiction reviews the plan and develops the portions of the plan that are specific to the jurisdiction as directed by the Yakima Valley Office of Emergency Management staff. The portion of the plan must meet the requirements of the current FEMA's Local Mitigation Planning Handbook, March 2013.

4. The new jurisdiction submits its portions of the plan to the Yakima Valley Office of Emergency Management and the new jurisdiction plan is forwarded to the State Hazard Mitigation Program Manager for review and compliance with current Local Multi-Hazard Mitigation Planning Guidance.

5. The State Hazard Mitigation Program Manager reviews the new jurisdiction plan for compliance with current Local Multi-Hazard Mitigation Planning Guidance in conjunction with the Yakima County Multi-Jurisdictional Hazard Mitigation Plan. If the new jurisdiction does not meet the required standard, the State Hazard Mitigation Program Manager will work with the jurisdiction to resolve issues until it does.

6. The State Hazard Mitigation Program Manager forwards the new jurisdiction plan to FEMA Region X for review and comment.

7. Upon approval from FEMA Region X, the new jurisdiction is considered part of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan and will comply with the update schedule of the plan.

8.0 What is the Plan Mission?

The mission of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural and technological hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

9.0 What are the Plan Goals?

The plan goals describe the overall direction that Yakima County jurisdictions, organizations, and citizens can take to work toward mitigating risk from natural and technological hazards.

The goals represent stepping-stones between the broad direction of the mission statement and the specific recommendations outlined in the action items.

1. Protect Life, Property and Public Welfare

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural and technological hazards.

- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards. Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventive measures for existing development in areas vulnerable to natural and technological hazards.

2. Public Awareness

Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.

- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

3. Natural Systems

- Encourage development of acquisition and management strategies to preserve open space.

4. Partnerships and Implementation

- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.

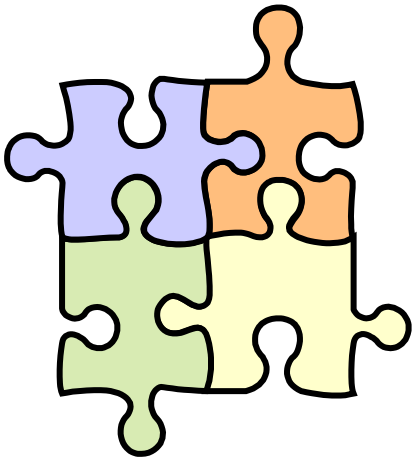
- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

5. Emergency Services

- Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.

- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

- Coordinate and integrate natural and technological mitigation activities, where appropriate, with emergency operations plans and procedures.



"People working together through a process"

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Preface

Each section of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan 2015 provides information to assist local governmental jurisdictions and agencies and the citizens of Yakima County in understanding the community in which we live and work and the hazard-related issues facing government, citizens, businesses, and the environment. Combined, the various sections of this plan work together to create a document that guides the mission to reduce vulnerability and minimize loss from hazard events.

The Annex structure of this plan enables jurisdictions to use only that portion of the plan of interest to them and/or pertains to their needs. It also allows jurisdictions to review and update specific sections as new data becomes available. In Part One, Section 1, Table 6 represents a mechanism for the Office of Emergency Management to track jurisdictional plan participation and status.

New data can be easily incorporated into jurisdiction-specific annexes, resulting in a hazards mitigation plan that remains current and relevant to the needs of the citizens of Yakima County.

Table of Contents

Section 1
Introduction

Throughout history, the residents of Yakima County have dealt with the various natural and technological hazards affecting the area. The county is subject to 38 hazards. For the purpose of this mitigation plan: Avalanche, Drought, Earthquake, Erosion, Extreme Temperatures Flood (Dam/Levee Failures), Hail, Hazardous Materials, Landslide, Lightning, Severe Winter Storm, Severe Wind Storm, Tornado, Volcanic Eruption, and Wildland Fire have been identified as those representing a higher level of concern. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the county. However, with careful planning and collaboration within the community, it is possible to minimize the losses that can result from natural and technological disasters.

Yakima County is located in the south-central portion of Washington State. It is the second largest county in Washington State with a total land area of 4,273 square miles. The county's western boundary generally follows the crest of the Cascade Mountain range. The widest portion of the county measures approximately 80 miles from north to south. The most eastern boundary measures 48 miles from north to south and runs along the Columbia River for approximately 9 miles. From east to west the county measures approximately 75 miles.

The terrain of Yakima County varies from areas of irregular, densely timbered, mountainous terrain in the west to broad valleys and arid sagebrush-covered foothills in the east. The arable lands within the county are made up of the basin lands, bottom lands, terraces, and lower uplands tributary to the Yakima River and are collectively called the Yakima Valley. The area north of Ahtanum and Rattlesnake Ridges is generally referred to as the Upper Yakima Valley while the area south of them is often referred to as the Lower Yakima Valley. The Upper Valley is more heavily populated while the Lower Valley is characterized by smaller towns and contains more productive farmland.

Much of the recent development in Washington State occurs in or near flood plains. This development increases the likelihood of flood damages in two ways. First, new developments near a flood plain add structures and people in flood areas. Secondly, new construction alters surface water flows by diverting water to new courses or increases the amount of water that runs off impermeable pavement and roof surfaces. This second effect diverts waters to places previously safe from flooding.

1.0 Stakeholders

The Yakima Valley Office of Emergency Management identified organizations consistent with federal guidance as to those which should be included in the mitigation process. Tables 1-5 beginning on page 1-5 represents those targeted for 2015 inclusion. Table 5 represents tracking Mitigation Plan Participation and Promulgation indicating which jurisdictions are continuing, new, or no longer participating in the plan.

Section 201.2 of 44 CFR defines Local Government as:

> *any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government.*

FEMA recognizes that local governance structures vary, and that the authority to implement mitigation strategies (*e.g*., land use planning and zoning, building code enforcement, infrastructure improvements, floodplain management, *etc*.) may not reside within a single governmental entity. In addition, certain FEMA hazard mitigation assistance programs accept applications from private, nonprofit organizations and other quasi-governmental entities that do not necessarily align with traditional geopolitical boundaries. To ensure these potential sub-applicants to FEMA mitigation assistance programs meet the eligibility requirements for mitigation plans under 44 CFR §201.6, FEMA has identified procedures for several of these entities.

FEMA's Local Mitigation Plan requirements under 44 CFR §201.6 specifically identify criteria that allow for multi-jurisdictional mitigation plans. Many issues are better resolved by evaluating hazards more comprehensively by coordinating at the county, regional, or watershed level. Although economy-of-scale efforts are apparent and encouraged with multi-jurisdictional plans, FEMA requires that all participating jurisdictions meet the requirements for mitigation plans identified in 44 CFR §201.6. While certain elements are common to all participating jurisdictions (*e.g.,* planning process, hazards, goals, and maintenance), there are some elements that are unique to each participating jurisdiction, including:

- risks, where they differ from the general planning area;
- mitigation actions (actions must be identified for each jurisdiction);
- participation in the planning process (examples of participation include attending meetings, contributing research, data, or other information, commenting on drafts of the plan, *etc*.); and
- adoption (each jurisdiction must formally adopt the plan).

Public College or University

Under 44 CFR 201, a public college or university may be an active participant in a FEMA approved State, Tribal or Local Mitigation Plan, or have an approved plan of their own that meets the requirements of 44 CFR §201.6 to be eligible for mitigation project grants. If a college or university has fully participated in the development and review of a plan in accordance with

44 CFR §201.6(b), Documentation of the Planning Process, it is not necessary for them to approve/adopt the plan, as long as it is adopted by the appropriate State, Tribal or local government.

If a college or university chooses to develop their own plan, adoption of the plan can be accomplished through a resolution or letter from the institution President, Board of Directors or recognized governing body. In a large and complex State university system, there may be several component universities, each with multiple campuses, extension offices, and other sites. The various universities may be subject to different risks, and each individual university may be best served by developing a stand-alone, single-jurisdiction plan, or be a participant in the planning process for their local government. However, the State university system's Board of Regents or other top-level entity may determine that the State would be best served if planning for all of its component institutions and campuses were coordinated at the highest possible level in order to facilitate capital improvement planning. In such a case, the top-level entity could develop a multijurisdictional plan to which the participating component institutions would then be signatories. Regardless of whether planning is distributed or centralized, however, the plans developed will be Local Mitigation Plans, not State Mitigation Plans, even if they are developed by and for State institutions.

Private Institutions

Similarly, private institutions may opt to participate in local or regional multi-jurisdictional plans, or they may develop plans of their own. Either way, the key to success is to ensure that all of the requirements established by regulation are met. This includes coordinating the planning activities of each campus with those of the surrounding community and, in the case of a multi-institution plan, ensuring that each institution's unique risks are addressed in addition to those risks affecting the entire university system.

School Districts

School districts or independent school districts, or other special districts are defined as local governments at 44 CFR Part 201.2, and are therefore required to have a FEMA-approved local mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs. A school district may also demonstrate their participation as a separate government entity in another local government's approved mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs. School districts do not fall under the definition of private nonprofit organizations (*See* the definition of private nonprofit organization under the Private Nonprofit (PNP) Organizations section below.)

Private Nonprofit (PNP) Organizations

Private nonprofit organizations are not considered governmental entities. This distinction is important, because current regulations under 44 CFR Part 201 provide only for governments (State, Tribal or Local), not PNPs, to meet the planning requirement for having a FEMA approved Mitigation Plan in order to receive project grant funds. For mitigation planning purposes, PNPs are defined consistently with 44 CFR 206.2(a)(19) as:

> *Any nongovernmental agency or entity that currently has: (i) An effective ruling letter from the U.S. Internal Revenue Service granting tax exemption under section 501 (c), (d), or (e) of the Internal Revenue Code of 1954; or (ii) Satisfactory evidence from the or entity is a nonprofit one organized or doing business under State law.*

Under HMGP regulations at 206.434(a)(1), certain PNPs are eligible sub-applicants; however, in those cases, the jurisdiction in which the PNP project is located must have a FEMA-approved Mitigation Plan to be eligible for grant funds. FEMA strongly recommends that PNPs participate in the development of the Local or Tribal Mitigation Plan to ensure that projects funded are consistent with the mitigation strategies of the jurisdiction. If they have fully participated in the development and review of the Local or Tribal Mitigation Plan, it is not necessary for them to approve/adopt the plan, as long as it is adopted by the jurisdiction.

Procedures for Additional Jurisdictions to the HMP

This procedure was developed by the Yakima Valley Office of Emergency Management in cooperation with the Washington State Emergency Management Division. This procedure has been incorporated into the plan as part of the 2015 plan update.

1. A jurisdiction not included in this update and wishing to join the plan contacts the Yakima Valley Office of Emergency Management with the request to become a participant of the plan.

2. The Yakima Valley Office of Emergency Management provides the jurisdiction with a copy of the approved plan, planning requirements and any other pertinent data.

3. The jurisdiction reviews the plan and develops the portions of the plan that are specific to the jurisdiction as directed by the Yakima Valley Office of Emergency Management staff. The portion of the plan must meet the requirements of the current FEMA's Local Mitigation Planning Handbook, March 2013.

4. The new jurisdiction submits its portions of the plan to the Yakima Valley Office of Emergency Management and the new jurisdiction plan is forwarded to the State Hazard Mitigation Program Manager for review and compliance with current Local Multi-Hazard Mitigation Planning Guidance.

5. The State Hazard Mitigation Program Manager reviews the new jurisdiction plan for compliance with current Local Multi-Hazard Mitigation Planning Guidance in conjunction with the Yakima County Multi-Jurisdictional Hazard Mitigation Plan. If the new jurisdiction does not meet the required standard, the State Hazard Mitigation Program Manager will work with the jurisdiction to resolve issues until it does.

6. The State Hazard Mitigation Program Manager forwards the new jurisdiction plan to FEMA Region X for review and comment. Upon approval from FEMA Region X, the new jurisdiction is considered part of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan and will comply with the update schedule of the plan.

Table 1: Yakima County Cities and Towns

Yakima County Cities and Towns	
Section 201.2 of 44 CFR defines Local Government as: *any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government.*	
Yakima County Unincorporated Area	City of Sunnyside
City of Grandview	City of Tieton
City of Granger	City of Toppenish
Town of Harrah	City of Union Gap
City of Mabton	City of Wapato
City of Moxee	City of Yakima
Town of Naches	City of Zillah
City of Selah	

Table 2: Yakima County Fire Protection Districts

Yakima County Fire Protection Districts	
Section 201.2 of 44 CFR defines Local Government as: *any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government.*	
Fire District #1 (Highland)	Fire District #6 (Gleed)
Fire District #2 (Selah)	Fire District #7 (Glade)
Fire District #3 (Naches)	Fire District #9 (Naches Heights)
Fire District #4 (East Valley)	Fire District #12 (West Valley)
Fire District #5 (Lower Valley)	Fire District #14 (Nile)

Table 3: Yakima County School Districts

Yakima County School Districts	
Section 201.2 of 44 CFR defines Local Government as: *any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government.* School districts or independent school districts, or other special districts are defined as local governments at 44 CFR Part 201.2, and are therefore required to have a FEMA-approved local mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs. A school district may also demonstrate their participation as a separate government entity in another local government's approved mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs.	
East Valley School District No. 90	Sunnyside School District No. 201
Grandview School District No. 200	Toppenish School District No. 202
Granger School District No. 204	Union Gap School District No. 2
Highland School District No. 203	Wapato School District No. 207
Mabton School District No. 120	West Valley School District No. 208
Mt. Adams School District No. 209	Yakima School District No. 7
Naches Valley School District Jt 3	Zillah School District No. 205
Selah School District No. 119	

Table 4: Irrigation Districts

Irrigation Districts	
Ahtanum Irrigation District #11	Snipes Mountain Irrigation District #100
Buena Irrigation District #20	Sunnyside Valley Irrigation District
Grandview Irrigation District #30	South Naches Irrigation District #190
Granger Irrigation District #40	Terrace Heights Irrigation District #120
Selah-Moxee Irrigation District	Union Gap Irrigation District #130
Home Irrigation District #50	Wenas Irrigation District #140
Naches Union Irrigation District #180	Zillah Irrigation District #170
Naches-Selah Irrigation District #60	Yakima Valley Canal Company—Congdon Canal
Outlook Irrigation District #70	Fruitvale Canal (City of Yakima)
Roza Irrigation District #98	
Selah-Moxee Irrigation District #90	

Table 5: 2015 Mitigation Plan Participation and Status

Mitigation Plan Promulgation
The Yakima Valley Office of Emergency Management identified organizations (stakeholders) consistent with federal guidance as to those which should be included in the mitigation process. These organizations were provided with mitigation planning specific to their jurisdiction. Pending are those jurisdictions who have not elected to adopt the plan for their jurisdiction. Participating jurisdictions are those that have adopted their plan.

This table represents a mechanism for the Office of Emergency Management to track jurisdictional plan participation and status.

Jurisdiction	**2015 HMP Participation**	**Pending** Jurisdictions listed as "Pending" will participate once requirements are met.	**2015 Requirements/ Status** 1. 2015-2020 Action Items 2. Plan Adoption
Cities and Towns			
To Be Added			
Fire Districts			
To Be Added			
School Districts			
To Be Added			
Irrigation Districts			
To Be Added			

Structure of the Plan

Each section of the mitigation plan provides information and resources to assist people in understanding the county and the hazard-related issues facing citizens, businesses, and the environment. Combined, the sections of the plan work together to create a document that guides the mission to reduce risk and prevent loss from future hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows county jurisdictions to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a staffing burden on jurisdictions. Decision-makers can allocate staff resources to selected pieces in need of review, thereby avoiding a full update, which can be time-consuming. New data can be easily incorporated, resulting in a hazards mitigation plan that remains current and relevant to Yakima County jurisdictions

The mitigation plan is organized in three parts. Part 1 contains an introduction, county profile, risk assessment and multi-hazard section. Part 2 contains the fifteen hazard sections and Part 3 includes three appendices and one attachment. Each section of the plan is described below.

Part 1: Mitigation Action Plan

Section 1: Introduction
The *Introduction* describes the background and purpose of developing the mitigation plan for Yakima County. Stakeholders are included.

Section 2: Community Profile
Community Profile presents the history, geography, demographics, and socio-economics of Yakima County and its jurisdictions. It serves as a tool to provide an historical perspective of hazards in the county. Stakeholders are included.

Section 3: Risk Assessment
Risk Assessment provides information on hazard identification, vulnerability and risk associated with hazards in Yakima County. Stakeholders are included.

Section 4: Multi-Hazard Goals and Action Items
Multi-Hazard Goals and Actions Items provides information on the process used to develop goals and action items that cut across the fifteen hazards addressed in the mitigation plan. The plan action items are included in this section, and addresses multi-hazard issues, as well as hazard-specific activities that can be implemented to reduce risk and prevent loss from future hazard events, multi-hazard issues, as well as hazard-specific activities that can be implemented to reduce risk and prevent loss from future hazard events.

Section 5: Plan Maintenance
Plan Maintenance provides information on plan implementation, monitoring and evaluation.

Section 6: Analysis and Prioritizing
Analysis and Prioritizing describes FEMA's requirements for benefit cost analysis in hazards mitigation, as well as approaches for conducting economic analysis of proposed mitigation activities. Methodology for prioritizing hazards is described.

Section 7: Public Involvement and Citizen Input
Public Involvement and Citizen Input includes specific information on the various public processes used during development of the plan.

Part 2: Hazard-Specific Information
Each of the hazard-specific tabs includes information on the history, hazard causes and characteristics, hazard assessment, goals and action items, and local, state, and national resources. Jurisdictions identified in this section were invited to submit their mitigation efforts and are included under their Annex .

Tab 1: Avalanche
Tab 2: Drought
Tab 3: Earthquake
Tab 4: Erosion
Tab 5: Extreme Temperatures
Tab 6: Flood
Tab 7: Hail
Tab 8: Hazardous Materials
Tab 9: Landslide
Tab 10: Lightning
Tab 11: Severe Winter Storm
Tab 12: Severe Wind Storm
Tab 13: Tornado
Tab 14: Volcanic Eruption
Tab 15: Wildland Fire

Part 3: Resources
The plan appendices are designed to provide users of the Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and potential resources to assist them with implementation.

Appendix A: Plan Resource Directory
This appendix includes county, regional, state, and national resources and programs that may be of technical and/or financial assistance to Yakima County during plan implementation.

Appendix B: Definitions and Acronyms
This appendix provides a list of definitions and acronyms for county, regional, state, and federal agencies and organizations that may be referred to within the Mitigation Plan.

Appendix C: Mitigation Actions and Ideas
This appendix provides lists of "best practices" compiled from numerous sources, e.g., federal mitigation guidebooks.

Attachment One

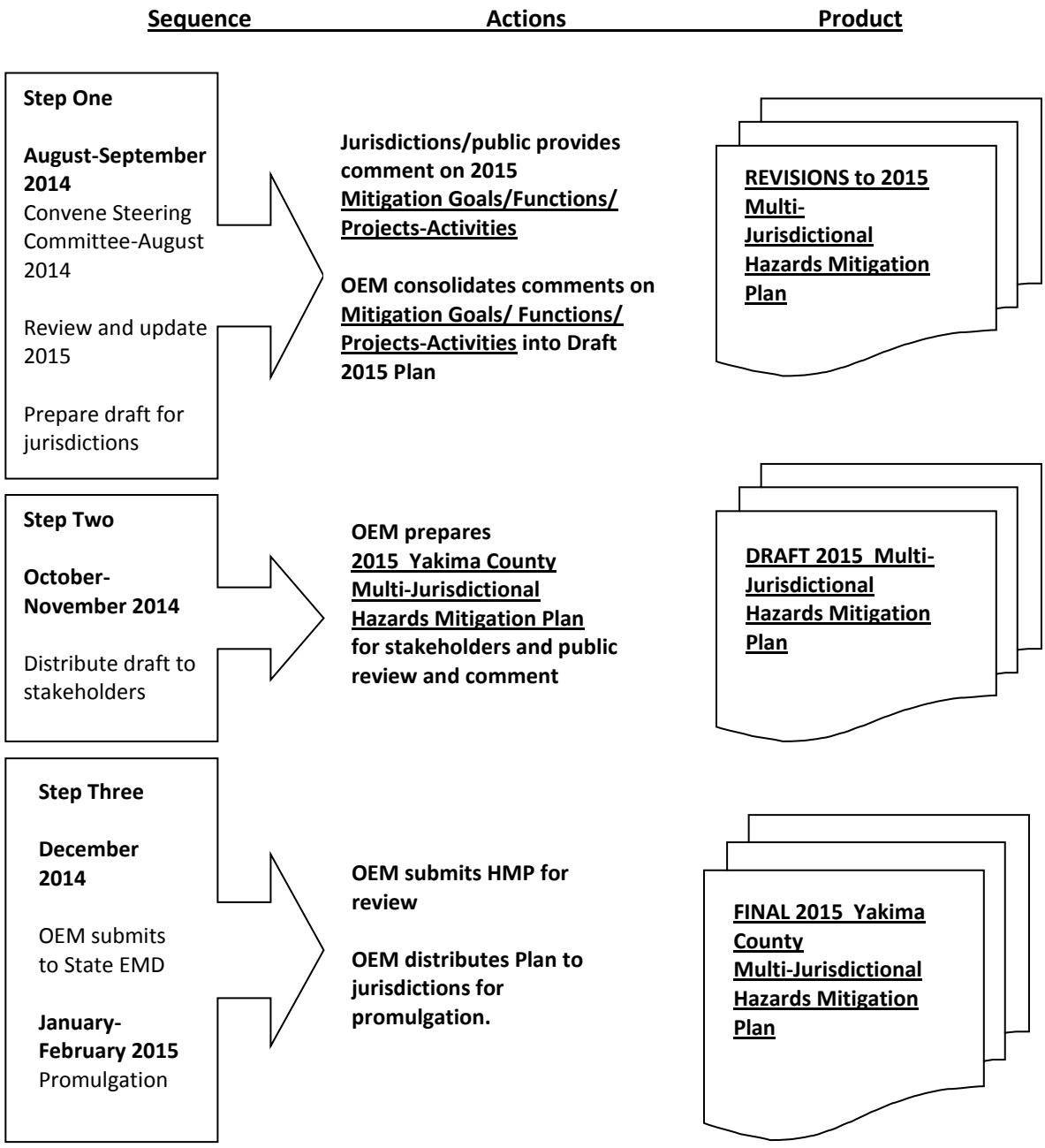
Section Two Mitigation, Comprehensive Emergency Management Program (CEMP). This section of the CEMP describes the strategy for county-wide mitigation efforts. The Yakima County Multi-Jurisdictional Hazard Mitigation Plan becomes an extension of Section Two.

Annexes

Separate annexes will be developed for those jurisdictions participating in the 2015 HMP.

- Local Government
- Fire Protection Districts
- School Districts
- Irrigation Districts

2015 Plan Review and Update—Jurisdiction and Public Involvement



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2015 Yakima County Multi-Jurisdictional Hazard Mitigation Plan

Note: This *Table of Changes* documents most of the pertinent changes made from the 2010 YC HMP Plan to the 2015 YC HMP Plan update. This 2015 Table represents high level changes made.

Yakima County Multi-Jurisdictional Hazard Mitigation Plan	**2015**
Part 1 – Mitigation Action Plan	
Executive Summary	The 2015 YC HMP retains the same integrity in the Executive Summary, as the 2010 YC HMP. Added the HMP Steering Committee/Technical Advisory Groups (TAGS) *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Section 1: Introduction	The 2015 YC HMP retains the same integrity in the Introduction, as the 2010 YC HMP Procedures for adding additional jurisdictions to the HMP *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Section 2: Community Profile	The 2015 YC HMP retains the same integrity in the Community Profile, as the 2010 YC HMP. Updated for 2015 based upon 2013 population estimates. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Section 3: Risk Assessment	The 2015 YC HMP retains the same integrity in the Risk Assessment, as the 2010 YC HMP Added Profiling Hazards (Hazard Type/Should it be Profiled/Explanation) and Extent (Magnitude or Severity) *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Section 4: Multi-Hazard Goals and Action Items	The 2015 YC HMP retains the same integrity in the Multi-Hazard Goals and Action Items, as the 2010 YC HMP Updated for 2015.

	Added Existing Planning Studies Reviewed and Mitigation Plan Included in Other Planning Mechanisms; Capabilities Assessment: Existing Plan and Strategy/ Codes, Regulations, & Procedures and Strategy *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Section 5: Plan Maintenance	The 2015 YC HMP retains the same integrity in the Plan Maintenance, as the 2010 YC HMP Added Plan Review and Update Process Specific references to Mitigation Plan Participation *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Section 6: Analysis and Prioritizing	The 2015 YC HMP retains the same integrity in the Plan Maintenance, as the 2010 YC HMP Future mitigation actions were evaluated using this methodology. A re-evaluation of the hazard impact using this methodology will be done annually, or as a result of an actual event.
Section 7: Public Involvement and Citizen Input	The 2015 YC HMP retains the same integrity in the Plan Maintenance, as the 2010 YC HMP

Part 2 – Hazard Specific Information	
Tab 1: Avalanche	A new addition for 2015 *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 2: Drought	A new addition for 2015 *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 3: Earthquake	Updated for 2015—2010 HMP Earthquake was Section 11—now Tab 3. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 4: Erosion	A new addition for 2015 *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 5: Extreme Temperatures	A new addition for 2015

	Record of Changes – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 6: Flood	Updated for 2015—2010 HMP Flood was Section 6--now Tab 6. The 2015 YC HMP retains the same integrity in the Plan Maintenance, as the 2010 YC HMP
Tab 7: Hail	A new addition for 2015 *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 8: Hazardous Materials	Updated for 2015—2010 HMP Hazardous Materials was Section 13--now Tab 8. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 9: Landslide	Updated for 2015—2010 HMP Landslide was Section 7--now Tab 9. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 10: Lightning	A new addition for 2015 *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 11: Severe Winter Storm	Updated for 2015—2010 HMP Severe Winter Storms was Section 9—now Tab 11. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 12: Severe Wind Storm	Updated for 2015—2010 HMP Wind Storm was Section 10—now Tab 12. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 13: Tornado	A new addition for 2015 *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.
Tab 14: Volcanic Eruption	Updated for 2015—2010 HMP Volcanic Eruption was Section 14—now Tab 14.
Tab 15: Wildland Fire	Updated for 2015 —2010 HMP Wildland Fire was Section 8—now Tab 15. *Record of Changes* – New tracking document for 2015 will be located in Part One, Section 5: Plan Maintenance.

Part 3 – Resources	
Appendix A: Plan Resource Directory	No changes. The 2015 YC HMP retains the same integrity in the Plan Resource Directory, as the 2010 YC HMP
Appendix B: Definitions and Acronyms	Updated for 2015—new Appendix B The 2015 YC HMP retains the same integrity in the Definitions and Acronyms, as the 2010 YC HMP
Appendix C: Mitigation Actions and Ideas	Updated for –new Appendix C The 2015 YC MHMP retains the same integrity in the Mitigation Projects and Initiatives, as the 2010 YC HMP

Attachments	
Attachment One: Comprehensive Emergency Management Program (CEMP), Section Two--Mitigation	Updated to reflect current June, 2014 version. The 2015 YC HMP retains the same integrity in the CEMP, Section 2--Mitigation, as the 2010 YC HMP

Annexes	
Local Government Cities and Towns	1. Participants and Level of Participation 2. Community Profile 3. Risk Assessment Profile 4. Future Action Items (2015-2020)
Fire Protection Districts	1. Participants and Level of Participation 2. Fire District Profile 3. Risk Assessment Profile 4. 2015-2020 Action Items
School Districts	1. Participants and Level of Participation 2. School District Profile (See Community Profiles) 3. Risk Assessment Profile 4. 2015-2020 Action Items
Irrigation Districts	1. Participants and Level of Participation 2. Risk Assessment Profile 3. 2015-2020 Action Items

Section 2: Community Profile

Why Plan for Natural and Technological Hazards in Yakima County?

Natural and technological hazards impact citizens, property, the environment, and the economy of Yakima County. Flooding, landslides, wildfire, windstorms, severe winter storms, volcanoes, earthquakes and hazardous materials have exposed Yakima County residents and businesses to the financial and emotional costs of recovering after disasters. The risk associated with natural and technological hazards increases as more people move to areas affected by these events. The inevitability of natural and technological hazards, and the growing population and activity within the county create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying risks posed by both natural and technological hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the county to create a hazards mitigation plan that addresses the potential impacts of hazard events.

A composite of the Yakima County Profile—population; labor; economy; government; transportation and utilities can be found both in this section and in Annex 1

Annexes x-xx provide information that focuses on profiles for Yakima County jurisdictions—population, labor, economy, and government

Index of Supporting Maps. GIS maps attached to each annex illustrate the following elements of Demographical Data:

Demographics Elements

Population Density

Land Use Elements

Major Land Ownership (Unincorporated Areas)
Existing Land Use--Upper Valley
Existing Land Use--Lower Valley

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YAKIMA COUNTY PROFILE

Population	Education	Community
Economy	Government	Transportation
Labor	Housing	Culture

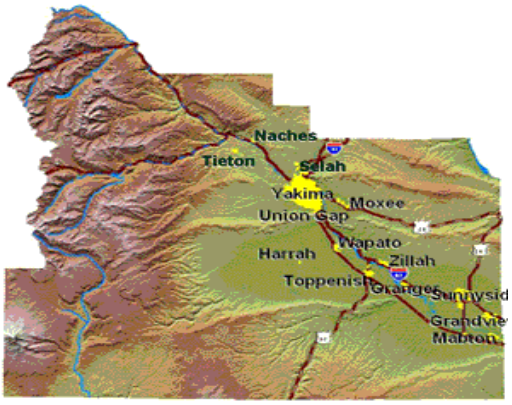
Location

Yakima County is located in South Central Washington State. It is bounded to the north by Kittitas County, to the south by Klickitat County, on the west by Thurston, Lewis and Skamania Counties and the east by Benton and Grant Counties. The geography varies from densely timbered, mountainous terrain at the crest of the Cascade Mountain Range in the west to rolling foothills, broad valleys, and arid sagebrush covered regions to the east to fertile valleys in the central and southern parts of the County that has made agriculture the staple of the economy over the last 100 years. The highest point in the county is Mount Adams at 12,277 feet (3,742 meters) above sea level. The city of Yakima sits at 1,068 feet.

Yakima County is 4,296 square miles, or approximately 2.75 million acres, making it the second largest county in Washington. Three entities own over 1.7 million of the total acres of Yakima County. The city of Yakima, the tenth largest city in the state, contains over 35% of the population (84,074). 90% of the state's population is within a 3-hour drive from Yakima.

Land Owner	*Acres Owned*
Yakama Nation	1,074,174
U.S. Forest Service	503,726
Military Reservation	165,787

The County derives its names from the regional Yakama Indian tribes. There are several theories on the meaning of "Yakima," including a native legend about a Chief's daughter from Moxee who fled from her home after breaking tribal rules. The word Yakima in this legend means "runaway." Others believe "runaway" refers to the rivers that surround the valley. Yakima has also been interpreted to mean "well-fed people."



Climate

Yakima has four distinct seasons. Sunshine is the norm in Yakima County, and nearly of 300 days per year. Average precipitation is 8 inches a year, of which 24 inches occurs as snowfall in the months of November, December, and January. The average temperature in the winter is 37°, spring 63°, summer 88°, and fall 64°. This favorable weather makes Yakima a leader in agricultural products, wine growing, outdoor recreation & tourism

YAKIMA VALLEY HIGH YIELD GROWTH

Demographics

Yakima is the largest city in the county. In addition to its permanent resident base, the county has a large seasonal population related to the agricultural industry. This temporary population has been estimated at up to 50,000 during peak activity.

Area Population	2010	2011	2013
County	243,231	244,700	246,640
Unincorporated	83,889	85,090	84,300
Incorporated	159,342	161,887	162,340
Grandview	10,862	10,920	11,010
Granger	3,246	3,270	3,315
Harrah	625	630	645
Mabton	2,286	2,290	2,305
Moxee	3,308	3,415	3,655
Naches	795	805	805
Selah	7,147	7,205	7,340
Sunnyside	15,858	16,010	16,200
Tieton	1,191	1,195	1,235
Toppenish	8,949	8,950	8,950
Union Gap	6,047	6,055	6,110
Wapato	4,997	5,025	5,035
Yakima	91,067	91,630	92,620
Zillah	2,964	3,000	3,115

Total County Population by Age

Age	2013	Estimate 2015
0-19	81,328	77,023
20-24	17,217	13,962
25-54	92,000	92,795
55-64	26,821	27,213
65+	31,393	28,443
Total	**247,250**	**239,436**

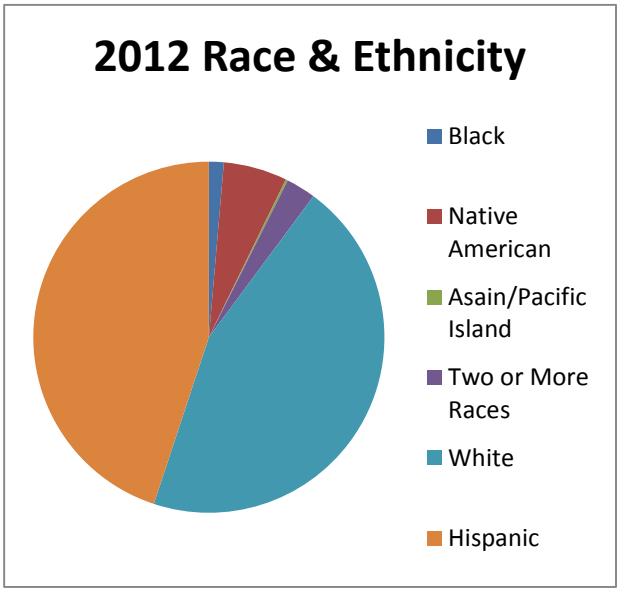
The median age in 2013 was 33.31, with median age of men being 32.07, women 34.46.

Classification	2012
Speaking English only	60.8%
Speaking language other than English	39.2%
Speaking Spanish at home	37.3%
Other languages	.8%
Asian and Pacific Islander	.7%
Speaking Indo-European	.4%

Income	
2012 Median Household Income	$49,008
2012 Per Capita Income	$19,610
2012 Annual Covered Wage	$33,108

Ethnicity

Classification	*2012*
White	114,597
Black	3,457
Native American	14,077
Asian/Pacific Island	493
Two or More Races	6,915
Hispanic (*race*)	114,350
Total	246,977



Sources of Personal Income - 2012 (000's)

Total Personal Income	$8,566,757
Net Earnings	*$4,841,330*
Personal Current Transfers	*$2,152,369*
Investment, Dividends, Rent	*$1,573,052*
Retirement/Transfer Pmts	$ 585,272
Non-Farm Proprietors Income	$ 566,577
Farm Proprietors Income	$ 311,375
Earnings by place of work	$5,390,643
Wages/Salaries	*$3,572,908*
Other Labor	*$ 566,577*
Proprietors	*$ 877,952*

Structure of Economy

Agriculture

Yakima County has 558,000 irrigated acres of private land used for agriculture. As the state's leading agricultural county ($850 million per year), Yakima has a large and highly varied farm base, complemented by diverse non-agricultural sectors. Yakima County is Washington State's number one producer of apples, hops, corn, spearmint, peppermint and grapes and one of the top producers of sweet cherries. Farmers in the Yakima Valley harvest 40 million pounds of hops annually – 20% of the world's supply. Yakima's wine industry has gained national awareness, producing blue ribbon varieties of Riesling, Merlot, and Syrah wines. Yakima produces 29% of the nation's cherries, 42% of the nation's pears, and 38% of the nation's concord grapes. Yakima County has the largest inventory of bee colonies, cattle and sheep of any county in the state. Washington ranked first in the nation for milk production per cow

Non-Agricultural Industries

Between February 2012 and 2013, the Yakima County nonfarm labor market added 1,800 jobs, a 2.4% upturn.

Wholesale/Retail Trade

Trade comprises 22 percent of the non-farm employment, or 13,000 jobs. Yakima County has a high concentration in wholesale trade (i.e. fresh fruit packing houses) reflecting warehousing of food products. They added 700 jobs in 2006; retail sales for the county were over 2.6 billion.

Construction, Mining, Forestry

Construction accounts for the vast majority of jobs in this category. Residential and commercial real estate sales increased 1.2% in 2006, allowing the construction industry to add 400 new jobs.

Services

The Services industry is the largest employment group in Yakima County employing about 66,500. Health care comprises 19% of this growing industry, reflecting Yakima's importance as a regional medical center.

Government

Over 21% of the county's non-farm work force is in government. Of the three levels of government (federal, state and local) the largest numbers of employees are in the local level, specifically in the elementary and secondary school system. The Yakima Training Center, located seven miles north of Yakima, is the Army's premier maneuver training area in the Northwest and has 325 permanent military/civilian personnel.

Manufacturing

Closely tied with Washington's agricultural tradition is value added manufacturing processes with specific focus on food processing. These activities include milling, blending, packaging, canning, freezing, processing, manufacturing, and refining end products for industrial, business and consumer production. Food processing represents about 40 percent of the manufacturing sector. It's more than 250 firms employ nearly 8,000 workers, and, in 2006, the gross sales for Yakima's food processors exceeded $1.4 billion. A significant share of manufacturing employment stems from the agricultural sector but lumber & wood products, non-electrical machinery, paper and allied products, transportation equipment, metals, plastics, and fabricated metal products all have a significant impact. Bio-fuel is an emergent industry with a bright future in Yakima County, and includes bio-diesel, bio-gas and ethanol products.

Top 16 Employers - 2013

Company	FTEs
Yakima Valley Memorial Hospital	2200
Yakima School District, No. 7	1756
Wal-Mart -Yakima/Sunnyside/Grandview	1700
Zirkle	1500+
Washington Fruit	1500+
Borton	1212
Yakima County	1027
Monson Fruit	1023
Yakima Valley Farm Workers Clinic	1006
Yakima Regional Cardiac & Medical	985
AB Foods & Washington Beef	900
Sunnyside School	740
City of Yakima	681
Yakama Nation Legends Casino.	644
Tree Top	615
Shields Bag and Printing	500

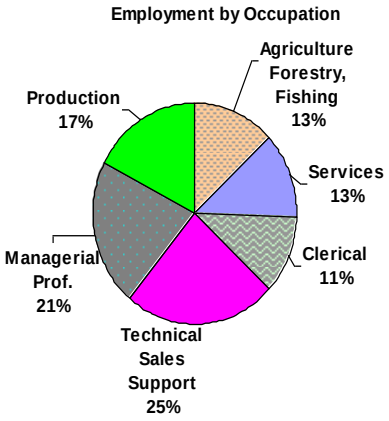
2012 - # Firms, Employees & Covered Wages Paid

	#Firms	Employees	Wages (million)
Ag, Forestry & Fishing	1,082	27,029	$651,858
Mining/Construction	557	2,646	$106,531
Manufacturing	224	7,813	$318,746
Transportation, Warehousing, Utility	206	3,054	$121,660
Trade (Wholesale/ Retail)	868	14,025	$451,836
Finance, Insurance, Real Estate, Information	387	3,137	$135,466
Services	3,624	3,978	$61,194
Government	138	16,773	$723,999
Totals	6,584 Firms	78,455 Employees	$2,571,294,029 Wages

Labor Analysis

Yakima County's total non-agricultural employment in 2012 was 125,257. The labor force fluctuates throughout the year due largely to seasonal agricultural activity and ranged in size from 118,489 to 135,363 in 2013. The average unemployment rate for 2013 was 9.2%, which represents an average of approximately 11,500 people monthly looking for work

Yakima County's employment outlook has been one of continued growth. From 2012-2014, jobs have increased by 8,760 in the county.



2012 Annual Workforce - 16 & Over

Labor Force	Employed	Unemployed
125,250	102,748	12,240
Total Firms	**Unemployment Rate**	**Average Annual Wage**
8,501	8.0%	$33,108

Labor Force & Industry Employment, not seasonally adjusted (Yakima County)		
	2012	2013
**NAICS Industry (numbers in thousands)	An Avg	An Avg
Total Nonfarm 1/	78.8	79.2
Total Private	61.8	62.2
Goods Producing	11.0	11.3
Mining, Logging, and Construction	3.0	3.2
Manufacturing	8.0	8.1
Nondurable Goods	5.2	5.4
Service Providing	67.8	68.0
Private Service Providing	50.8	50.9
Trade, Transportation, and Utilities	17.5	18.0
Wholesale Trade	4.1	4.4
Retail Trade	10.2	10.4
Transportation and Utilities	3.2	3.3
Professional and Business Services	4.0	4.0
Education and Health Services	16.4	16.1
Health Care and Social Assistance	15.4	14.9
Leisure and Hospitality	6.7	6.7
Food Services	4.8	4.9
Government	17.0	17.1
Federal Government	1.3	1.2
State Government	2.7	2.7
Local Government	13.1	13.1

May 2013 Salary Information	Entry Level	Mean Hourly	Hourly – Fully Experienced	Mean Yearly
Bookkeeping, Accounting, Auditing Clerk	$14.61 hr	$17.97	$21.01	$37,370
First-Line Manager/Supervisor - Production	$15.93 hr	$22.76	$27.42	$47,330
Sales Reps, Wholesale & Manufacturing	$30.12 hr	$41.02	$52.73	$85,320
Purchasing Agents – Wholesale, Retail	$19.37 hr	$25.35	$29.62	$52,740
Human Resource Manager	$31.42 hr	$43.37	$53.99	$90,200
Office Clerks, General	$11.92 hr	$14.83	$16.97	$30,840
Machinist	$15.71 hr	$19.95	$23.89	$41,500
Structural Metal Fabricators & Fitters	$16.47 hr	$18.29	$20.34	$38,030
Assembly & Fabricators	$9.49hr	$13.04	$15.44	$27,130
Laborers of Freight/Material Movers	$9.67 hr	$12.25	$14.30	$25,470
Helpers – Production Workers	$9.49 hr	$11.28	$13.00	$23,460
Truck Driver, Heavy or Tractor Trailer	$13.92 hr	$17.24	$19.92	$35,860

Education

Yakima County offers a complete range of educational resources. Options range from a private technical college and to major universities. Parents can choose from a wide variety of public and private educational settings for their children.

Primary & Secondary Education

Public School Districts	Enrollment (2013)
East Valley	3,000
Grandview	3,453
Granger	1,496
Highland	1,246
Mabton	899
Mt. Adams	985
Naches Valley	1,390
Selah	3,459
Sunnyside	6,493
Toppenish	3,836
Union Gap (K-8)	599
Wapato	3,426
West Valley	4,929
Yakima	15,186
Zillah	1,322
Total	51,719

Private schools (Top 10 most attended)	Enrollment (2012-2013)
La Salle High School	196
Montessori School of Yakima	105
Riverside Christian School	350
St. Joseph/Marquette	341
St. Paul Cathedral School	220
Sunnyside Christian Elementary	250
Sunnyside Christian High	80
Westpark Christian Academy	80
Yakima Adventist Christian	85
Yakima Nation Tribal School	108
Total	**1,815**

Number of Public Districts	**15**
Total Number of Teachers	2,870
Total Operating Revenue	$491,702,920

Education Levels of Population

Persons 25 years and older 2012

Years of school completed	Percentage
Less than 9th grade	17.0%
4 or more years of high school	71.1%
4 or more years of college	15.9%

Higher Education

Over 20,000 students are enrolled in higher education in area colleges and vocational-technical schools. The largest school in the region is Central Washington University, located within commuting distance in nearby Ellensburg.

Higher Education Technical Institute	Enrollment 2013-2014
Central Washington University	10,737
Yakima Valley Community College	9,226
Heritage College	1,108
WSU Extension	1,347
Perry Technical Institute	685
Pacific Northwest University Of Health Sciences	364

Central Washington University

CWU is a branch of the state of Washington's higher education system. It is a four-year university offering undergraduate degrees in arts and sciences, business, professional education, technical fields, and graduate degrees at the master's level in arts and sciences and professional education.

Yakima Valley Community College

YVCC is a public two-year institution offering 58 programs of study. It provides lower division college arts and sciences, university transfer, and vocational & technical education. They feature a well-respected two year nursing program while also allowing the student to earn their Bachelor's in nursing through work-based internships and clock hours.

Washington State University Learning Center

is a Higher Education Center offering four-year and postgraduate degrees in partnership with Central Washington University and Washington State University.

Heritage University

Heritage is a private four-year institution whose major fields of concentration are teacher education, business administration and social sciences.

Perry Technical Institute

Perry Tech is a privately endowed, non-profit institute that offers a nationally recognized vocational/technical program. In cooperation with Central Washington University, it offers extension programs in engineering, robotics, and other technology.

Pacific Northwest University of Health Sciences

Opened in 2007 PNWU is the Pacific Northwest's first Osteopathic Medical University focusing on the education of primary care physicians for practicing in rural and underserved communities. They also offer the courses from the College of Allied Health Studies and College of Post Graduate Studies.

Government

Yakima County has a County Commission with three elected commissioners. The city of Yakima has a City Manager, a seven-member City Council and serves as the county seat. There are 15 incorporated towns within the county that are governed by town councils. Yakima County maintains 1,737 miles of roads, a large majority of which are oiled or gravel. There are 12 County Fire Districts that operate outside the Valley's major towns or cities. Over 600 paid and volunteer firemen help run these rural fire stations. Yakima County maintains a jail facility with an average monthly inmate population of over 600.

Yakima County Building Permits

Year	Permits Issued	$Value-Millions
2013	77	$ 109.4

Retail Sales-City and County

Year	City of Yakima	Countywide
2013	$ 1,630,076,358	$ 3,214,688,425
2012	$ 1,532,458,231	$ 2,979,171,518
2011	$ 1,405,582,328	$ 2,777,584,276
2010	$ 1,430,578,741	$ 2,722,622,265
2009	$ 1,421,263,019	$ 2,724,992,404
2008	$ 1,539,739,751	$ 2,954,364,053

State and Local Tax Structure

Washington State uses sales and use taxes, business and occupation (B&O) taxes, gas taxes and property taxes to generate a predominate share of overall state revenue. The state's tax structure is relatively stable when tracked against changes in personal income. Washington State has no corporate income, unitary, or inventory tax. There is also no tax on interest, dividends, or capital gains. The business and occupation tax is based on gross receipts generated within the state. Local governments work within the state tax collection system. A portion of local property taxes and sales taxes is also retained by Yakima County. Total Assessed Value of all Taxable Property in 2013 = $14,671,231,105. Total Property Tax Collected 2013 = $191,871,368.

Average Property/ Tax Levy Rates $/000			
Year	2010	2012	2013
Levy Rate	11.58	11.80	11.85

Tax Rates 2014

Washington State Sales Tax	6.5 %
Yakima City Local Tax	1.7 %
Other City Local Tax Rates	1.5 %
Real Estate Tax	.0025 %

Yakima County General Fund - Revenues & Expenditures

Revenue By Source	***2013***
Property Taxes	$37,826,621
Sales and Use Taxes	$22,440,640
Other Taxes	$2,890,905
Licenses and Permits	$411,400
Intergovernmental	$37,164,780
Charges for Services	$18,918,755
Fines and Forfeits	$2,769,633
Interest Earnings	$1,781,672
Special Assessments	$997,784
Donations	$73,971
Other Revenues	$1,283,458
Total Revenue	***$126,559,619***

Expenditures by Function	***2013***
General Government Services	$19,704,599
Judicial	$8,671,891
Public Safety	$40,081,001
Physical Environment	$2,534,416
Transportation	$12,542,883
Economic Environment	$4,897,056
Health and Human Services	$18,854,038
Culture & Recreation	$397,164
Debt Service (Principal & Interest)	$4,892,351
Capital Outlays	$9,178,693
Total Expenditures	***$121,754,092***
Excess (Deficit) Revenues Over Expenditures	*$4,805,527*

Housing – Yakima County

March 2014 Residential Sales	
Residential Sales	315
Average Price	$163,869
Active Listings	979

2014 Sales by Category

Category	Sale Price	Sales
Agricultural	$82,158,462	193
Commercial	$91,102,709	137
Manufacturing	$13,092,481	17
Multi Family	$11,102,350	62
Other	$34,518,876	264
Single Family	$372,324,006	2649

Cost of 2,200 sq. ft. Single Family Home

Area	*Cost*	*Area*	*Cost*
Yakima	**$159,100**	Seattle	$344,400
Tri-Cities	$181,700	Spokane	$171,000

Housing Availability – January 2014		
Description	**#**	**Avg List price**
4+ Bedrooms	216	$335,957
3 bedrooms	374	$229,308
1-2 bedrooms – all areas	125	$139,427
Condo/Townhouse	40	$152,923
All homes on the market	715	$244,988
Manufactured Home, with land	80	$146,744

Rental Information - 2014	
Description	Average Cost (Yakima)
Home (s)	
One Bedroom	$450 - $700
Two Bedroom	$550 - $1,100
Three Bedroom	$850 - $2,000
Duplexes	
One Bedroom	$450 - $700
Two Bedroom	$550 - $1,100
Three Bedroom	$950 - $1,500
Apartments	
Studio	$350 - $600
One Bedroom	$500 - $745
Two Bedroom	$750 - $1150

ACCRA Cost of Living Index - Selected Cities – Annul Report 2013						
Weight	**Cost**	**Yakima WA**	**Seattle WA**	**Portland OR**	**Spokane WA**	**Tri-Cities WA**
100%	Composite Index	**91.7**	**119.1**	**101.4**	**96.0**	**95.8**
13%	Grocery Items	**91.9**	**102.9**	**88.1**	**92.1**	**90.7**
29%	Housing	**86.8**	**141.1**	**98.6**	**89.1**	**101.8**
10%	Utilities	**80.7**	**97.0**	**94.6**	**91.3**	**90.5**
11%	Transportation	**100.0**	**118.6**	**109.6**	**99.8**	**99.3**
4%	Health Care	**111.0**	**119.1**	**109.8**	**110.0**	**107.5**
32%	Misc. Goods & Services	**98.7**	**115.1**	**106.7**	**100.9**	**91.7**

Banking/Financing

Yakima County has 167 banks and financial institutions. This includes nine commercial banks with 44 branches, one savings and loan with four branches, one savings bank with six branches and eight credit unions with 15 branches. Combined total deposits are $2+ billion. The local business community has access to comprehensive financial services including assistance with international business transactions.

Several non-traditional finance programs are available to businesses and entrepreneurs. Micro-loans from $1000-$25,000 are available to emerging businesses that complete a certified training program. Other loan programs such as Small Business Administration [SBA], State Development Loan Fund, Industrial Revenue Bonds and others offer financing ranging from $10,000-$10,000,000. Most of these programs operate in conjunction with a commercial banking institution and the borrower will usually have to obtain credit approval from a bank to access these programs.

Community Facilities

Health Care

Yakima County, the region's medical center, has five hospitals and a number of clinics. The largest two hospitals, *Yakima Regional Medical and Cardiac Center and Yakima Valley Memorial Hospital*, are located in the city of Yakima. Yakima Regional, with a hospital in *Toppenish,* was named among the top 100 cardiovascular hospitals in the nation. *Sunnyside Community Hospital* serves the Lower Valley and is a critical access hospital with a 24 hour emergency room, 4 bed Intensive Care Unit, Medical Surgical Floor, Family Birth Center, Operating Rooms, Laboratory and Diagnostic Imaging (X-Ray, CT Scan, Mobile MRI, Ultrasound, Nuclear Medicine, Bone Density Scan). *Children's Village* is a comprehensive medical facility designed for children with disabilities and special health needs. *North Star Lodge* provides total care outpatient cancer treatment. The *Yakima Regional Cancer Care Center* was opened in 2000 to provide a one-stop location for a wide range of out-patient cancer services. Approximately 275 physicians from 36 medical specialties support these hospitals, providing surgical, general medical, neurosurgery, oncology, coronary care, intensive care, pediatric services and maternity.

Worship

There are over 250 churches in Yakima County. The variety includes divisions of Christianity, Jewish, Buddhist, Latter Day Saints, and other non-denominational practices.

Media

Newspapers

Publication	Frequency	Circulation
Yakima Herald Rep.	daily	29,821
Daily-Sun News	daily	4,000
VIVA	weekly	9,000
Toppenish Review	weekly	6,400
Grandview Herald	weekly	2,500
Wapato Independ't	weekly	2,000
Selah Independent	weekly	1,800
Yakima Bus Times	monthly	6,000
Valley Press	weekly	22,000
Centr'l Wa S. Times	weekly	19,000

Television Stations

Station	Affil.	L-Local C-Cable
KIMA	CBS	L29/C6
KNDO	NBC	L23/C4
KAPP	ABC	L35/C2
KYVE	PBS	L47/C8
KCYU	FOX	L68/C3
UNIVISION		L2.1/C18

Radio Stations

Station	Frequency	Category
KYXE	AM1020	Spanish
KJOX	AM1390	ESPN/Sports
KUTI	AM1460	Country
KIT	AM1280	News/Talk
KATS	FM94.5	Rock
KXDD	FM104.1	Country
KDBL	FM92.9	Country
KFFM	FM107.3	Contemporary
KYPL	FM91.1	Christian
KYAK	AM930	Christian
KRSE	FM105.7	Soft Rock
KENE	AM1490	Spanish
KARY	FM100.9	Oldies
KDNA	FM91.9	Spanish
KZTA	FM96.9	Spanish
KHHK	FM99.7	Hot Rock
KBBO	AM980	Talk Radio

Transportation

Major Highways

Interstate 82 runs through the heart of Yakima County. The modern freeway links with Interstate 90 at Ellensburg, just 30 miles north of Yakima and Interstate 84 to the south. I-90 connects Seattle with New York City. Major highways include US Routes 12 and 97, and State Routes 22, 24, 241and 410.

Local Transit

Yakima Transit buses connect Yakima, Selah, and Union Gap with all downtown services. Buses run every 20 minutes.

Airport

General aviation service is available at Yakima Air Terminal, Sunnyside Airport, and Buena Field. Yakima has a 7,603 and a 4,239 foot asphalt runway. Sunnyside has a 3,500 foot asphalt runway, while the Buena runway has 2, 600 feet of turf. Yakima is served by Horizon Air with three flights daily to Seattle. There are two full service fixed base operators on the airfield. Airfreight service is available from Federal Express and UPS.

Motor Freight Carriers

Within Yakima County there are 10 trucking firms for heavy hauling, one for liquid or dry bulk, two for local cartage, and 38 for motor freight.

Railroads

Rail shipment to and from Yakima County is available via Burlington Northern Santa Fe and Central Washington railroad lines with 292 active spurs throughout the county.

Ports

Puget Sound is three hours from Yakima County and provides major international ports on the Pacific Ocean. Inland ports are available within two hours on the Columbia River.

Bus Service

Greyhound Bus Lines serve daily routes from Grandview, Sunnyside, Granger, Toppenish, Wapato, and Yakima to Seattle, Pasco, and Portland.

Utilities

Electric

Hydroelectric dams on the Columbia and Snake Rivers provide Washington State with the lowest rates in the nation. Yakima County is served by two electric utilities, Pacific Power, an investor-owned utility, and the Benton County Rural Electric Association.

Natural Gas

Cascade Natural Gas Corporation distributes natural gas throughout Yakima County with service available for all types of installations. An ample supply of natural gas from U.S. and Canadian sources is expected to meet all anticipated future demand.

Solid Waste Disposal

Solid waste collection service is available throughout the county either by municipal systems or private companies. There are three solid waste landfills and two transfer station within Yakima County. The area has recycling centers for a number of items.

Water

There are 16 municipal/public water systems in the county. Through interagency agreements, they are able to meet water demands in a more efficient manner.

Wastewater

Each city operates its own wastewater collection system. The Port of Sunnyside operates a system dedicated to the treatment of industrial waste. The regional treatment plant operated by the city of Yakima has a delegated industrial pretreatment monitoring program in place.

Telecommunications

Advanced telecommunication services are available in Yakima County. Competition between local providers has helped improve telecommunications infrastructure dramatically. Extensive fiber optic cables are in place in most of the major communities in the region, including Yakima. These systems are supported by four different state-of-the-art digital switches. Multimillion dollar investments allow businesses to tap into broadband services that are increasingly in today's digital economy. Cowiche Telephone, CenturyLink, United Telephone, and Fairpoint Communications serve Yakima County. Cellular companies serving Yakima County are: AT&T, U.S.Cellular, Verizon, Sprint, and T-Mobile.

Culture/Recreation

Yakima County offers an almost limitless variety of recreational opportunities. Twelve ski resorts within a few hours drive offer excellent downhill and cross-country skiing. 71 lakes, 14 rivers and numerous streams offer stream and lake fishing, white water rafting, boating, swimming, windsurfing and water skiing. Upland bird and big game hunting, backpacking, hiking, bicycling are all available in season. Golfing (three private and six public courses) challenges even the master golfer. At the Apple Tree Golf Course water hazards come into play on twelve holes. The signature hole is #17, a 180-yard, par 3, requiring a tee shot over water to an apple-shaped island green. "Golf Digest" has rated this as one of the top ten "Best in State" courses. Tennis, baseball and softball are avidly pursued sports. Park and Recreation departments offer varied year round programs for both children and adults.

Entertainment events include the annual Central Washington State Fair, Wild West Parades & Rodeos, auto racing, art fairs, and colorful community celebrations and festivals. Yakima is the home to several semi-professional sports teams: The Yakima Valley Pippins, the Yakima Reds (soccer - 2000 Western Conference Champions and 2003 Northwest Division Champions), the Yakima Valley Warriors (indoor football, American Indoor Football Association affiliate), and the Yakima Mavericks (outdoor football, Evergreen Football League). NASCAR sanctioned stock car racing and drag racing can be experienced at the Yakima Speedway or Renegade Raceway.

Touring professional and local performing arts are regularly presented at the beautifully restored Capitol Theatre in Yakima where the Yakima Symphony Orchestra and Chorus perform and Broadway style shows are featured, The Seasons Performance Hall, a 100-year old church transformed into a performing arts venue, and an active community theatre group performs at the Warehouse Theatre.

There are 63 historic and culturally significant sites within Yakima County. Art galleries, Libraries, Yakima Valley Museum, Yakama Indian Nation Cultural Center and the Legends Casino, Agricultural Museums, McAllister Museum of Aviation, Fort Simcoe State Park, and the Historical Toppenish Murals preserve our history and enrich our culture in Yakima County.

Hotel & Convention Facilities

There are over 2,900 hotel and motel rooms available in the Yakima County. Additional facilities are available in several of the smaller communities and in more rural, secluded settings. The Yakima Convention Center offers 41,000 square feet of meeting space, free parking, on site caterers, an all-inclusive bid process that offers booking incentives, and a full range of support services.

For additional information on Yakima County contact:

Yakima County Development Association
(509) 575-1140
www.ycda.com
Economic development, sites and buildings, workforce

Yakima County
1-800-572-7354
http://www.yakimacounty.us/
Public works, permitting, planning

Greater Yakima Chamber of Commerce
(509) 248-2021
www.yakima.org
Business networking and advocacy

City of Yakima
(509) 575-6000
www.ci.yakima.wa.us
Public works, permitting, community development

Yakima Valley Visitors and Convention Bureau
1-800-221-0751
www.visityakima.com
Tourism and convention center information

Section 3
Risk Assessment

What is a Risk Assessment?

Conducting a risk assessment can provide information on the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural and technological hazard events. Specifically, the levels of a risk assessment are as follows:

(1) ***Hazard Identification*** identifies the geographic extent and intensity of the hazard, and the probability of its occurrence. Maps are frequently used to display hazard identification data. Yakima County identified fifteen major hazards that consistently affect this geographic area. These hazards—avalanche, drought, earthquake, extreme temperatures, flood, hail, hazardous materials, landslide, lightning, severe winter storms, severe wind storm, tornado, volcanic eruptions and wildland fire--were identified utilizing input from the Hazard Mitigation Steering Committee and WA State 2013 Enhanced HMP. The geographic extent of each of the identified hazards has been identified by the Yakima County GIS department using the best available data, and is illustrated by the maps listed in Table 1.

(2) ***Profiling Hazard Events*** describes the causes and characteristics of each hazard, how it has affected Yakima County in the past, and what part of Yakima County's population, infrastructure, and environment might be vulnerable to each specific hazard. A summary of the hazard and its impact county-wide is found on the Risk Assessment matrices at the end of this section.

(3) ***Vulnerability Assessment/Inventorying Assets*** combine hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard. Critical facilities are of particular concern because these entities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life in the county and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified, mapped, and are illustrated in Maps at the end of this section. A description of the critical facilities in the county is also provided in the county's *Hazard Identification and Community Assessment, Section 3*. In addition, this plan includes a community issues summary in each hazard section to identify the most vulnerable and problematic areas in the county, including critical facilities, and other public and private property.

(4) ***Risk Analysis/Estimating Potential Losses*** involves estimating the damage, injuries, and financial losses likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. Using the best available data, the Yakima County Hazards Mitigation Plan estimates potential losses from the hazards discussed in the plan. For each hazard where data was available, quantitative estimates for potential losses are included in the hazard assessment.

(5) ***Assessing Vulnerability/Analyzing Development Trends*** provides a general description of land uses and development trends within the community so that mitigation options can be considered in land use planning and future land use decisions. This plan provides comprehensive description of the character of Yakima County in the Community Profile. This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Analyzing these components of Yakima County can help in identifying potential problem areas, and can serve as a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

List of Hazard Mitigation Plan Maps

Avalanche
Earthquakes
Flood Impact Areas
Geological Hazards
Hail
Hazardous Materials
Hispanic Populations
Landslides
Population Density
Public Owned Land
Tornadoes
Transportation Corridors
Volcanoes
Wildland Fire
Wind

Note: *The information on the maps in this plan was derived from Yakima County's GIS. Care was taken in the creation of these maps, but is provided "as is". Yakima County cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.*

Profiling Hazard Events--Hazard/Population at Risk

Yakima County is vulnerable to approximately thirty-nine threats and hazards. They range from natural to technological--human caused events. From the list of hazards avalanche, drought, earthquake, erosion, extreme temperatures, flood, hail, hazardous materials, landslide, lightning, severe winter storms, severe wind storm, tornado, volcanic eruptions and wildland fire--were identified as the greatest threat to its citizens. A matrix for every hazard identified can be found in the reference above. For the purpose of the Hazard Mitigation Plan, major focus is placed on Natural Hazards. Hazardous Materials has been included in the HMP.

Yakima County Types of Threats and Hazards	
Natural **Resulting from acts of nature**	**Technological/Human-Caused** **Involves accidents or the failures of systems and structures** **Caused by the intentional actions of an adversary**
Avalanche	Air Pollution
Drought	Attack, Conventional
Earthquake	Building/Structure Collapse
Erosion	Business Interruption
Extreme Temperatures	Chemical Stockpiles
Flood	Civil Unrest
Hail	Ecological Terrorism
Landslide	Economic Emergency
Lightning	Energy Emergency
Severe Wind Storm	Financial Collapse
Severe Winter Storm	Fire/Explosion
Tornado	Fuel Shortage
Volcanic Eruption	HM Accident, Fixed Facility
Wildland Fire	HM Accident, Transportation
	Hostage Situation
	Power Outage
	Radiological, CGS or DOE
	Radiological, Transportation
	Riot/Demonstrations/Violent Protest/Illegal Assembly
	Sabotage
	Strike
	Transportation Accident, Aircraft
	Transportation Accident, Railroad
	Weapons of Mass Destruction: biological, chemical, explosive, incendiary, nuclear incidents
	Workplace Violence: business/industry and schools

Summary of Jurisdictional Hazards for HMP. Jurisdictions will gain an understanding of their specific threat/hazard by cross-reference their hazard with the Profiling Hazards Chart on the following pages.

Jurisdiction	Hazards Identified in Their HMP
Yakima County Unincorporated	Avalanche, Drought, Earthquake, Erosion, Extreme Temperatures, Flood , Hail, Hazardous Materials, Landslide, Lightning, Severe Winter Storm, Severe Wind Storm, Tornado, Volcanic Eruption, Wildland Fire
Grandview, City of	Drought, Earthquakes, Extreme Temperatures, Hazardous Materials, Lightning, Severe Wind Storm, Severe Winter Storms, Volcanic Eruption
Granger, City of	Earthquake, Erosion, Flood, Hail, Hazardous Materials, Severe Wind, Severe Winter Storm
Harrah, Town of	Drought, Earthquakes, Erosion, Flood (Dam/Canal Failure), Hail , Hazardous Materials, Lightning, Severe Wind Storm, Severe Winter Storms, Tornado, Volcanic Eruption, Wildland Fires
Mabton, City of	Earthquake, Hazardous Materials, Severe Wind Storm, Severe Winter Storm, Volcanic Eruption
Moxee, City of	Drought, Earthquakes, Extreme Temperatures, Hazardous Materials, Severe Wind Storm, Severe Winter Storms
Naches, Town of	Drought, Earthquakes, Floods, Hazardous Materials, Severe Wind Storms, Severe Winter Storm, Volcanic Eruption, Wildland Fires
Selah, City of	Earthquakes, Floods, Hazardous Materials, Landslide, Severe Wind Storms, Severe Winter Storm, Volcanic Eruption, Wildland Fires
Sunnyside, City of	Earthquakes, Floods (Private Dam and Canal Failures), Hazardous Materials (Fixed and Transportation), Pipelines, Severe Wind Storms, Severe Winter Storms, Wildland Fires
Tieton, City of	Earthquakes, Floods (Dam Failure Impact Area) , Hazardous Materials (Fixed and Transportation), Severe Wind Storms, Severe Winter Storms, Wildland Fires
Toppenish, City of	Earthquakes, Floods , Hazardous Materials, Severe Wind Storms, Severe Winter Storms, Wildland Fires
Union Gap, City of	Earthquakes, Floods (River/Stream) , Hazardous Materials (Fixed and Transportation), Landslide, Severe Wind Storms, Severe Winter Storms, Volcanic Eruption
Wapato, City of	Earthquakes, Floods , Hazardous Materials, Severe Wind Storms, Severe Winter Storms, Wildland Fires
Yakima, City of	Drought, Earthquakes, Extreme Temperatures, Floods, Severe Wind Storms, Severe Winter Storms, Tornadoes, Volcanic Eruptions, Wildland Fires
Zillah, City of	Earthquakes, Floods, Hazardous Materials, Landslide, Severe Wind Storms, Severe Winter Storms, Wildland Fires

Profiling Hazards

Hazard Type	Should it be Profiled	Explanation Reference: Part Two—Hazard-Specific Information
Avalanche	Yes	Based on the location of key transportation routes and recreational areas threatened by avalanche, parts of Yakima County would be vulnerable. Yakima County Planning Division uses policies and ordinances to mitigate for avalanches and other geologic hazards. Reference: Part Two—Tab 1
Drought	Yes	From the State Hazard Mitigation Plan, a county is most vulnerable to drought if it meets at least five of seven criteria. Yakima County meets that criteria. Yakima County Comprehensive Plan update (Horizon 2040) will be updated by 2017. This update is expected to include a Hazard Mitigation element, which will address drought among other natural hazards. Reference: Part Two—Tab 2
Earthquake	Yes	Factors, including the size of potentially vulnerable populations and age of the housing stock, play a part in determining which counties are most vulnerable. Yakima County is at a greater risk and most vulnerable to earthquakes. Yakima County Planning Division uses policies and ordinances to mitigate for Earthquakes and other geologic hazards. Reference: Part Two—Tab 3
Erosion	Yes	Long-term erosion is a result of multi-year impacts such as repetitive flooding. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure Yakima County Planning Division uses policies and ordinances to mitigate for Erosion and other geologic hazards. . Reference: Part Two—Tab 4
Extreme Temperatures	Yes	Extreme heat is typically recognized as the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for an extended period. Fatalities can result from extreme temperatures, as they can push the human body beyond its limits (hyperthermia and hypothermia). Reference: Part Two—Tab 5

Hazard Type	Should it be Profiled	Explanation Reference: Part Two—Hazard-Specific Information
Flood	Yes	During the 1996 flood, the following communities experienced significant damage: Selah, Wapato and Toppenish on the Yakima River; Rock Creek, The Nile, Town of Naches, Gleed and Ramblers Park on the Naches River; Wiley City, Ahtanum and Emma Lane on Ahtanum Creek, and White Swan on Toppenish Creek within Yakima Nation. Flood damages are not well represented in Yakima County by insurance claims due to the relative absence of flood insurance for older flood prone homes. Of the above locations Rock Creek, the Town of Naches and Ramblers Park were behind PL84-99 levees that were overcome and resulted in larger scale devastation. Efforts to reinforce these three levees are either complete or underway. In addition bridges severely damaged on the mainstem during the 1996 flood have been replaced with structures with opening widths that are multiples of the original; at SR-24 and Donald-Wapato highway on the Yakima River and Powerhouse Road (Ramblers Park) on the Naches River. Yakima County Planning Division uses policies and ordinances to mitigate for floods. Yakima County Critical Areas Ordinance (Titles 16A and 16C) and Yakima County Shoreline Master Program (Title 16D) implements policies that restrict development in the floodplain and floodway and protect hydrologically related critical areas. These critical areas include flood hazard areas and wetlands, which provide flood flow attenuation and other flood mitigation functions. Reference: Part Two—Tab 6
Hail	Yes	A potentially damaging outgrowth of severe thunderstorms. Hailstorms frequently accompany thunderstorms, so their locations and spatial extents overlap. Hail can cause substantial damage to vehicles, roofs, landscaping, and other areas of the built environment. U.S. agriculture is typically the area most affected by hail storms, which cause severe crop damage even during minor events. Reference: Part Two—Tab 7
Hazardous Materials (Fixed and Transportation)	Yes	<u>Major highway system</u> Interstate 82 runs through the heart of Yakima County. The modern freeway links with Interstate 90 at Ellensburg, just 35 miles north of Yakima and Interstate 84 to the south. I-90 connects Seattle with New York City. Major highways include US Routes 12 and 97, and State Routes 22, 24, 241and 410. <u>Railroads</u> Rail shipment to and from Yakima County is available via Burlington Northern Santa Fe railroad with 292 active spurs

Hazard Type	Should it be Profiled	Explanation Reference: Part Two—Hazard-Specific Information
		throughout the county. Extremely Hazardous Substances (EPA defined) Yakima County has in its data base over two hundred facilities subject to this reporting. Reference: Part Two—Tab 8
Landslide	Yes	On October 11, 2009, a landslide occurred at approximately RM 22.3 (T 15N, R15E, Sec. 2) on the Naches River in Yakima County. The landslide was a rotational slump, approximately 16 million cubic yards in size. State Route 410 was obliterated in the slide area for a quarter mile, and the Naches River was completed blocked by landslide debris on the western side of the slide. Yakima County Planning Division uses policies and ordinances to mitigate for Landslides and other geologic hazards. Reference: Part Two—Tab 9
Lightning	Yes	Lightning can strike communications equipment (e.g., radio or cell towers, antennae, satellite dishes, etc.) and hamper communication and emergency response. Lightning strikes can also cause significant damage to buildings, critical facilities, and infrastructure, largely by igniting a fire. Lightning can also ignite a wildfire. Reference: Part Two—Tab 10
Severe Wind Storm		All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, heavy snow, large hail, thunderstorms, lightning, tornados, rain, snow or other mixed precipitation. Reference: Part Two—Tab 11
Severe Winter Storm	Yes	All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, heavy snow, large hail, thunderstorms, lightning, tornados, rain, snow or other mixed precipitation. Reference: Part Two—Tab 12
Tornado	Yes	All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities.

Hazard Type	Should it be Profiled	Explanation Reference: Part Two—Hazard-Specific Information
		Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, heavy snow, large hail, thunderstorms, lightning, tornados, rain, snow or other mixed precipitation. Reference: Part Two—Tab 13
Volcanic Eruption	Yes	Scientists define a volcano as active if it has erupted in historic time or is seismically or geothermally active. By this definition Mount Rainier, Mount Baker, and Mount St. Helens are active volcanoes. Mount Adams is also capable of renewed activity. On May 18, 1980 at 8:32 a.m., Mount St. Helens erupted killing 57 people. After a 5.1 magnitude earthquake, the volcano's summit slid away in a huge landslide, the largest in earth's recorded history. The landslide depressurized the volcano's magma system, triggering a powerful explosion that ripped through the sliding debris. Rock, ash, volcanic gas, and steam were blasted upwards and outward to the north. Over the course of the day, prevailing winds blew 520 million tons of ash eastward across the United States and caused complete darkness in the City of Yakima. Yakima County Planning Division uses policies and ordinances to mitigate for Volcanic Eruptions and other geologic hazards. Reference: Part Two—Tab 14
Wildland Fire	Yes	Residents in the west valley area of Yakima County who live near open shrub-steppe range areas have experienced repeated cycles of wildland fires. The Cowiche Mill fire of 2010 burned over 6,300 acres of shrub-steppe on Cowiche Mountain. This largely uninhabited zone is owned by public and private interests for use as grazing lands, recreating areas, habitat conservation, and wildlife/domestic animal migratory corridors. The 2010 fire in particular prompted local residents, government officials, a local recreation non-profit land owner, and local fire district leaders to come together and act to reduce the future risk of damaging wildfires. Yakima County Comprehensive Plan (Plan 2015) contains goals and policies that mitigate for fire hazards. The Yakima County Comprehensive Plan Update (Horizon 2040) is expected to include a Hazard Mitigation element which will address Wildland Fire mitigation goals and policies. Reference: Part Two—Tab 15

Risk Assessment Tool

The Yakima County Risk Assessment tool is an Excel spreadsheet, which is designed to measure a jurisdiction's risk from the effects of various hazards. The tool is based on a formula that weighs the probability and severity of potential impacts against preparations in place which are intended to minimize these impacts. Using a simple 1 to 5 scale, the probability of occurrence and the impact potential are tabulated along with mitigation efforts and the resources available to respond to the hazard. The score is based on a formula that weighs risk heavily but provides credit for mitigation and response and recovery resources. The higher the score, the higher the jurisdiction's risk from the hazard.

Hazards—avalanche, drought, earthquake, extreme temperatures, flood, hail, hazardous materials, landslide, lightning, severe winter storms, severe wind storm, tornado, volcanic eruptions and wildland fire.

Risk Assessment charts for county jurisdictions are located in separate annexes.

Scoring Guidelines.
There are eight risk assessment factors contained in the spreadsheet. All factor scoring is done on a scale of 1-5. The formula contained in the spreadsheet calculates higher scores in the occurrence and impact columns as increasing risks, while higher scores in the mitigation and resource categories lower the overall risk score giving credit for steps taken to reduce the likely impact. Based your scoring on a "worst-case scenario."

Historical Occurrence (Frequency):
Based on the number of occurrences: At least one occurrence every **1-4 years = 5**; At least one occurrence every **5-10 years = 4**; At least one occurrence every **11-50 years = 3**; At least one occurrence every **51-100 years = 2**; Has not occurred, but for **planning purposes** should be evaluated = **1**.

Probability of Occurrence:
Based on the statistical probability of the hazard occurring in a given year. This may be obtained by scientific research or may simply be an educated guess. The higher the probability, the higher the score. Use the following guideline in determining you score. If less than **5% score 1**, if **5% to 10% score 2**, if **10% to 20% score 3**, if **20% to 40% score 4**, and **score 5 if greater than 40%** probability.

Human Impact:
Score based on greatest possible impact should worst-case event occur within the jurisdiction. Consider the likely number of fatalities, injuries, homeless, etc. Score **1 low - 5 highest.**

Property Impact:
Score based on the economic costs of the event, including both direct and indirect property damage from the hazard. Smoke damage would be a 1 while a total loss should be a 5. Score **1 low - 5 highest.**

Business Impact:
Score based on factors such as service impact, lost wages, revenues, and taxes. Consider cost of relocation, permanent damage to valuable resources, etc. Score **1 low - 5 highest.**

Mitigation Activities:
Based on steps taken to mitigate the hazard such as security barriers, fire sprinklers, and redundant technical systems. The more mitigation measures taken, the higher the score. Score **1 low - 5 highest.**

Internal Resources:
Base your score on the internal response and recovery resources. High scores should be given when there are a formal on-site response teams, floor wardens, continuity teams, or recovery teams. Score **1 low - 5 highest.**

External Resources:
Base your score on the external resources that would be immediately available. This would include the local fire department. Give higher scores if there are specialized teams available or if contractor support such as hot sites, alternate facilities, and response teams are immediately available. Score **1 low - 5 highest.**

Understanding the Scores
Based on the weighted scoring formula hazards that are relatively high will score 3.5 or higher. The spreadsheet is programmed to change colors based on the score as follows:

Red	High Risk	Greater than 3.5
Yellow	Medium Risk	From 2.0 to 3.5
Green	Low Risk	Less than 2.0

These scores are based on subjective judgments but, nonetheless, they provide a means to quickly rate the jurisdiction's risk from various hazards. Based on this risk scoring, priorities for increased mitigation and preparedness activities can be determined

Risk Assessment

Jurisdiction: Yakima County Unincorporated
Date Completed: October, 2014
Completed by: Technical Advisory Group (TAG)

Type of Hazard	Historical Occurrence	Prob. of Occurrence	Human Impact	Property Impact	Business Impact	Mitigation Activities	Internal Resources	External Resources	Total
Natural/Technological									
Avalanche									0.0
Drought									0.0
Earthquake	3	1	1	1	1	1	1	1	1.4
Extreme Temperatures									0.0
Flood	4	4	3	3	4	4	3	3	3.8
Hail									0.0
Hazardous Materials	2	2	2	2	3	2	3	4	1.9
Landslide/Mudslide/Debris Torrent	2	2	3	3	3	1	3	4	2.4
Lightning									0.0
Severe Winter Storm	4	4	2	1	2	1	1	1	3.4
Severe Wind Storm	2	2	1	1	1	1	1	1	1.7
Tornado									0.0
Volcanic Eruption	1	1	2	2	2	1	4	5	0.9
Wildland Fire	4	4	2	2	2	2	4	5	2.8
Erosion									0.0
Dam break	0	1	5	5	5	1	5	3	2.8

Summary: This tool looks at an organization's or a community's vulnerability to the effects of various hazards. Using a scale of 1 to 5, the probability of occurrence and the impact potential are measured against mitigation activities and the resources available to respond to the hazard. The total is based on a formula that weighs risk heavily but provides credit for mitigation and response and recovery resources. The highest score possible is 5.0. The lower the total score, the lower the overall risk from the Hazard.

Instructions:

Score each hazard based on a scale of 0 to 5 with 5 being the highest.

Add or delete hazards as required based on your analysis.

Historical Occurrence: Based on number of occurrence in the last 20 years. Maximum is 5; if a new hazard use 0.

Probability: Score 1 if less than 1%, 2 if less than 5%, 3 if less than 10%, 4 if less than 20%, and 5 if greater than 20%.

Impact: Based on "worst-case scenario" - greatest possible impact should worst-case event occur.

Final Step: Sort the Total Column in descending order once scoring is completed.

Analysis Results:

High Risk: Greater than 3.5

Medium Risk: 2.0 to 3.5

Low Risk: Less than 2

Blank Intentionally

Hazard Impact on Critical/Essential Service—Natural and Technological Hazards

Generally, a catastrophic incident will demand extraordinary actions from state agencies and local jurisdictions - actions for which we are not currently well prepared. Yakima County is vulnerable to technological and natural hazards with the potential to cause significant casualties and infrastructure damage. Disasters labeled 'major' are not uncommon and the Yakima County Comprehensive Emergency Management Program (CEMP) addresses the response requirements of floods, earthquakes, hazardous materials and wildfires. These incidents cause injuries, loss of life and damage in a relatively limited area. Current procedures provide response and recovery for these incidents including terrorist incidents. In contrast a catastrophic incident impacts a large area or across many societal sectors. Mitigation efforts reduce impacts and current mitigation efforts are focused on many of the catastrophic scenarios in Yakima County; however a catastrophic incident is one that overwhelms. The nature and extent of damage; number, location and severity of personal injuries; type, availability and condition of surviving resources and the damages to critical infrastructure all are likely to be in the extreme range. Warning may or may not be available.

Yakima County jurisdictions would be subject to the following impacts. The 14 cities/towns will populate the following charts as part of their Annex.

(Keyed to Table)

Critical/Essential Service Impacts--Disruptions	Critical Facility Name/Location
1. Streets/roads debris, power lines, water	
2. Utilities power lines, water mains	
3. Health/medical health/medical care facilities	
4. Emergency response fire, police, ambulance	
5. Communications landlines, cell phones, radio linkages	
6. Continuity of government day-to-day business	
7. Private-sector business normal business activities	

Hazard Impact on Critical/Essential Service							
Critical/Essential Service Impacts--Disruptions	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Natural Hazards							
Avalanche							
Drought							X
Earthquake	X	X	X	X	X	X	X
Erosion	X						
Extreme Temperatures		X	X	X			
Flood	X	X	X	X			X
Hail	X			X	X		X
Landslide	X	X	X	X			X
Lightning					X		
Severe Winter Storm	X	X		X		X	X
Severe Wind Storm	X	X		X		X	X
Tornado	X	X		X	X	X	X
Volcanic Eruption	X	X	X	X	X	X	X
Wildland Fire				X			
Technological Hazards							
HM Accident, Fixed Facility			X	X			
HM Accident, Transportation	X		X	X			X

Section 4
Multi-Hazard Goals and Action Items

This section provides information on the process used to develop goals and action items that pertain to the fifteen natural and technological hazards addressed in the mitigation plan. It also describes the framework that focuses the plan on developing successful mitigation strategies. The framework is made up of three parts: ***Mission, Goals***, and ***Action Items***.

MISSION

The *mission* of the Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural and technological hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

GOALS

The plan *goals* describe the overall direction that Yakima County agencies, organizations, and citizens can take to minimize the impacts of natural and technological hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations that are outlined in the action items.

ACTION ITEMS

The *action items* are a listing of activities in which county agencies and citizens can be engaged to reduce risk. Each action item includes an estimate of the time line for implementation. *Short-term action items (ST)* are activities that county agencies may implement with existing resources and authorities within one to two years. *Long-term action items (LT)* may require new or additional resources or authorities, and may take between one and five years to implement.

1.0 Mitigation Plan Goals and Public Participation

The Plan goals help to guide direction of future activities aimed at reducing risk and preventing loss from natural and technological hazards. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The Office of Emergency Management surveyed the participating jurisdictions and asked for input into changes and/or updates to these twelve goals. Based upon comments received, there was

overwhelming consensus that the twelve should remain the same. Hence, there is no change from the 2010 plan.

2.0 Mitigation Plan Goals

Protect Life, Property and Public Welfare	Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural and technological hazards. Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards. Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural and technological hazards
Public Awareness	Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards. Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.
Natural Systems	Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment. Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.
Partnerships and Implementation	Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation. Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Emergency Services	Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure. Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry. Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

3.0 Public Participation

Public input during development of the mitigation plan assisted in creating plan goals. Meetings with the steering committee, stakeholder interviews, and public forums served as methods to obtain input and identify priorities in developing goals for reducing risk and preventing loss from natural and technological hazards in Yakima County.

The Yakima Valley Office of Emergency Management held public forums to gather ideas from Yakima County residents regarding the goals for the Mitigation Plan. Attendees included representatives from public agencies, private organizations and private residents. The attendees reviewed the goals for the plan by examining the issues and concerns that they had regarding natural and technological hazards, and further discussed potential action items for the Plan.

Other county government departments, Planning, Public Services Permit Services/Flood Control Zone District, hosted public meetings to address their existing programs which are integral to the Hazards Mitigation Plan. These are detailed under Section 7 of this document.

4.0 Overarching Hazard Mitigation Plan Action Items

The mitigation plan identifies short and long-term action items developed through data collection and research, and the public participation process. Mitigation plan activities may be considered for funding through federal and state grant programs, and when other funds are made available through the county. Action items address multi-hazard (MH) and hazard specific issues. To help ensure activity implementation, each action item includes information on the time line and coordinating organizations. Upon implementation, the coordinating organizations may look to partner organizations for resources and technical assistance. A description of the partner organizations is provided in Appendix A, the resource directory of this plan.

HOW ARE THE ACTION ITEMS ORGANIZED?

The *action items* are a listing of activities in which county agencies, local jurisdictions and citizens can be engaged to reduce risk. Each action item includes an estimate of the time line for implementation.

Short-term action items (ST) are activities that county agencies, local jurisdictions may implement with existing resources and authorities within one to two years.

Long-term action items (LT) may require new or additional resources or authorities, and may take between one and five years to implement.

Details are located beginning on page 4-11.

5.0 Overarching Multi-Year Action Plan Matrix

The action items are organized within the matrices beginning on page 4-11, which list the multi-hazard (Table One) and hazard-specific action items (Table Two) included in the mitigation plan. The matrices include the following information for each action item:

1. Coordinating Organization. The coordinating organization is the public agency with regulatory responsibility to address natural or technological hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

2. Time Line. Action items include both short- and long-term activities. Each action item includes an estimate of the time line for implementation. Short-term action items (ST) are activities which county and local jurisdiction agencies are capable of implementing with existing resources and authorities within one to two years. Long-term action items (LT) may require new or additional resources or authorities, and may take between one and five years to implement.

3. Ideas for Implementation. Each action item includes ideas for implementation and potential resources, which may include grant programs or human resources. The matrix includes the page number within the mitigation plan where this information can be found.

4. Plan Goals Addressed. The plan goals addressed by each action item are included as a way to monitor and evaluate how well the mitigation and evaluate how well the mitigation plan is achieving its goals once implementation begins. The plan goals are organized into the following five areas:
- Protect Life, Property and Public Welfare
- Public Awareness
- Natural Systems
- Partnerships and Implementation
- Emergency Services

5. Partner Organizations. Partner organizations are listed in the Introduction to this plan and are agencies or public/private sector organizations that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

HOW WILL THE PLAN BE IMPLEMENTED, MONITORED, AND EVALUATED?

The Plan Maintenance Section of this document details the formal process that will ensure that the Yakima County Multi-Jurisdictional Hazards Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years.

PLAN ADOPTION

The Board of County Commissioners (BOCC) and participating jurisdictions, e.g. cities, towns and special districts, will be responsible for adopting the Yakima County Multi-Jurisdictional Hazards Mitigation Plan.

These governing boards have the authority to promote sound public policy regarding natural and technological hazards. Reference Section 1: Introduction, Tables 1-5, pages 1-11 through 1-12 for a listing of those jurisdictional stakeholders participating in mitigation plan. Table 6 classifies jurisdictions as either Pending or Participating.

COORDINATING BODY

A Yakima County Hazard Mitigation Steering Committee will be responsible for coordinating implementation of Plan action items and undertaking the formal review process.

FACILITATOR

The BOCC and governing bodies representing the cities/towns and special districts will adopt the Yakima County Multi-Jurisdictional Hazards Mitigation Plan, and the Hazard Mitigation Steering Committee will take responsibility for plan maintenance. The Office of Emergency Management Director, or designee, will serve as a ***facilitator*** to convene meetings of the steering committee, assign tasks such as updating and presenting the Plan to the members of the committee. Plan implementation and evaluation will be a shared responsibility among the Hazard Mitigation Steering Committee members.

IMPLEMENTATION THROUGH EXISTING PROGRAMS

Yakima County jurisdictions address county-wide planning goals and legislative requirements through its Comprehensive Land Use Plans, Flood Control Zone District, Critical Areas and Shoreline Programs, Capital Improvement Plans, and International Building Codes. The Mitigation Plan provides a series of recommendations that are closely related to the goals and objectives of these existing planning programs. Yakima County jurisdictions will have the opportunity to implement recommended mitigation action items through existing programs and procedures. Upon adoption of the Mitigation Plan, the Office of Emergency Management will assist local municipalities in developing their hazard mitigation goals and actions by providing the mitigation plan as a baseline of information on the natural and technological hazards that impact the county.

6.0 Existing Planning Reviewed

The Yakima County Steering Committee compiled this data.

INTEGRATION WITH OTHER LOCAL PLANNING DOCUMENTS	
County-Wide Plans	**2014 Status**
Naches River Comprehensive Flood Hazard Management Plan (CFHMP)	Adopted by the participating agencies on the following dates: Board of County Commissioners – 8/22/06 Naches Town Council – 9/11/06 Ecology - 10/12/07
Upper Yakima Comprehensive Flood Hazard Management Plan (CFHMP)	Adopted by Board of County Commissioners - 6/19/07 Selah City Council – 6/26/07 Union Gap City Council – 08/13/07 Yakima City Council – 5/6/08 Ecology - 01/22/10
Ahtanum-Wide Hollow Comprehensive Flood Hazard Management Plan	Adopted by the Board of County Commissioners on October 16, 2012 Yakima City Council-10/15/13 Union Gap City Council-1/28/13 Ecology-10/31/13
Lower Yakima River CFHMP	Initiated in 2014
Yakima County Flood Emergency Response Plan Special Subject to the CEMP	Updated October 2012
Highways 410 and 12--Community Wildfire Protection Plan	The State Highway 410 and U.S. Highway 12 CWPP (Highway 410/12) was completed in 2005.
Yakima County Community Wildfire Protection Plan (YCCWPP) This document serves as an overarching strategic plan highlighting the need for coordinated risk management.	In early 2011, the Board of Yakima County Commissioners adopted the Yakima County Wildfire Protection Plan. Updated version will be adopted on April 28, 2015.
Cowychee Mountain Community Wildfire Protection Plan	Completed in 2012.
Yakima County Comprehensive Emergency Management Program (CEMP) 2014	Approved by Wa State EMD (Approval letter dated March 10, 2014)
EPA's Emergency Planning and Community Right to Know (EPCRA)	Yakima Valley Office of Emergency Management serves as the LEPC for Yakima County hazardous materials fixed facilities (sites required for EPA reporting)

Codes, Regulations & Procedures

Codes, Regulations, & Procedures	2014 Status
International Building Codes Chapter 16—Structural Design Roof Snow Load Wind Design Data Earthquake Design Data Flood Design Data Chapter 9--Fire Protection Systems	Ordinance 5-2013 adopted the International Building Code, 2012 Edition on October 8, 2013
Urban-Wildland Interface Code	Ordinance 5-2013 adopted the International Building Code, 2012 Edition on October 8, 2013 Review and adopt the 2012 edition of the IWUIC (International Wildland Urban Interface Code) in 2015
Critical Area Ordinance (CAO) and Shoreline Master Program (SMP)	CAO adopted December 18th, 2007 SMP effective February 25th, 2010
Growth Management Act	Adopted in 1990
Yakima County's Comprehensive Plan—Plan 2015	Adopted May 20, 1997; GMA update December 18, 2007; Anticipated 2040 update in 2017
Yakima Urban Area Comprehensive Plan 2025	Adopted jointly by Yakima County and the City of Yakima December 2006
West Valley Neighborhood Plan A Subarea Plan of the Yakima Urban Area Comprehensive Plan 2025	Adopted February 2011

Formal Review Process

The Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and timeline, and identifies the local agencies organizations participating in plan evaluation. The facilitator will be responsible for contacting the Hazard Mitigation Steering Committee members and organizing the annual meeting. Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

Continued Public Involvement

The Office of Emergency Management is dedicated to involving the public directly in the continual review and updates of the Mitigation Plan. Copies of the plan will be catalogued and kept at public libraries in the county. The existence and location of these copies will be publicized on the county's website. This site will also contain an email address and phone number to which people can direct their comments and concerns.

Development of Mitigation Actions

FEMA provides grants (Hazard Mitigation Grant Program) to local jurisdictions to implement long-term hazard mitigation measures following major disaster declarations. To be eligible, projects must permanently reduce losses from natural hazards, comply with environmental requirements, be identified in the local Hazard Mitigation Plan, and be cost-effective. Examples of projects that can be funded include: property acquisition or structure relocation with conversion of land to public open space; elevation-in-place of flood prone buildings; flood retrofit or seismic rehabilitation of existing buildings; training for architects, engineers, building officials, and other professionals on implementation of mitigation standards and codes; and initial implementation of vegetation management programs intended to reduce exposure of high-risk structures to wildfire hazards. The local government HMGP cost-share is normally 25%.

Hazard mitigation actions can identify a range of structural approaches to lower the costs of future disasters by meeting the unique needs of the community. Structural mitigation projects could involve modifying the current "built" environment to decrease the risk to people and property by "retrofitting" structures in existing neighborhoods. They can also be just the opposite and involve restoring the environment of hazardous areas to its original condition by removing vulnerable structures. Two critical mitigation initiatives that impact jurisdictions are the county-wide Flood Control Zone District funding and the adoption of the International Building Codes.

Mitigation strategies can also involve non-structural initiatives, such as educational programs to inform the community about the risk the public and its property face in order to encourage them to purchase insurance or retrofit their homes. Program can also include developing and enforcing regulations to prevent construction in hazard areas, or to ensure that development that does occur will be resistant to the hazards threatening the area.

Yakima County jurisdictions, i.e., cities/towns, special districts—schools, fire and irrigation, occupy a uniqueness when attempting to follow FEMA guidance in developing mitigation actions. First, declared disasters under the Stafford Act, which historically have included Yakima County, have been limited to

100-year flooding as witnessed in the 1995-1996 floods. Even the most recent Nisqually Earthquake resulted in Yakima County's inclusion in a federal disaster declaration for Individual Assistance only. The Risk Assessment and hazard map for each participating jurisdiction, located in their specific annex, establishes the jurisdiction's hazard vulnerability. Based upon these two tools, Yakima County jurisdictions are relatively disaster-free. The exception to this would be incidents of flooding. Flood mitigation actions, to include funding, are adequately addressed by the county-wide Flood Control Zone District. Jurisdictions rely upon the FCZD for determining flood mitigation actions. An exception to this are the irrigation districts.

Secondly, due to a jurisdiction's risk assessment and proximity to identified hazards, the majority of mitigation actions involve on-going public awareness and education, as represented by fire and school districts. Therefore, public education, emphasizing individual responsibility and action, is an important element of a successful hazard mitigation program. Many of the participating jurisdictions have developed educational materials and programs that benefit them and the population within their jurisdiction.

Table One: Overarching Multi-Hazard Mitigation Strategy—Short-Term and Long-Term

Overarching Multi-Hazard Mitigation Strategy—Short-Term and Long-Term					Plan Goals Addressed				
Multi-Hazard	**Overall Strategy**	**Coordinating Organization**	**Time Line**	**Strategies for Implementation**	**Protect Life and Property**	**Public Awareness**	**Natural Systems**	**Partnerships & Implementation**	**Emergency Services**
Short-Term Multi-Hazard #1	Integrate the goals and action items from the Yakima County Hazards Mitigation Plan into existing regulatory documents and programs where appropriate.	Hazard Mitigation Steering Committee Yakima County cities/towns	Ongoing	Section 4; 4-25				√	
Short-Term Multi-Hazard #2	Identify and pursue funding opportunities to develop and implement local and county mitigation activities.	Yakima Valley Office of Emergency Management Yakima County Cities and Towns	Ongoing	Section 4; 4-25				√	
Short-Term Multi-Hazard #3	Establish a formal role for the Yakima County Hazard Mitigation Steering Committee to develop a sustainable process for implementing, monitoring, and evaluating countywide mitigation activities.	Hazard Mitigation Steering Committee Yakima County cities/towns	Ongoing	Section 4; 4-25				√	
Short-Term Multi-Hazard	Identify, improve, and sustain collaborative	Yakima County Public Services/Permit Services	Ongoing	Section 4; 4-26	√	√		√	

Overarching Multi-Hazard Mitigation Strategy— Short-Term and Long-Term					Plan Goals Addressed				
Multi-Hazard	**Overall Strategy**	**Coordinating Organization**	**Time Line**	**Strategies for Implementation**	**Protect Life and Property**	**Public Awareness**	**Natural Systems**	**Partnerships & Implementation**	**Emergency Services**
#4	programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural and technological hazards.	Yakima County cities/towns							
Short-Term Multi-Hazard #5	Develop public and private partnerships to foster hazard mitigation program coordination and collaboration in Yakima County.	Yakima Valley Office of Emergency Management Yakima County cities/towns	Ongoing	Section 4; 4-27				√	
Short-Term Multi-Hazard #6	Develop inventories of at-risk buildings and infrastructure and prioritize projects.	Yakima Valley Office of Emergency Management GIS Yakima County Public Services/Permit Services	1-2 years	Section 4; 4-27	√			√	
Long-Term Multi-Hazard #1	Strengthen emergency services preparedness and response by linking emergency services with hazard mitigation programs,	Yakima Valley Office of Emergency Management Yakima County cities/towns Yakima County Fire	Ongoing	Section 4; 4-27				√	

Overarching Multi-Hazard Mitigation Strategy—Short-Term and Long-Term					Plan Goals Addressed				
Multi-Hazard	**Overall Strategy**	**Coordinating Organization**	**Time Line**	**Strategies for Implementation**	**Protect Life and Property**	**Public Awareness**	**Natural Systems**	**Partnerships & Implementation**	**Emergency Services**
	and enhancing public education on a countywide scale.	Protection Districts							
Long-Term Multi-Hazard #2	Develop, enhance, and implement education programs aimed at mitigating hazards, and reducing the risk to citizens, public agencies, private property owners, businesses, and schools.	Yakima Valley Office of Emergency Management Yakima County Public Services/Permit Services Yakima County cities/towns Yakima County Fire Protection Districts	Ongoing	Section 4; 4-28	√	√			
Long-Term Multi-Hazard #3	Use technical knowledge of natural ecosystems and events to link natural resource management and land use organizations to mitigation and technical assistance.	Yakima County Public Services/Permit Services	Ongoing	Section 4; 4-29			√		

Multi-Hazard Strategy Items (MH)

Multi-hazard action items are those activities that pertain to eight hazards in the mitigation plan: flood, land slide, wildfire, severe winter storm, wind storm, earthquake, volcanic eruption, and hazardous materials. There are six short-term (ST-MH) and three long-term (LT-MH) multi-hazard strategies described below. Table Three: Capabilities Assessment: Mitigation Plan included in other planning mechanisms incorporates existing planning documents and strategies for implementation.

ST-MH #1

Integrate the goals and action items from the Yakima County Multi-Jurisdictional Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.

Strategies for Implementation

- Use the mitigation plan to help the county's comprehensive land use plan meet state goals, designed to protect life and property from disasters and hazards through planning strategies that restrict development in areas of known hazards;

- Integrate the county's mitigation plan into current capital improvement plans to ensure that development does not encroach on known hazard areas; and

- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant at the local level.

ST-MH #2

Identify and pursue funding opportunities to develop and implement local and county mitigation activities.

Strategies for Implementation

- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects;

- Allocate county resources and assistance to mitigation projects when possible, and

- Partner with other organizations and agencies in Yakima County to identify grant programs and foundations that may support mitigation activities.

ST-MH #3

Establish a formal role for the Yakima County Hazard Mitigation Steering Committee to develop a sustainable process for implementing, monitoring, and evaluating countywide mitigation activities.

Strategies for Implementation

- Establish clear roles for participants, meeting regularly to pursue and evaluate implementation of mitigation strategies;

- Oversee implementation of the mitigation plan;

- Establish measurable standards to evaluate mitigation policies and programs and provide a mechanism to update and revise the mitigation plan;

- Monitor hazard mitigation implementation by jurisdictions and participating organizations through surveys and other reporting methods;

- Develop updates for the Mitigation Plan based on new information;

- Conduct a full review of the Mitigation Plan every 5 years by evaluating mitigation successes, failures, and areas that were not addressed; and

- Provide training for Committee members to remain current on developing issues in the hazard loss reduction field.

ST-MH #4

Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural and technological hazards.

Strategies for Implementation

- Distribute information about flood, fire, earthquake, and other forms of natural and technological hazards insurance to property owners in areas identified to be at risk through hazard mapping;

- Develop a one-page handout on types of insurance and deliver through county service agencies;

- Educate individuals and businesses on the benefit of engaging in mitigation activities such as developing impact analyses;

- Identify areas of high risk and transfer the cost of risk to property owners through insurance (rather than to the public);

- Encourage the development of unifying organizations to ensure communication and dissemination of hazard mitigation information; and

- Identify activities for private sector and citizen involvement such as nonstructural seismic daycare retrofits.

ST-MH #5

Develop public and private partnerships to foster hazard mitigation program coordination and collaboration in Yakima County

Strategies for Implementation

- Work with city governments to develop local hazards mitigation projects that are consistent with the goals and framework of the county plan;

- Identify organizations within Yakima County that have programs or interests in hazards mitigation;

- Involve private businesses throughout the county in mitigation planning;

ST-MH #6

Develop inventories of at-risk buildings and infrastructure and prioritize mitigation projects.

Strategies for Implementation

- Identify critical facilities at risk from natural and technological hazard events;

- Develop strategies to mitigate risk to these facilities, or to utilize alternative facilities should natural or technological hazard events cause damages to the facilities in question; and

- Identify bridges at risk from flood or earthquake hazards, identify enhancements, and implement projects needed to reduce the risks.

LT-MH #1

Strengthen emergency services preparedness and response by linking emergency services with hazard mitigation programs, and enhancing public education on a countywide scale.

Strategies for Implementation

- Educate private property owners on limitations of bridges and dangers associated with them.

- Develop a process to encourage private property owners to upgrade their bridges to support weight of fire trucks and emergency vehicles.

- Encourage individual and family preparedness through public education projects such as safety fairs.

- Identify opportunities for partnerships with citizens, private contractors, and other jurisdictions to increase availability of equipment and manpower for efficiency of response efforts.

- Familiarize public officials of requirements regarding public assistance for disaster response.

LT-MH #2

Develop, enhance, and implement education programs aimed at mitigating hazards, and reducing the risk to citizens, public agencies, private property owners, businesses, and schools.

Strategies for Implementation

- Make the Yakima County Multi-Jurisdictional Hazard Mitigation Plan available to the public by publishing the plan electronically on the county and emergency management websites.

    * Include information specific to Yakima County residents, including site-specific hazards information, building codes information, insurance companies that provide earthquake insurance for county residents, and educational information on damage prevention.

    * Develop a web page to facilitate Internet discussions and information sharing.

- Develop and complete baseline survey to gather perceptions of private citizens and the business community regarding hazard risks and identify mitigation needs. Repeat the survey in five years to monitor successes and failures of hazard mitigation programs.

- Develop outreach programs to business organizations than must prepare for natural and technological events.

- Develop adult and child educational programs to be used by local radio and cable stations.

- Use local radio and cable stations as a conduit for advertising public forums.

- Develop curriculum for school programs and adult education on reducing risk and preventing loss from natural and technological hazards.

- Conduct hazards awareness programs in schools and community centers.

- Conduct workshops for public and private sector organizations to raise awareness of mitigation activities and programs.

- Develop outreach materials for mitigation, preparedness, response and recovery.

LT-MH #3

Use technical knowledge of natural ecosystems and events to link natural resource management and use organizations to mitigation activities and technical assistance.

Strategies for Implementation

- Review ordinances that protect natural systems and resources to mitigate for natural hazard events for possible enhancements.

- Pursue vegetation and restoration practices that assist in enhancing and restoring the natural and beneficial functions of the watershed.

- Develop education and outreach programs that focus on protecting natural systems as a mitigation activity.

Table Two: Hazard-Specific Mitigation Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	**Timeline:** Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing		**Funding Source:** Local; State; FEMA; Private; Other		**Estimated Cost:** Actual; Estimated
*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response. **Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.					
General: All hazards Public Awareness					
Action Items	***Lead Responsibility**	***Priority**	****Timeline**	****Funding**	****Estimated Cost**
Emergency preparedness education programs for schools	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Drills, exercises in homes, workplaces, classrooms, etc.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Preparedness handbooks, brochures.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Distribution of severe weather guides, homeowner's retrofit guide, etc.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Avalanche					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	
Drought					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Plan for drought	Yakima County Planning		Ongoing	In-Kind	
Earthquake					
Action Items	***Lead**	****Priority**	****Timeline**	****Funding**	****Estimated**

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated
	Responsibility				**Cost**
Adopt and Enforce Building Codes Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	H	Ongoing	In-Kind	
Incorporate Earthquake Mitigation into Local Planning	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Increase Earthquake Risk Awareness	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Erosion					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Manage short-term erosion resulting from periodic natural events.	Yakima County Planning	L			
Extreme Temperatures					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	
Flood					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Protect and Restore Natural Flood Mitigation Features	Yakima County Planning	H	Ongoing	In-Kind	
Preserve Floodplains as Open Space	Yakima County Planning	H	Ongoing	In-Kind	
Update Special Subject Flood Response Plan to the 2014 CEMP	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Yakima County Flood Control Zone District Activities and Projects					
Form Partnerships to Support Floodplain Management	Yakima County FCZD and Local Planning	See CFHMPs See Comprehensive			

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing		Funding Source: Local; State; FEMA; Private; Other		Estimated Cost: Actual; Estimated
	Department	Plan			
Improve Flood Risk Assessment	Yakima County FCZD and Local Planning Department	See CFHMPs See Comprehensive Plan			
Join or Improve Compliance with NFIP	Local Floodplain Official	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Participate in the CRS	Local Floodplain Official	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Remove Existing Structures from Flood Hazard Areas	Local Floodplain Official	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Improve Stormwater Drainage System Capacity	City Engineers				
Conduct Regular Maintenance for Drainage Systems and Flood Control Structures	County Road Maintenance Division and Local Jurisdictions	Ongoing	Ongoing	Ongoing	Ongoing
Protect Infrastructure	County Engineer and City Engineers	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Construct Flood Control Structures	County Engineer and City Engineers	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Increase Awareness of Flood Risk and Safety	Yakima County FCZD and Local Jurisdictions	ongoing	ongoing	ongoing	ongoing
Educate Property Owners about Flood Mitigation Techniques	Yakima County FCZD and Local Jurisdictions		ongoing	**ongoing**	**ongoing**
Hail					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	
Landslide/Mudslides					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Manage development in landslide hazard areas	Yakima County Planning	M	Ongoing	In-Kind	

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated
	Yakima County Building Official/Code Enforcement				
Lightning					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	
Severe Wind Storm					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	M	Ongoing	In-Kind	
Adopt and Enforce Building Codes Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	M	Ongoing	In-Kind	
Severe Winter Storm					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Adopt and Enforce Building Codes Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	M	Ongoing	In-Kind	
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	M	Ongoing	In-Kind	
Tornado					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster	Yakima Valley Office of Emergency	L	Ongoing	In-Kind	

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated
actions, recovery activities.	Management				
Volcanic Eruption					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Wildland Fire					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Develop defensible space around homes and encourage residents to participate in community awareness and education events	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Continuous	In-Kind	
Offer hands-on workshops to highlight individual home vulnerabilities and how-to-techniques to reduce ignitability of common structural elements and encourage residents to participate.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Annually	In-Kind	
Encourage residents to assess and improve accessibility to their property.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Continuous	In-Kind	
Develop a community-level CWPP for each at-risk community that will identify specific firefighting resource	Lead: Community Wildfire Protection Plan (CWPP) Steering	H	As needed	In-Kind	

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated
projects, fuels reduction projects, public education and outreach projects, and reduction in structural ignitability projects through collaboration with state, federal, tribal, county, and private entities.	Committee Support: Yakima County Fire Marshal's Office				
Develop a program to incorporate Firewise and Fire Adaptive Communities into all aspects of the community through education on individual roles and responsibilities for wildland fire prevention and safety.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Annually	In-Kind	
Incorporate Wildfire Mitigation in the Comprehensive Plan	Yakima County Planning	H			
Reduce Risk through Land Use Planning	Yakima County Planning	H	Ongoing	In-Kind	
Review and adopt the 2012 edition of the IWUIC (International Wildland Urban Interface Code) in 2015	Yakima County Building and Safety Division	H	Ongoing	In-Kind	
Hazardous Materials—Fixed Sites					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Hazardous Materials—Transportation					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Pipeline					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	

Footnotes:

1. Each participating jurisdiction will develop their unique action items and these will be detailed in their specific annex.

2. Action items are identified in Appendix C: Mitigation Actions and Ideas. The source of these actions and ideas are from *FEMA's Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013.*

Table Three: 2015 Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action Item		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Action Status	O Action completed O Action canceled O Action on schedule Anticipated completion date: _____ O Action delayed Explain: _____	

Summary of Action Progress for this Report Period

1. **What was accomplished for this Action during this reporting period?**
   _____
2. **What obstacles, problem, or delays did the Action encounter?**
   _____
3. **If uncompleted, is the Action still relevant? Should the Action be changed or revised?**
   _____
4. **Other comments**
   _____

Section 5
Plan Maintenance

The plan maintenance section of this document details the formal process that will ensure that the Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. Plan maintenance will be the overall responsibility of the Yakima Valley Office of Emergency Management.

1.0 Monitoring and Implementing the Plan

Plan Adoption

The Yakima Valley Office of Emergency Management will be responsible for facilitating the adoption of the Mitigation Plan. The Board of County Commissioners (BOCC) will be responsible for adopting for the county; city councils for the cities/towns; and governing bodies for the special districts. These governing bodies have the authority to promote sound public policy regarding natural and technological hazards. Once the plan has been adopted, the Yakima Valley Office of Emergency Management will be responsible for submitting it to the Mitigation Officer at the Washington State Emergency Management Division. WaEMD will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Yakima County will gain eligibility for Hazard Mitigation Grant Program funds.

Yakima County Hazard Mitigation Steering Committee

A Yakima County Hazard Mitigation Steering Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process for mitigation issues covering the entire county.

The choice of these county departments as the core group of committee members is based upon county-wide planning initiatives (e.g., Flood Control Zone District and Wildland Fire) which involve other jurisdictions as well as special districts.

This HMP Steering Committee/Technical Advisory Groups (TAGs)—Natural and Technological consist of the following participating departments:

1. <u>County Steering Committee</u>

Board of County Commissioners (BOCC)
Public Services Director
- Environmental Services
- Water Resources Division
- Transportation and Roads
- Planning
- Building and Safety Division Bureau Chief/Fire Marshal

2. Technical Advisory Groups (TAGs)

Natural

Flood Control Zone District
Environmental/Natural Resources
Subdivision/Zoning

Technical

Building & Fire Safety
Building Official/Code Enforcement

GIS

Technology Services

Facilities Services

Hazardous Materials

Local Emergency Planning Committee (LEPC) Representative

Facilitator

The Director, Yakima Valley Office of Emergency Management, or designee, will serve as a ***facilitator*** to convene meetings of the county steering committee, assign tasks such as updating and presenting the Plan to the members of the committee. Plan implementation and evaluation will be a shared responsibility among the jurisdictions.

Cities and Towns

The Yakima Valley Office of Emergency Management used the existing city/town emergency organization structure to facilitate the review, solicit public feedback and coordinate the promulgation of the Yakima County HMP. The OEM has established within each city and town an emergency structure consisting of the Mayor, City Manager/Administrator, City Attorney, City Clerk, Fire Chief, Police Chief, Public Works Director, School Superintendent, Code Enforcement and others selected by the Mayor/City Manager. OEM has created an Emergency Coordination Center for emergency/disaster response in each of the thirteen cities and towns. In addition to this group providing Direction and Control before, during, and after an emergency, OEM utilizes their role in the government structure to review emergency plans, coordinate training and exercises, and disseminating alert and warning.

Example of Local Jurisdiction Participants and Level of Participation

Mitigation Plan Participants
Fire Chief, Police Chief, Public Works Director, Code Enforcement

Contributions
Yakima Valley Office of Emergency Management's Senior Program Analyst provided the Emergency Preparedness Director changes/updates to the 2015 Yakima County Multi-Jurisdictional Hazard Mitigation Plan as reviewed by the WaState Hazard Mitigation Strategist. The City's 2015 Hazard Mitigation Plan is consistent with this update.

Codes, Regulations, & Procedures	2015 Status
International Building Codes Chapter 16—Structural Design Roof Snow Load Wind Design Data Earthquake Design Data Flood Design Data Chapter 9--Fire Protection Systems 2012 International Codes All current and adopted by State and City 6/1/13	Continue until 6/1/16—new code version
Critical Area Ordinance (CAO)	
Growth Management Act--current	

Public Participation/Public Meetings	
Date	**Meeting Summary**

As in the development of the Yakima County Comprehensive Emergency Management Program (CEMP), this existing emergency structure was instrumental in the process of reviewing and promulgation of the 2015 HMP. Critical information as to hazardous materials sites within the boundaries of their city or town is provided to the emergency response agencies, i.e., fire and law enforcement, and they will advise their elected or appointed leaders. Most recently, the severe weather events of early 2009 which resulted in the availability of federal assistance, the OEM provided jurisdictions with key information as provided by the State of Washington. The points of contact for the transfer of this information were these same key players in each jurisdiction.

These existing emergency networks within the unincorporated areas of the county as well as the incorporated cities and towns will continue to part of the HMP steering committees.

Implementation through Existing Programs

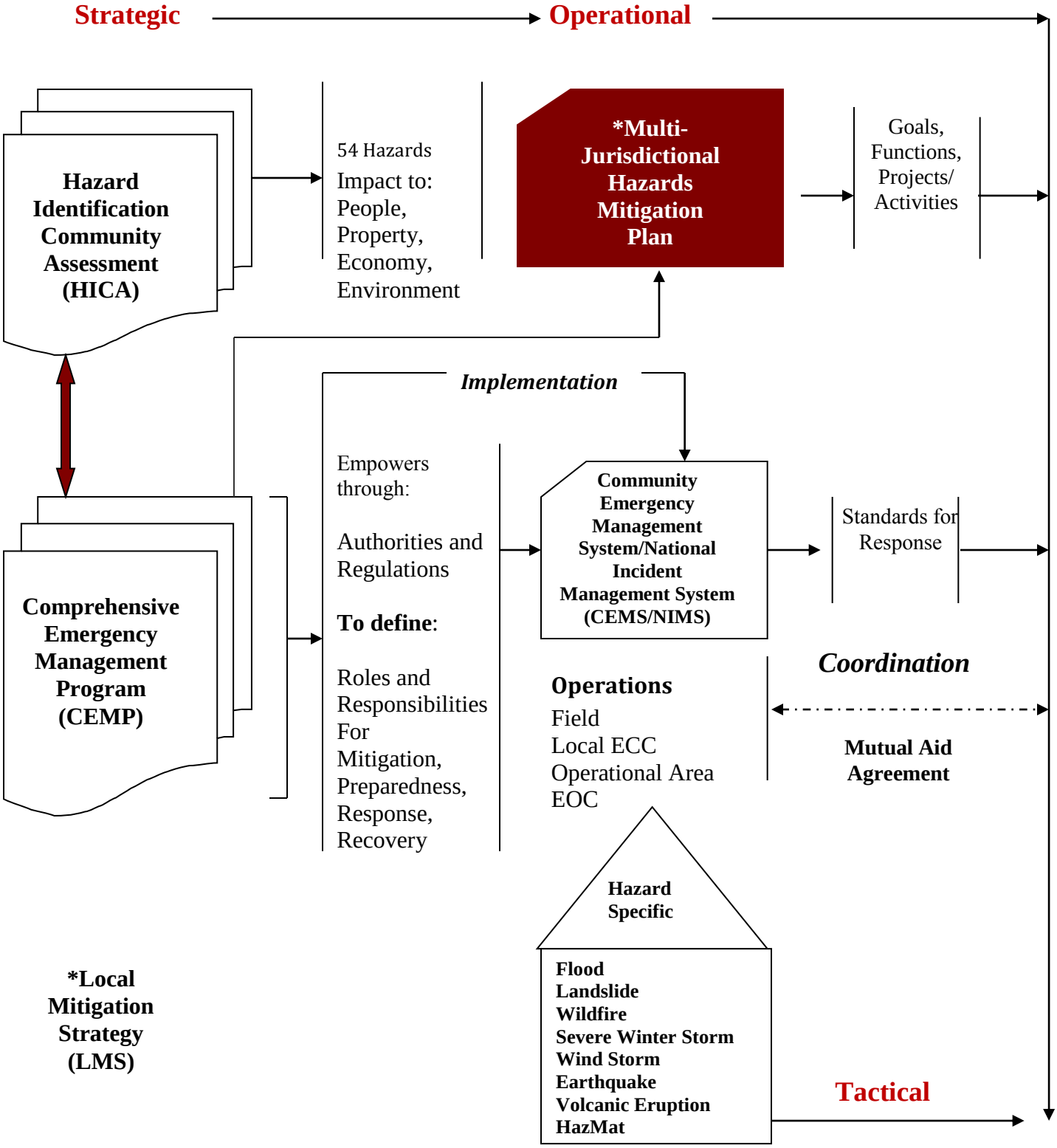
Yakima County jurisdictions, i.e., cities and towns, address county-wide planning goals and legislative requirements through their Comprehensive Land Use Plan, Capital Improvement Plans, and Building Codes. The Mitigation Plan provides a series of recommendations that are closely related to the goals and objectives of these existing planning programs. Reference: Part One: Section 4: Multi-Hazard Goals and Action Items, 4-7; and Table Three, 4-31.

Yakima County jurisdictions, i.e., cities and towns, utilize the county-wide Flood Control Zone District for implementation of flood measures. Upon adoption of the Mitigation Plan, the Yakima Valley Office of Emergency Management will assist local jurisdictions in developing their hazard mitigation goals and actions by providing the mitigation plan as a baseline of information on the natural and technological hazards that impact the county. Cities and towns are signatory to the Yakima County Comprehensive Emergency Management Program (CEMP) which includes Section Two--Mitigation. The Multi-Jurisdictional Hazard Mitigation Plan is part of that document. Upon their approval through a resolution, they have made the mitigation plan and their actions an active part of the emergency management program.

The flow chart on the following page illustrates the emergency/disaster planning methodology comprising the Yakima County Emergency Management Program and how they are interrelated.

Finally, please note that the Yakima County Multi-Jurisdictional Hazard Mitigation Plan is a by-product of the Comprehensive Emergency Management Program Section Two—Mitigation. The text is located in Attachment One of this plan.

Yakima County Emergency Management Program Elements



Special District Implementation. An off-shoot of the mitigation planning process conducted by the Office of Emergency Management is an increased awareness by special districts of the importance of emergency planning beyond the typical response to an incident. These special jurisdictions are becoming aware of mitigation as a proactive element of emergencies. Special districts, i.e., schools, fire and irrigation, will adopt the plan and it will become a work in progress for their emergency planning efforts. The challenge facing the Office of Emergency Management will be to encourage districts to become an active partner in their community's efforts to mitigate the impact of major disasters. However, these special districts will use the mitigation plan as a stand alone document in support their jurisdiction's planning.

OEM will continue to provide information and solicit comment from fire and law enforcement association meetings and utilize the ESD #105 to reach out to the school districts.

Economic Analysis of Mitigation Projects

The Federal Emergency Management Agency's approaches to identify costs and benefits associated with hazard mitigation strategies or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating hazards can provide decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. As identified in Annex 1, the county-wide Flood Control Zone District identified costs projections for mitigation projects and developed prioritization. Other natural hazards, i.e., earthquake, landslide, wildfire, severe winter storm, wind storm, and volcano, have no specific mitigation action requiring major expenditure of funds. This is due in part to the Risk Assessment and hazard mapping as described in the Executive Summary, pages v and vi.

Continued Public Involvement

Yakima County jurisdictions are dedicated to involving the public directly in the continual review and updates of the Mitigation Plan. Public meetings are summarized in Section 7.

The public will also have the opportunity to provide feedback about the Plan. Copies of the plan will be catalogued and kept at the appropriate jurisdiction in the county. Section 1: Introduction, Tables 1-4 represents those targeted for 2015 inclusion.

In addition, copies of the plan and any proposed changes will be posted on the Office of Emergency Management's website. This site will also contain an email address and phone number to which people can direct their comments and concerns.

A public meeting will also be held after each annual evaluation or when deemed necessary by the steering committee. The meeting will provide the public a forum for which they can express their concerns, opinions, or ideas about the Plan. The Yakima Valley Office of Emergency Management will utilize local resources to publicize annual public meetings and maintain public involvement through the webpage, and newspapers. Public forums, specific to hazards identified in Part 2--Sections 13 and 22, are chronicled in Section 7

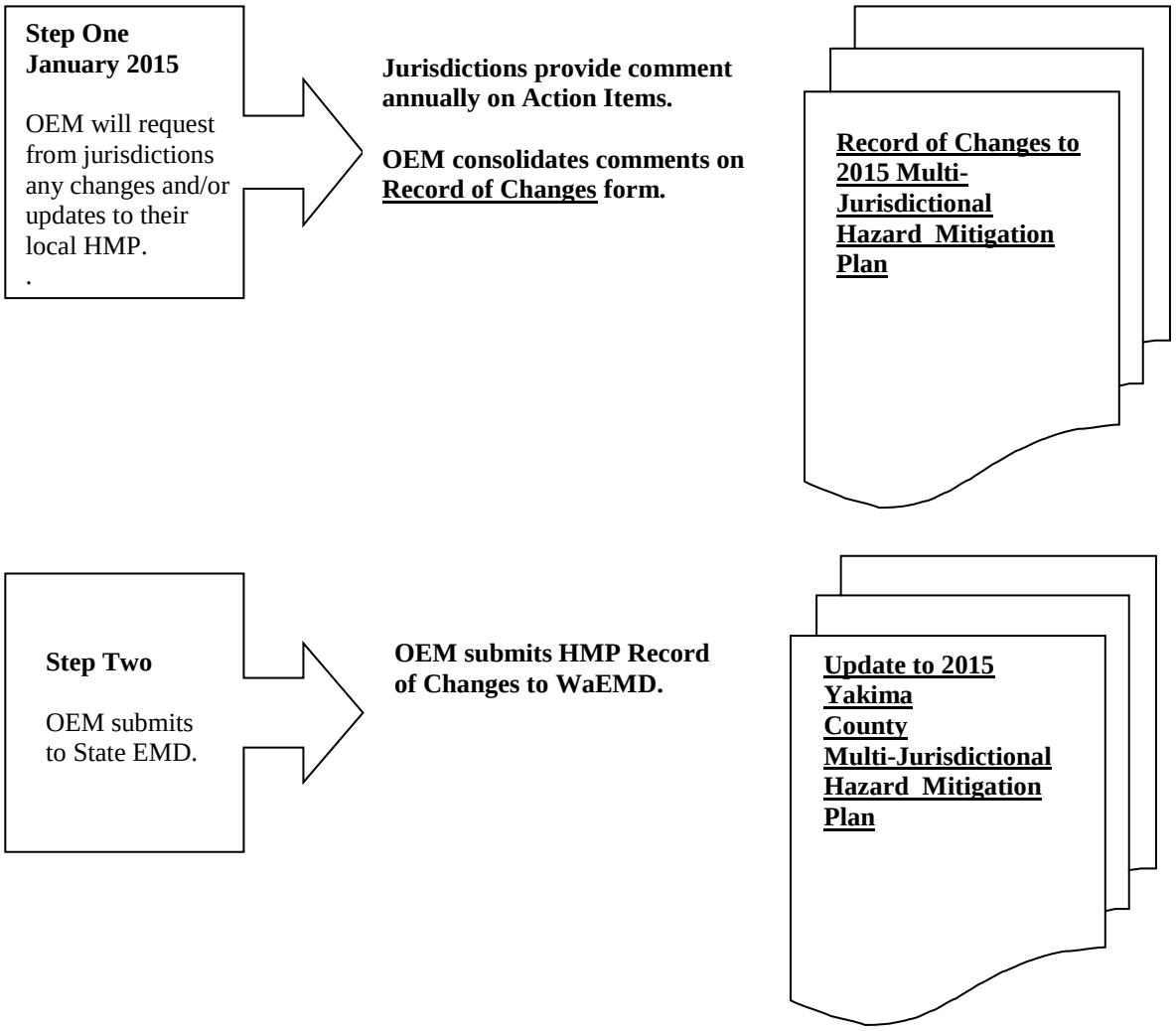
2.0 Plan Review and Update

The Yakima Valley Office of Emergency Management (YVOEM) ensures that necessary changes and revisions to the plan are prepared, coordinated, published and distributed.

The OEM will review elements of the HMP annually and submit updates to Washington State Emergency Management Division (EMD). **Record of Changes** form is on the following page.

The plan will undergo revision whenever:

- Any other condition occurs that causes conditions to change.
- Local government structure changes.
- Community situations change.
- FEMA requirements change.



The YVOEM will maintain a list of individuals and organizations which have controlled copies of the plan. Only those with controlled copies will automatically be provided updates and revisions. Plan holders are expected to post and record these changes. Revised copies will be dated and marked to show where changes have been made.

Formal Review Process

The Mitigation Plan will be reviewed on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. The plan maintenance process includes a step-by-step sequence, actions and product. The Plan Review and Update sequence is located at the end of this section. The facilitator, or designee, will be responsible for contacting the participating jurisdiction and organizing the annual meeting. Jurisdictions will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan based upon their area of expertise.

The Yakima Valley Office of Emergency Management will distribute a local survey electronically. Jurisdictions will be asked to:

1. Describe level of participation in the planning process.
2. Review action items (checklists) to determine their relevance to changing situations within their jurisdiction.
3. Review the risk assessment to determine if this information should be updated or modified, given any new available data.
4. Status of National Flood Insurance Program (NFIP)

The Office of Emergency Management will notify holders of the county plan when changes have been made. Every five years the updated plan will be submitted to the State Mitigation Officer and the Federal Emergency Management Agency for review.

Review and Progress Report

The Office of Emergency Management will review hazard actions item and provide the State with an annual report.

2015 Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action Item		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Action Status	O Action completed O Action canceled O Action on schedule Anticipated completion date: _____ O Action delayed Explain: _____	

Summary of Action Progress for this Report Period

1. **What was accomplished for this Action during this reporting period?**
   _____
2. **What obstacles, problem, or delays did the Action encounter?**
   _____
3. **If uncompleted, is the Action still relevant? Should the Action be changed or revised?**
   _____
4. **Other comments**
   _____

A Status of Mitigation Actions Identified in the Last Plan

City of Union Gap 2010-2014 Action Items ***Status:** Completed Deferred—Funding Availability; Not as Effective On-Going/Unchanged—Perpetual or Annual
Flood (River/Stream)
The City of Union Gap will be adopting the 2009 International Building Codes by the mandated date of July 2010. *Status--Completed The City of Union Gap building inspectors all have within their vehicles a packet to placard buildings after assessing damages for their structural stability. *Status—On-going/Unchanged City will continue be a part of the National Flood Insurance Program and regulate floodplain construction. *Status—On-going/Unchanged City of Union Gap participates in the County Flood Control Zone District. Projects identified as FCZD include mitigation encompassing the city's impact area for floods. *Status—On-going/Unchanged
Landslide
Not applicable—the City of Union Gap is not identified in Landslide impact area Union Gap will review landslide-related information as disseminated by the Office of Emergency Management. *Status—On-going/Unchanged
Severe Winter Storm
The City of Union Gap will be adopting the 2009 International Building Codes by the mandated date of July 2010. *Status--Completed The City of Union Gap building inspectors all have within their vehicles a packet to placard buildings after assessing damages for their structural stability. *Status—On-going/Unchanged
Wind Storm
The City of Union Gap will be adopting the 2009 International Building Codes by the mandated date of July 2010. *Status--Completed The City of Union Gap building inspectors all have within their vehicles a packet to placard buildings after assessing damages for their structural stability. *Status—On-going/Unchanged
Earthquake
The City of Union Gap will be adopting the 2009 International Building Codes by the mandated date of July 2010. *Status--Completed The City of Union Gap Building Inspectors all have within their vehicles a packet to placard buildings after assessing damages for their structural stability.

*Status—On-going/Unchanged
Volcano
Continue to develop plans to remove ash fall from critical infrastructures, i.e., waste water treatment, major arterials, water supply; etc. *Status-- On-going/Unchanged Improve emergency service support through alert and warning, emergency operations center, and other direction and control facilities *Status-- On-going/Unchanged Improve emergency public information on clean-up and removal of ashfall *Status-- On-going/Unchanged
Hazardous Materials—Fixed and Transportation
2009 International Fire Code dictates issues dealing with chemical regulations established by state and federal programs, i.e., Ecology, EPA, OSHA, etc. *Status--Completed Union Gap Fire Department continues to update response equipment and training. *Status-- On-going/Unchanged Union Gap Fire Department continues to conduct hazard assessments on chemical facilities. *Status-- On-going/Unchanged Union Gap Fire Department continues to use risk mapping and technologies *Status-- On-going/Unchanged Union Gap Fire Department continues to participate in the county LEPC. *Status-- On-going/Unchanged

RECORD OF CHANGES

NOTE: Recipients of the Yakima County HMP will be asked to insert additions and/or modifications of this Plan into their copy. The Yakima Valley Office of Emergency Management is the approving authority for revisions to this Plan.

Nature of Change	Date of Change	Page(s) Affected	Changes Made By

Section 6
Analysis and Prioritizing

This section is not intended to provide a comprehensive description or analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

It should be understood that projects differ from actions; and, placing a dollar value on actions, i.e., adopting the International Building Codes, may not fit this analysis.

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

This appendix outlines several approaches for conducting economic analysis of hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from *Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation*.

1.0 Why Evaluate Mitigation Strategies?

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

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

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

2.0 What Are Some Economic Analysis Approaches For Mitigation Strategies?

The approaches used to identify the costs and benefits associated with hazard mitigation strategies, measures, or projects fall into two general categories: *benefit/cost analysis* and *cost-effectiveness analysis*. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/Cost Analysis

Benefit/cost analysis will used in hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. The challenge for Yakima County will be to incorporate this methodology into natural and technological hazards. Conducting benefit/cost analysis for a mitigation activity should assist Yakima communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis will be based on calculating the frequency and severity of a hazard, avoided future damages, and risk. Yakima County will be utilizing FEMA's BCAR software.

In benefit/cost analysis, costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost-Effectiveness Analysis

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

<u>Investing in public sector mitigation activities</u>

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

<u>Investing in private sector mitigation activities</u>

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

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;

3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

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

3.0 Prioritizing

One of the goals of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan is the development of an effective local jurisdiction hazard prioritizing methodology. The project prioritizing methodology is the tool with which the Yakima Valley Office of Emergency Management agency will prioritize mitigation projects for each jurisdiction submitting mitigation actions.

Prioritizing methodology. The question which creates a unique challenge for jurisdictions identifying mitigation actions is this, "Does the project mitigate a frequently occurring problem or a problem to which the jurisdiction is particularly vulnerable?" This criterion attempts to balance the actual risk of a specific disaster occurring versus the jurisdiction's exposure in terms of life and property damage if the disaster does occur. Data for this evaluation will come from the Section 3--Risk Assessment portion of the mitigation plan as well as risk maps. Key is in its simplicity, easily understood, and relatively easy to apply.

RISK ASSESSMENT TOOL

The Yakima County Risk Assessment tool is an Excel spreadsheet, which is designed to measure a jurisdiction's risk from the effects of various hazards. The tool is based on a formula that weighs the probability and severity of potential impacts against preparations in place which are intended to minimize these impacts. Using a simple 1 to 5 scale, the probability of occurrence and the impact potential are tabulated along with mitigation efforts and the resources available to respond to the hazard. The score is based on a formula that weighs risk heavily but provides credit for mitigation and response and recovery resources. The higher the score, the higher the jurisdiction's risk from the hazard.

Scoring Guidelines.
There are eight risk assessment factors contained in the spreadsheet. All factor scoring is done on a scale of 1-5. The formula contained in the spreadsheet calculates higher scores in the occurrence and impact columns as increasing risks, while higher scores in the mitigation and resource categories lower the overall risk score giving credit for steps taken to reduce the likely impact. Based your scoring on a "worst-case scenario." The following guidelines will assist you in scoring each hazard.

Historical Occurrence (Frequency):
Based on the number of occurrences: At least one occurrence every **1-4 years = 5**; At least one occurrence

every **5-10 years = 4**; At least one occurrence every **11-50 years = 3**; At least one occurrence every **51-100 years = 2**; Has not occurred, but for **planning purposes** should be evaluated = **1**.

Probability of Occurrence:
Based on the statistical probability of the hazard occurring in a given year. This may be obtained by scientific research or may simply be an educated guess. The higher the probability, the higher the score. Use the following guideline in determining you score. If less than **5% score 1**, if **5% to 10% score 2**, if **10% to 20% score 3**, if **20% to 40% score 4**, and **score 5 if greater than 40%** probability.

Human Impact:
Score based on greatest possible impact should worst-case event occur within the jurisdiction. Consider the likely number of fatalities, injuries, homeless, etc. Score **1 low - 5 highest.**

Property Impact:
Score based on the economic costs of the event, including both direct and indirect property damage from the hazard. Minor damage would be a 1 while a total loss should be a 5. Score **1 low - 5 highest.**

Business Impact:
Score based on factors such as service impact, lost wages, revenues, and taxes. Consider cost of relocation, permanent damage to valuable resources, etc. Score **1 low - 5 highest.**

Mitigation Activities:
Based on steps taken to mitigate the hazard such as structural and redundant technical systems. The more mitigation measures taken, the higher the score. Score **1 low - 5 highest.**

Internal Resources:
Base your score on the internal response and recovery resources. High scores should be given when there are a formal on-site response teams, or recovery teams. Score **1 low - 5 highest.**

External Resources:
Base your score on the external resources that would be immediately available. This would include the local jurisdictions. Give higher scores if there are specialized equipment and responders available or if contractor support such as specialized equipment, is immediately available. Score **1 low - 5 highest.**

Understanding the Scores
Based on the weighted scoring formula hazards that are relatively high will score 3.5 or higher. The spreadsheet is programmed to change colors based on the score as follows:

Red	**High Risk**	**Greater than 3.5**
Yellow	**Medium Risk**	**From 2.0 to 3.5**
Green	**Low Risk**	**Less than 2.0**

These scores are based on subjective judgments but, nonetheless, they provide a means to quickly rate the jurisdiction's risk from various hazards. Based on this risk scoring, priorities for increased mitigation and preparedness activities can be determined.

Each jurisdiction will complete this assessment and the results will be found in their specific annex. A summary of jurisdictional risk assessments begins on Page 6-7, Tables One–Four. Jurisdictional Risk Charts are located in separate annexes.

Aside from flood mitigation projects described by the Flood Control Zone District and located in Annex 1, other natural hazards, i.e., landslide, wildfire, severe winter storm, wind storm, earthquake and volcano, and the subsequent impact on the jurisdiction, is consistently at a Low Risk. For this reason, jurisdictions have focused their efforts on non-structural actions with heavy emphasis on public education and emergency response. Public education within the schools and fire districts are on-going with little or no costs to the district. They are low cost mitigation efforts, but have high effectiveness.

Current and future mitigation actions will be evaluated using this methodology. A re-evaluation of the hazard impact using this methodology will be done annually, or as a result of an actual event.

Risk Assessment

Jurisdiction: Yakima County Unincorporated
Date Completed: October, 2014
Completed by: Technical Advisory Group (TAG)

Type of Hazard	Historical Occurrence	Prob. of Occurrence	Human Impact	Property Impact	Business Impact	Mitigation Activities	Internal Resources	External Resources	Total
Natural/Technological									
Avalanche									0.0
Drought									0.0
Earthquake	3	1	1	1	1	1	1	1	1.4
Extreme Temperatures									0.0
Flood	4	4	3	3	4	4	3	3	3.8
Hail									0.0
Hazardous Materials	2	2	2	2	3	2	3	4	1.9
Landslide/Mudslide/Debris Torrent	2	2	3	3	3	1	3	4	2.4
Lightning									0.0
Severe Winter Storm	4	4	2	1	2	1	1	1	3.4
Severe Wind Storm	2	2	1	1	1	1	1	1	1.7
Tornado									0.0
Volcanic Eruption	1	1	2	2	2	1	4	5	0.9
Wildland Fire	4	4	2	2	2	2	4	5	2.8
Erosion									0.0
Dam break	0	1	5	5	5	1	5	3	2.8

Summary: This tool looks at an organization's or a community's vulnerability to the effects of various hazards. Using a scale of 1 to 5, the probability of occurrence and the impact potential are measured against mitigation activities and the resources available to respond to the hazard. The total is based on a formula that weighs risk heavily but provides credit for mitigation and response and recovery resources. The highest score possible is 5.0. The lower the total score, the lower the overall risk from the Hazard.

Instructions:

Score each hazard based on a scale of 0 to 5 with 5 being the highest.

Add or delete hazards as required based on your analysis.

Historical Occurrence: Based on number of occurrence in the last 20 years. Maximum is 5; if a new hazard use 0.

Probability: Score 1 if less than 1%, 2 if less than 5%, 3 if less than 10%, 4 if less than 20%, and 5 if greater than 20%.

Impact: Based on "worst-case scenario" - greatest possible impact should worst-case event occur.

Final Step: Sort the Total Column in descending order once scoring is completed.

Analysis Results:

High Risk: Greater than 3.5

Medium Risk: 2.0 to 3.5

Low Risk: Less than 2

Table One: Summary of Jurisdictional Risk Assessments—Local Governments

Summary of Jurisdictional Risk Assessments								
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	**Avalanche**	**Drought**	**EQ**	**Erosion**	**Extreme Temperatures**	**Flood**	**Hail**	**HM**
Local Governments								
Yakima County—Unincorporated			1.4			3.8		1.9
City of Grandview								
City of Granger								
Town of Harrah								
City of Mabton								
City of Moxee								
Town of Naches								
City of Selah								
City of Sunnyside								
City of Tieton								
City of Toppenish								
City of Union Gap								
City of Wapato								
City of Yakima								
City of Zillah								

Summary of Jurisdictional Risk Assessments							
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	**Landslide**	**Lightning**	**Severe Winter Storm**	**Severe Wind Storm**	**Tornado**	**Volcanic Eruption**	**Wildland Fire**
Local Governments							
Yakima County—Unincorporated	2.4		3.4	1.7		0.9	2.8
City of Grandview							
City of Granger							
Town of Harrah							
City of Mabton							
City of Moxee							
Town of Naches							
City of Selah							
City of Sunnyside							

City of Tieton							
City of Toppenish							
City of Union Gap							
City of Wapato							
City of Yakima							
City of Zillah							

Table Two: Summary of Jurisdictional Risk Assessments—Fire Protection Districts

Summary of Jurisdictional Risk Assessments								
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	**Avalanche**	**Drought**	**EQ**	**Erosion**	**Extreme Temperatures**	**Flood**	**Hail**	**HM**
Fire Protection Districts								

Summary of Jurisdictional Risk Assessments							
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	**Landslide**	**Lightning**	**Severe Winter Storm**	**Severe Wind Storm**	**Tornado**	**Volcanic Eruption**	**Wildland Fire**
Fire Protection Districts							

Table Three: Summary of Jurisdictional Risk Assessments—School Districts/Higher Education

Summary of Jurisdictional Risk Assessments								
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	Avalanche	Drought	EQ	Erosion	Extreme Temperatures	Flood	Hail	HM
School Districts/Higher Education								

Summary of Jurisdictional Risk Assessments							
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	Landslide	Lightning	Severe Winter Storm	Severe Wind Storm	Tornado	Volcanic Eruption	Wildland Fire
School Districts/Higher Education							

Table Four: Summary of Jurisdictional Risk Assessments—Irrigation Districts

Summary of Jurisdictional Risk Assessments								
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	Avalanche	Drought	EQ	Erosion	Extreme Temperatures	Flood	Hail	HM
Irrigation Districts								

Summary of Jurisdictional Risk Assessments							
High Risk--Greater than 3.5 but less than 5.0 Medium Risk--From 2.0 to 3.5 Low Risk--Less than 2.0	Landslide	Lightning	Severe Winter Storm	Severe Wind Storm	Tornado	Volcanic Eruption	Wildland Fire
Irrigation Districts							

Section 7
Public Involvement and Citizen Input

Public Involvement

The Yakima County Multi-Jurisdictional Hazard Mitigation Plan integrates a cross-section of citizen input throughout the planning process. To accomplish this goal, the Yakima County Hazard Steering Committee developed a public participation process through two components: (1) stakeholder surveys to target the specialized knowledge of individuals working with populations or areas at risk from natural and technological hazards; and (2) conducting public forums to identify common concerns and ideas regarding hazard mitigation and to discuss specific goals and actions of the mitigation plan. Table 1 chronicles that process.

(1) Stakeholders Input (See page 7 Public Survey/Questionnaire)

Stakeholders identified in the plan include:
- Yakima County Unincorporated Department/Agencies
- Yakima County Unincorporated Community Groups
- Yakima County Cities and Towns Departments/Agencies
- Yakima County Fire Protection Districts
- Yakima County School Districts
- Irrigation Districts

Table 1 Stakeholders Input

Yakima County Unincorporated Department/Agencies		
Date	**Participants**	**Actions**
August 18, 2014	<u>County Steering Committee</u> Board of County Commissioners (BOCC) Public Services Director Environmental Services Water Resources Division Transportation and Roads: Planning Building and Safety Division Bureau Chief/Fire Marshal <u>Technical Advisory Groups (TAGs)</u> Flood Control Zone District Water Resources Engineer Environmental/Natural Resources Subdivision/Zoning	The committee will approve the overall mission, goals, and action items for the mitigation plan. They will approve direction of the 2015 Mitigation plan using the Executive Summary as their guide. Approve Technical Advisory Groups for the continuing monitoring of the fifteen hazards identified in the 2015 Hazard Mitigation Plan. Add additional staff as appropriate. The TAG will play an integral role in developing goals, and action items for the fifteen hazards identified in the Part 2 of the Hazard Mitigation Plan. This will be an ongoing process.

	Building & Fire Safety Building Official/Code Enforcement GIS Technology Services Facilities Services LEPC	
September 8, 2014	Yakima County Planning	Follow-up on Hazard Mitigation Action Items and Risk Assessment
September 12, 2014	Yakima County GIS	Hazard Maps updating
September26, 2014	Yakima County Planning	Update on Critical Areas and HMP Hazards
October 1, 2014	Yakima County FCZD	Follow-up on Tab 6--Flood
November 4, 2014	Yakima County FCZD	Final draft to Tab 6--Flood
November 17, 2014	County Steering Committee Board of County Commissioners (BOCC) Public Services Director Environmental Services Water Resources Division Transportation and Roads: Planning Building and Safety Division Bureau Chief/Fire Marshal Technical Advisory Groups (TAGs) Flood Control Zone District Water Resources Engineer Environmental/Natural Resources Subdivision/Zoning Building & Fire Safety Building Official/Code Enforcement GIS Technology Services Facilities Services LEPC	The committee approved update to the 2015 HMP and authorized presentation to the State.
Yakima County Unincorporated Community Groups		
Date	**Participants**	**Actions**
October 31, 2014— November 7, 2014	Chinook Pass CERT Team NOTE: Chinook Pass area is highly susceptible to flooding and wildland fires.	Distributed the Public Survey/Questionnaire during the Nile Community's Halloween 'Trunk or Treat' event.
		Provided the Yakima Fire Protection District 12 the Public Survey/Questionnaire during fire training.
		Provided copies of the Public Survey/ Questionnaire to the Eagle Rock Store for distribution.

Yakima County Cities and Towns Departments/Agencies		
Date	Participants	Actions

Yakima County Fire Protection Districts		
Date	Participants	Actions

Yakima County School Districts		
Date	Participants	Actions

Irrigation Districts		
Date	Participants	Actions

(2) Public Forums

Public participation is a key component to strategic planning processes. Citizen participation offers citizens the chance to voice their ideas, interests, and opinions. Washington State's land use planning goals (RCW 36.70A.020) addresses the need for public input. Goal 11--Citizen Participation and Coordination-- "encourages the involvement of citizens in the planning process and ensure coordination between communities and jurisdictions to reconcile conflicts." The Federal Emergency Management Agency also requires public input during the development of mitigation plans.

Integrating public participating during the development of the Yakima County Multi-Jurisdictional Hazard Mitigation Plan has ultimately resulted in increased public awareness. Through citizen

involvement, the mitigation plan reflects community issues, concerns, and new ideas and perspectives on mitigation opportunities and plan action items.

Public Forums: Flood

As flooding is the single natural hazard impacting this county the greatest, and as this county considers mitigation planning as an ongoing process, the Yakima County Flood Control Zone District coordinated public forums in the county to gather public ideas and opinions about the mitigation plan goals and activities included in this updated Yakima County Multi-Jurisdictional Hazard Mitigation Plan for 2015.

Public Forums: Wildland Fire

The goal of the Yakima County Community Wildfire Protection Plan is to enable local communities to improve their wildfire mitigation capacity while working with government agencies to identify high fire-risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. The YCCWPP addresses requirements for completion of a CWPP outlined in the HFRA, paying special attention to the desires and needs of the communities and multiple jurisdictions throughout the planning area. Table 2 chronicles those meetings.

Table 2 Public Participation/Public Meetings: Flood and Wildland Fire

Public Participation/Public Meetings	
Date	**Meeting Summary**
Flood	
June 9, and 10, 2010	Public meetings to discuss the potential flooding in the Cottonwood Grove area including the application of a grant to address future flooding.
November 14, 2013	Public meeting to present alternatives for the Emma Lane flood mitigation project. Presentation of alternatives being considered in the Environmental Assessment process.
August 14, 2014 Open house will be 6pm to 8pm. Staff will be available to make flood maps at 5:30	Ahtanum Flood Map Open House ➢ The creeks included are North and South Forks, Ahtanum, Hatton, Spring and Bachelor ➢ At previous open houses, there's an introduction by FEMA (and probably the state) about the new maps and floodplain regulations. Afterwards, attendees are welcomed to visit around the room if they have regulatory or flood insurance questions.
Wildland Fire	
September 19th-28th, 2014	Rather than conduct CWPP-specific public meetings, the steering committee decided to partner with the Yakima Valley Fire and Injury Prevention Association to construct and staff a booth at the Central Washington State Fair, which takes place annually in Yakima. The Fair ran from September 19th-28th, 2014 and attracted well over 300,000 attendees. In addition to the prevention messages of the Association, information was available to the public regarding the wildfire risk in Yakima County, planned fuels reduction and other projects, and details on how to comment on the draft Yakima County CWPP. In addition, several members of the steering committee helped staff the booth in order to answer questions about the CWPP and wildland fire preparedness. Yakima Valley OEM made the Public Survey/Questionnaire available for distribution.

Comment Period--November 28-Dec 17, 2014	Public comment period allowed members of the general public an opportunity to view the full draft and submit comments and any other input to the committee for consideration. ■ **What:** A chance to examine and comment on Yakima County's Community Wildfire Protection Plan ■ **Where:** The plan can be found on the Yakima County Public Services website — yakimacounty.us/PublicServices/News/Yakima County CWPP.pdf — or at the Yakima County Fire Marshal's office on the fourth floor of the Yakima County Courthouse, 128 N. Second St., Yakima.
Multi-Hazards	
December 10, 2014	Yakima County Planning Commission and Yakima Valley Office of Emergency Management Draft of Comprehensive Plan The Yakima Valley Office of Emergency utilized this forum to address the all-hazards approach to mitigation planning. The Public Survey/Questionnaire was distributed.

Stakeholder Surveys: Public Survey/Questionnaire

The Yakima Valley Office of Emergency Management distributed a survey on October 17, 2014, requesting input from a wide-range of stakeholders. The YVOEM utilized its Email distribution list (300+) in the follow categories:

Ecology-Washington State
WSP Yakima
OEM In-House
OEM List
American Red Cross
Bureau of Reclamation
CERT Team
City of Yakima
City Officials List
Dispatch List
Fire Services
Health Care Emergency Preparedness Group
Chinook Pass CERT Team
Law Enforcement
National Guard
Public works
Schools
WASPC
WSDOT
WS-Fish & Wildlife
Yakama Nation
Yakima Airport
Yakima State Fair Park
Yakima Training Center
Ahtanum Irrigation District

Yakima County Multi-Jurisdictional Hazard Mitigation Plan

Mitigation: Actions taken to reduce or eliminate long-term risk to life and property from natural hazards.

Public Survey/Questionnaire

Location: _____
(City/Town/County Area)

Instructions:

Please give us your feedback on the following topics regarding mitigation planning.

I. From the list of threats and hazards, indicate which of these have impacted, or might impact, your household and home.

____Avalanche
____Drought
____Earthquake
____Erosion
____Extreme Temperatures
____Flood
____Hail
____Landslide
____Lightning
____Severe Winter Storm
____Severe Wind Storm
____Tornado
____Volcanic Eruption
____Wildland Fire

Other: _____

II. What actions would you take to mitigate (lessen) the hazard(s)?

_____

_____

_____

III. What actions should your elected officials take to lessen the impact of hazards in Yakima communities? (Check one or more)

____Protect Life, Property and Public Welfare

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural and technological hazards.

____Public Awareness

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.

____Natural Systems

- Encourage development of acquisition and management strategies to preserve open space.

____Partnerships and Implementation

- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.

____Emergency Services

- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

Other Suggestions:

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IV. What are the <u>most effective</u> ways for you to receive information about how to make your household and home safer from natural disasters? (Check one or more)

____Emergency preparedness education programs for schools
____Drills, exercises in homes, workplaces, classrooms, etc.
____Public service announcements
____Hazard "safety fairs."
____Hazard conferences, seminars
____Hazard awareness weeks
____Preparedness handbooks, brochures
____Regular newspaper articles

Other Suggestions:

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Part Two—Hazard-Specific Information
Tab-1

Avalanche

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AVALANCHE

Definition

An avalanche is an often-rapid downhill motion of the snow pack or portion of the snow pack. Some wet snow or slush-flow avalanches may travel quite slowly. This motion may be natural or artificially induced, and controlled or uncontrolled in terms of time, place, and severity. An avalanche occurs when a layer of snow loses its grip on a slope and slides downhill. Avalanches have killed more than 190 people in the past century in Washington State, exceeding deaths from any other natural hazard. The nation's worst avalanche disasters occurred in 1910 when massive avalanches hit two trains stopped on the west side of Stevens Pass; at least 96 people were killed. Avalanches kill one to two people, on average, every year in Washington, although many more are involved in avalanche accidents that do not result in fatalities. Since 1985, avalanches have killed 56 people in Washington State (through March 14, 2012).

Hazard

Avalanches occur in four mountain ranges in the state – the Cascade Range, which divides the state east and west, the Olympic Mountains in northwest Washington, the Blue Mountains in southeast Washington, and the Selkirk Mountains in northeast Washington. The avalanche season begins in November and continues until early summer for all mountain areas of the state. In the high alpine areas of the Cascades and Olympics, the avalanche season continues year-round.

The hazard – An avalanche occurs when a layer of snow loses its grip on a slope and slides downhill. Avalanches typically occur from November until early summer in all mountain areas, but year-round in high alpine areas. They primarily pose danger to people in areas where there is no avalanche control, and to continued movement of people and freight over the state's mountain highway passes.

Previous occurrences – Avalanches occur frequently each year and kill one to two people annually in the Northwest (about 25-35 deaths annually in the U.S.). *Avalanches have killed more people in Washington than any other hazard during the past century*. In 90 percent of avalanche fatalities, the weight of the victim or someone in the victim's party triggers the slide.

Probability of future events – Avalanches occur regularly every year in mountain areas. Many weather and terrain factors determine actual avalanche danger. Avalanches along two key mountain highway passes are limited due to ongoing mitigation to control slides during winter months.

Jurisdictions at greatest risk – Twelve counties in which the Cascade, Olympic, Blue or Selkirk Mountains are found.

Factors That Affect Avalanche Danger

A number of weather, terrain and snowpack factors determine avalanche danger:

Weather

- Storms – A large percentage of all snow avalanches occur during and shortly after storms.

- Rate of snowfall – Snow falling at a rate of one inch or more per hour rapidly increases avalanche danger.

Temperature – Storms starting with low temperatures and dry snow, followed by rising temperatures and wetter snow, are more likely to cause avalanches than storms that start warm and then cool with snowfall.

Wet snow – Rainstorms or spring weather with warm, moist winds and cloudy nights can warm the snow cover resulting in wet snow avalanches. Wet snow avalanches are more likely on sun-exposed terrain (south-facing slopes) and under exposed rocks or cliffs.

Wind is the most common cause of avalanches. Wind can deposit snow 10 times faster than snow falling from storms. Wind erodes snow from the upwind side of obstacles and deposits snow on the downwind (lee) side. This is called "wind loading".

Thousands of avalanches occur in the mountains of Washington every winter. Hundreds of these incidents can affect travel over the mountain pass highways, and all present the potential for accidents, delays, and fatalities to the citizens of the State. Current mitigation strategies in place lessen the potential for impact by this hazard. However, the possibility still exists for avalanches to affect the people, economy, environment, and property of Washington.

Jurisdictions Most Vulnerable to Avalanches

Based on the location of key transportation routes and recreational areas threatened by avalanche, parts of the following counties are most vulnerable to avalanche:

Asotin	**Chelan**	**Ferry**	**Garfield**	**King**	**Kittitas**	**Klickitat**	**Lewis**
Okanogan	**Pend Oreille**	**Pierce**	**Skagit**	**Skamania**	**Snohomish**	**Whatcom**	**Yakima**

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	**Timeline:** Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing		**Funding Source:** Local; State; FEMA; Private; Other		**Estimated Cost:** Actual; Estimated
*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response. **Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.					
Avalanche					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Monitor WaDOT mountain pass reports to determine extent of travel over White Pass US 12.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	
Advise local emergency responders of travel restrictions	Yakima Valley Office of Emergency Management				

Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Part 2 Section Avalanche 2015 Planning Updates

Yakima County Planning Division uses policies and ordinances to mitigate for avalanches and other geologic hazards. Yakima County Critical Areas Ordinance (Chapter 16C.08) and Yakima County Shoreline Master Program (Chapter 16D.08) provide guidelines for development in mapped geologically hazardous areas. In addition, Yakima County limits development in avalanche susceptible areas through zoning; most geologic hazard areas are in zoning districts that have minimum lot sizes of at least 40 acres, which prevents dense residential development.

16C.08.01 Purpose and Intent.

(1) Geologically hazardous areas include those areas susceptible to erosion, sliding, earthquake or other geological events. They pose a threat to the health and safety of the citizens of Yakima County when incompatible development is sited in areas of significant hazard. Some risks due to geologic hazards might be capable of mitigation through engineering, design, or modified construction standards so the level of risk is reduced to an acceptable level. However, when mitigation is not feasible, development within geologically hazardous areas is best avoided.

(2) The purposes of this chapter are to:

(a) Minimize risks to public health and safety and reduce the risk of property damage by regulating development on or adjacent to geologically hazardous areas;

(b) Maintain natural geological processes while protecting existing and new development;

(c) Establish review procedures for development proposals in geologically hazardous areas.

(Ord. 13-2007 §1 (Exh. A)(16C.08.01), 2007).

16C.08.02 Mapping and Designation.

(1) Geologically hazardous areas are areas that are susceptible to one or more of the following types of hazards, based on WAC 365-190-080(4)(b) through (f):

(a) Erosion hazards;

(b) Landslide hazards, which in the Yakima County inventory includes:

(i) Oversteepened slope hazards;

(ii) Alluvial fan/flash flooding hazards;

(iii) Avalanche hazards; and

(iv) Stream undercutting hazards;

(c) Seismic hazards (referred to below as earthquake hazards);

(d) Volcanic hazards.

(2) The approximate location and extent of erosion hazard areas are shown on the county's critical area map titled "Erosion Hazard Areas of Yakima County." Erosion hazard areas were identified by using the "Soil Survey of Yakima County Area, Washington" and the "Soil Survey of Yakima Indian Reservation

Irrigated Area, Washington, Part of Yakima County." The analysis utilized the general soil map unit descriptions of severe and very severe hazard of water erosion.

(3) The approximate location and extent of geologically hazardous areas are shown on the county's critical area map titled "Geologically Hazardous Areas of Yakima County." The following geologically hazardous areas, with the corresponding map code in parentheses, are mapped and classified using the stated criteria based on WAC 365-190-080(4)(b) through (f):

(a) Landslide Hazard Areas (LS). These include places where landslides, debris flows, or slumps have already occurred. Where sliding is presumed to have occurred within ten thousand years or less is shown as High Risk (LS3) on the map. Slides thought to be older than ten thousand years but still capable of movement are shown as Intermediate Risk (LS2). Areas where slides are absent are unlabeled and combined with other Low Risk areas.

(i) Oversteepened Slope Hazard Areas (OS). These include areas with slopes steep enough to create potential problems. High Risk areas (OS3) have a high potential to fail, and include slopes greater than forty percent, and consist of areas of rock fall, creep, and places underlain with unstable materials. Intermediate Risk areas (OS2) are less likely to fail but are still potentially hazardous. This category also includes some slopes between fifteen and forty percent. Low Risk areas, unlikely to fail, are unlabeled and combined with other Low Risk categories.

(ii) Alluvial Fan/Flash Flooding Hazard Areas (AF). These are areas where flash flooding can occur, and are often associated with inundation by debris from flooding. They include alluvial fans, canyons, gullies, and small streams where catastrophic flooding can occur. They do not include all areas where flash flooding may occur with Yakima County. Flooding may also occur in larger streams and rivers, but these are depicted in the "Flood Insurance Study for the Unincorporated Areas of Yakima County," dated March 2, 1998, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps, and any amendments which may thereafter be made by the Federal Emergency Management Agency, rather than on the geologically hazardous areas map. High Risk areas (AF3) are those most likely to experience flooding. These areas usually involve larger drainage areas, easily eroded sediments, and steeper gradients. Intermediate Risk areas (AF2) have some potential for flash flooding but involve smaller drainages and flatter slopes. Low Risk areas where flash flooding is unlikely are unlabeled and combined with other Low Risk areas on the map.

(iii) Avalanche Risk Hazard Areas (AR). Areas of avalanche hazards are limited (within the mapped boundaries) to areas near the Cascade Crest. High Risk areas (AF3) are those in areas of high snowfall where avalanche scars are visible and slopes are steep to moderately steep. These areas could also be rated OS3. Intermediate

Risk areas (AF2) are usually adjacent to AF3 areas but where vegetation is still in place and slopes are moderate. AF2 and AF3 areas are mapped on the basis of aerial photography and observed scars. Climatic data (snowfall, wind direction, etc.) are necessary for more detailed mapping. Low Risk areas, where avalanches are unlikely, are unlabeled and combined with other Low Risk geologic hazards.

(iv) Stream Undercutting Hazard Areas (SU). These areas are confined to banks near main streams and rivers where undercutting of soft materials may result. High Risk areas (SU3) include steep banks of soft material adjacent to present stream courses. Intermediate Risk areas (SU2) are banks along the edge of a floodplain but away from the present river course. Low Risk areas are unlabeled and combined with other Low Risk areas on the maps.

(b) Earthquake Activity Hazard Areas (EA). Recorded earthquake activity in Yakima County is mostly marked by low magnitude events and thus low seismic risk. One exception is an area along Toppenish Ridge where Holocene faulting may have produced earthquakes of as much as magnitude 7. Zones of surficial fault scarps are shown on High Risk areas (EA3) while areas adjacent to the scarps are assigned Intermediate Risk (EA2). The rest of the county is Low Risk, unlabeled, and combined with other low risk hazards.

(c) Suspected Geologic Hazard Areas (SUS). These are areas for which detailed geologic mapping is lacking but preliminary data indicate a potential hazard. No risk assessment (1-2-3) is given for these areas. Most are probably OS or LS hazards.

(d) Risk Unknown Hazard Areas (UNK). In these areas geologic mapping is lacking or is insufficient to make a determination. All of these areas are associated with other classified geologic hazards, and most are located in remote areas of Yakima County.

(4) Volcanic hazard areas are not mapped but are defined as areas subject to pyroclastic (formed by volcanic explosion) flows, lava flows and inundation by debris flows, mudflows or related flooding resulting from volcanic activity. Volcanic hazard areas in Yakima County are limited to pyroclastic (ash) deposits. While Yakima County contains a portion of Mt. Adams and is in close proximity to Mt. Rainier and Mt. St. Helens, the threat of volcanic hazards is minimal and limited to ash deposition. The more devastating effects of volcanic activity such as lava flows, and lahars (volcanic landslide or mudflow) are not possible due to intervening ridges. No specific protection requirements are identified for volcanic hazard areas.

(5) This chapter does not imply that land outside mapped geologically hazardous areas or uses permitted within such areas will be without risk. This chapter shall not create liability on the part of Yakima County, any officer, or employee thereof for any damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

Plan 2015 Comprehensive Plan Goals and Policies

As of this writing in 2014, Yakima County was awaiting adoption of a new Subdivision and Zoning ordinance, which will continue to provide avalanche mitigation though zoning. Yakima County Comprehensive Plan update (Horizon 2040) will be completed by 2017. This update is expected to highlight geologic hazard mitigation goals and policies, which include:

CRITICAL AREAS PURPOSE STATEMENT 8

Critical Areas are an important part of the natural setting in Yakima County. Their protection is required by the Growth Management Act and important to the quality of life of the residents of this county. Critical Areas include groundwater, fish and wildlife habitat (which includes surface waters), wetlands, frequently flooded areas, and geologic hazards. The protection of critical areas must include certain general approaches, which are provided for in the goals and policies below.

Goal NS 8: Establish critical areas protection measures to protect environmentally sensitive areas, and protect people and property from hazards.

Critical Areas: General

POLICIES

NS 8.1 Use the best available science in a reasonable manner to develop regulations to protect the functions and values of critical areas.

NS 8.2 Ensure proposed subdivisions, other development, and associated infrastructure are designed at a density, level of site coverage, and occupancy to preserve the structure, values and functions of the natural environment or to safeguard the public from hazards to health and safety.

NS 8.3 Use a preference-based system of mitigation sequencing for the County's stream, lake, pond, wetland, floodplain and fish and wildlife habitat critical areas that reduces impacts using approaches ranging from avoidance to replacement.

NS 8.4 In order to encourage Critical Area protection and restoration, the density and lot size limits stipulated in other policies may be adjusted or exceeded to accomplish clustering and bonus provisions adopted under the (Critical Areas Ordinance) CAO. The use of incentive based programs is encouraged

Critical Areas: Geologic Hazards

PURPOSE STATEMENT NS 19

Geologic hazards pose a threat to the health and safety of County citizens when incompatible commercial, residential, or industrial development and associated infrastructure is sited in areas of significant hazard. The following goal and policies address the risk associated with these areas by encouraging engineering designs or modified construction practices that will mitigate problems, and prohibiting building where problems cannot be mitigated.

GOAL NS19: Protect the public from personal injury, loss of life or property damage from geologic hazards.

POLICIES:

NS 19.1: Ensure that land use practices in geologically hazardous areas do not cause or exacerbate natural processes which endanger lives, property, or resources.

NS 19.2 Locate development within the most environmentally suitable and naturally stable portions of the site.

NS 19.3 Classify and designate areas on which development should be prohibited, conditioned, or otherwise controlled because of danger from geological hazards.

NS 19.4 Prevent the subdividing of known or suspected landslide hazard areas, side slopes of stream ravines, or slopes 40 percent or greater for development purposes.

REMOTE RURAL/EXTREMELY LIMITED DEVELOPMENT POTENTIAL AREAS

PURPOSE STATEMENT LU-R 11

Certain areas of the County are remote and/or extremely limited in their development potential. This land use category has generally been applied to Cascade Mountain foothills, ridges and uplands, including the Rattlesnake Hills, Yakima Ridge, unforested portions of Cowiche and Cleman Mountains, the upper Wenas Valley and floodways on the valley floor along the Naches and Yakima Rivers. The cost of extending or maintaining roads and services to these areas is often prohibitive given inaccessibility and challenging geographical features many of these areas possess, such as: natural hazard potential (excessive or unstable slopes, soil constraints, topographic or flooding characteristics, and wildfire potential); or remote location (outside of expected rural fire service area, lack of all-weather access, depth to groundwater). These areas may also include public values covered by Statute (e.g., protection of shorelines, or critical areas features such as sensitive fish and wildlife habitats). These areas are typically not well suited for commercial timber production, and agricultural uses are generally limited to grazing or other dryland farming, although soils and the land may become productive where irrigation water is available.

GOAL LU-R 11: Recognize and maintain Remote Rural/Extremely Limited Development Potential areas, and allow development at a level consistent with environ-mental constraints and service availability in remote areas and other places with extremely limited development potential.

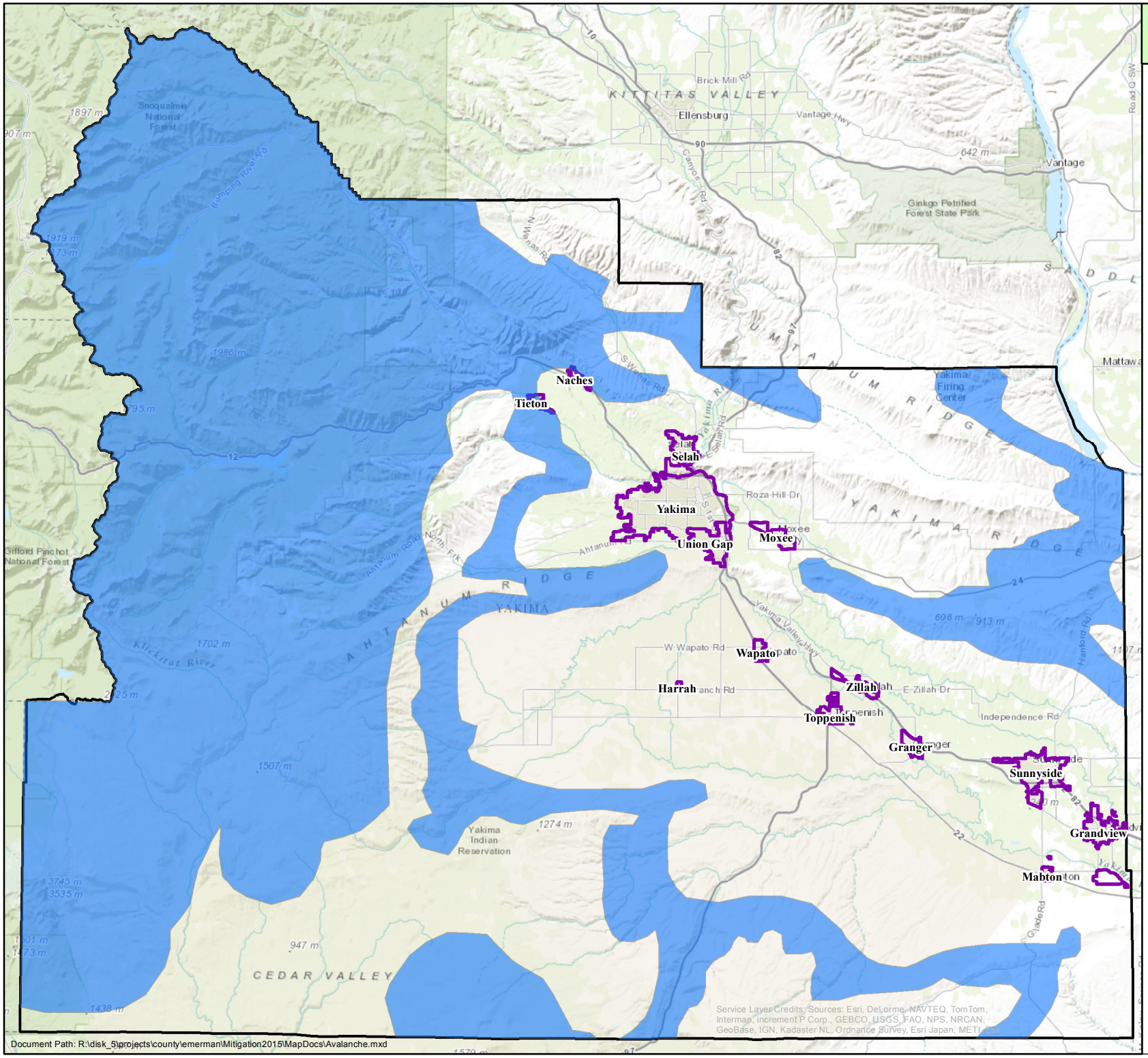
POLICIES:

LU-R 11.1 Minimum parcel size for new development within the Remote Rural /Extremely Limited Development Potential category should be one quarter quarter section (i.e., approximately 40 acres less rights of way).

LU-R 11.2 Require notice of service limitations to future purchasers of lands which are located within the Remote Rural/Extremely Limited Development Potential area through a declarative coven-ant to be recorded as an addendum to any instrument of sale, lease or transfer of ownership of properties in this area. This covenant must also be recorded as an addendum to all land divisions.

LU-R 11.3 Yakima County should not extend County roads into those lands which fall under the Remote Rural/Extremely Limited Development Potential category.

LU-R 11.4 New development within the Re-mote Rural/Extremely Limited Development Potential category should be served by individual wells and septic systems.



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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Avalanche Hazard Areas

Avalanche Hazard Areas
City Limits

Note: Data from the Washington State Hazard Mitigation Plan (June 2013).

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 22, 2014

Part Two—Hazard-Specific Information
Tab-2

Drought

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DROUGHT

Definition

Drought is a prolonged period of reduced precipitation severe enough to reduce soil moisture, water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems. Droughts are a natural part of the climate cycle. In the past century, Washington State has experienced a number of drought episodes, including several that lasted for more than a single season – 1928 to 1932, 1992 to 1994, and 1996 to 1997.

Unlike most states, Washington has a statutory definition of drought (Revised Code of Washington Chapter 43.83B.400). According to state law, an area is in a drought condition when:

- The water supply for the area is below 75 percent of normal.
- Water uses and users in the area will likely incur undue hardships because of the water shortage.

Drought can have a widespread impact on the environment and the economy, depending upon its severity, although it typically does not result in loss of life or damage to real property, as do other natural disasters.

Hazard

The hazard – Drought is a prolonged period of low precipitation severe enough to reduce soil moisture, water and snow levels below the minimum necessary for sustaining plant, animal, and economic systems. A natural part of the climate cycle, droughts can reduce water supply, threaten crops that rely on natural precipitation, and increase the threat of wildfires.

Previous occurrences – Washington has a history of drought, including several that lasted more than a single season. The worst two on record occurred in 1977 and 2001; the most recent event was in 2005.

Probability of future events – At this time, reliable forecasts of drought are not attainable for temperate regions of the world more than a season in advance. However, based on a 100-year history with drought, the state as a whole can expect severe or extreme drought at least 5 percent of the time in the future, with most of eastern Washington experiencing severe or extreme drought about 10 to 15 percent of the time.

Jurisdictions at greatest risk – Nine counties meet criteria including percentage of time in drought, water use for crop irrigation or due to growth, and potential inability to deal with financial impacts of drought on their communities.

Factors Creating Drought

The National Drought Mitigation Center at the University of Nebraska-Lincoln uses three categories to describe likely drought impacts:

- Agricultural – Drought threatens crops that rely on natural precipitation.
- Water supply – Drought threatens supplies of water for irrigated crops and for communities.

- Fire hazard – Drought increases the threat of wildfires from dry conditions in forest and rangelands.

Additionally, drought threatens the supply of electricity in our state. Hydroelectric power plants generated nearly three-quarters of the electricity produced in Washington State in 2000. When supplies of locally generated hydropower shrink because of drought, utilities seek other sources of electricity, which can drive up prices even as supply is reduced.

Unlike most disasters, droughts occur slowly but may last a long time. On average, the nationwide annual economic impacts of drought – between $6 billion and $8 billion annually in the United States – are greater than the impacts of any other natural hazard. They occur primarily in the agriculture, transportation, recreation and tourism, forestry, and energy sectors. Social and environmental impacts are also significant, although it is difficult to put a precise cost on these impacts.

Drought affects groundwater sources, but generally not as quickly as surface water supplies, although groundwater supplies generally take longer to recover. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry; shallow wells are more susceptible than deep wells. About 16,000 drinking water systems in Washington State get water from the ground; these systems serve about 5.2 million people.

Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when steam flows are lowest.

A drought directly or indirectly affects all people and all areas of the state. A drought can result in farmers not being able to plant crops or the failure of the planted crops. This results in loss of work for farm workers and those in related food processing jobs. Other water or electricity-dependent industries commonly shut down all or a portion of their facilities, resulting in further layoffs. A drought can spell disaster for recreational companies that use water (e.g., swimming pools, water parks, and river rafting companies) and for landscape and nursery businesses because people will not invest in new plants if water is not available to sustain them. Also, people could pay more for water if utilities increase their rates. With much of Washington's energy coming from hydroelectric plants, a drought can mean more expensive electricity from other resources than dams and probably higher electric bills.

Impact of Drought on the Washington's Agriculture Industry

Agriculture is the industry most heavily affected by drought. Most of Washington's crops grow in near-desert conditions in Eastern Washington and depend on irrigation; three-quarters of the water consumed in Washington State is used for irrigating crops, according the U.S. Geological Survey.

The state's food and agriculture industry support more than 180,000 jobs around the state and generates 13 percent of the state's economy. Almost 70 percent of Washington's crop value – about $3.6 billion – comes from the 27 percent of harvested cropland that is irrigated. This includes the most valuable crops: apples, cherries, other tree fruit, vegetables, onions and potatoes. Per acre, irrigated crops are worth almost seven times more than crops from non-irrigated land. The tree fruit industry is the largest single user of irrigation water.

According to the 2005 and 2006 production estimates from the U.S. Department of Agriculture (USDA), Washington State was the top producer of apples and pears in the nation, was the number-two producer of sweet cherries, plums, prunes and potatoes, and the seventh-ranked producer of vegetables. In 2011 USDA reported that Washington State was the top producer of apples in the nation, valued at $1.83 billion. Milk was ranked second, wheat third, potatoes fourth, and hay was the fifth leading agricultural commodity produced in Washington State. Overall, field crops were valued at $3.24 billion, fruit and nut crops at $2.50 billion, livestock at $2.39 billion, commercial vegetables at $481 million and specialty products at $378 million. Specifically, blueberries had the highest value per harvested acre in 2011 at $17,429, followed by sweet cherries at $15,500. Apples had a value per harvested acre of $12,542.

According to the Washington State Department of Agriculture, drought reduces crop production, sometimes for several years, reduces availability of food on rangeland for grazing animals and eliminates jobs in the field, at food processing plants and in affiliated facilities. Surprisingly, drought also reduces availability of relatively inexpensive hydropower for farmers, processors, and storage facilities, removing their competitive edge. Plus, drought increases shipping costs for some segments of the industry. For example, wheat growers may have to use truck and rail transport for a portion of their crop if the level of the Snake and Columbia Rivers become too low for barge traffic. Sixty percent of Washington wheat moves down these rivers.

The impact of drought varies by region, by crop, and by the status of the irrigation water right holder (junior or senior). Loss of water is far more damaging to perennial crops, such as fruit trees, grapes, hops, and asparagus, than to annual crops because it takes perennials a number of years to return to normal production.

Jurisdictions Most Vulnerable to Drought

Vulnerability to drought is affected by (among other things) population growth and shifts, urbanization, demographics, technology, water use trends, government policy, social behavior, environmental awareness, and economic ability to endure a drought. These factors evolve, and a community's vulnerability to drought may rise or fall in response to these changes. For example, increasing and shifting populations put greater pressure on water and other natural resources – more people need more water.

For the State Hazard Mitigation Plan, a county is most vulnerable to drought if it meets at least five of the following seven criteria:

History of severe or extreme drought conditions:

- The county must have been in serious or extreme drought at least 10-15 percent of the time from 1895 to 1995.

Demand on water resources based on:

- Acreage of irrigated cropland. The acreage of the county's irrigated cropland must be in top 20 in the state.
- Percentage of harvested cropland that is irrigated. The percentage of the county's harvested cropland that is irrigated must be in top 20 in the state.
- Value of agricultural products. The value of the county's crops must be in the top 20 in the state.
- Population growth greater than the state average. The county's population growth in 2000-2006 must be greater than state average of 8.17 percent.

A county's inability to endure the economic conditions of a drought, based on:

- The county's median household income less than 75 percent of the state median income of $51,749 in 2005.
- The county classified as economically distressed in 2005 because its unemployment rate was 20 percent greater than the state average from January 2002 through December 2004.

The following nine counties meet the above criteria: Adams, Benton, Chelan, Franklin, Grant, Kittitas, Klickitat, Okanogan, and **YAKIMA**.

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated
Hazard-Specific Action Items
2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Drought

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Plan for drought	Yakima County Planning		Ongoing	In-Kind	

Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Section 2 Drought 2015 Update

Yakima County Comprehensive Plan update (Horizon 2040) will be updated by 2017. This update is expected to include a Hazard Mitigation element, which will address drought among other natural hazards. The following goals and policies from Plan 2015 relate to water conservation practices.

PURPOSE STATEMENT UT 5

A built in system of checks and balances to measure anticipated future development needs against the available water supply should be implemented. These policies develop guidelines to promote a checks and balances system while encouraging efficient water use and water resource planning.

GOAL UT 5: Ensure that future development does not exceed the available amount of raw water.

POLICIES:

UT 5.1 Encourage water resource planning to promote more efficient management of both ground and surface water resources.

{Amended 12/98. Previous Policy UT 5.2 deleted, policies UT 5.2 through UT 5.4 renumbered.}

UT 5.2 Develop specific guidelines for determining the adequacy of water sup-plies proposed to serve new parcels and new structures and uses on existing parcels.

UT 5.3 In conjunction with the Yakima River Watershed Council and the irrigation districts, evaluate the implications of the use of irrigation water for residential landscaping.

UT 5.4 File on unappropriated water rights within urban growth and transitional areas.

PURPOSE STATEMENT UT 9

Water conservation should play a major role in a community's water resource management. Two ways to meet this goal are educational training on voluntary water use reduction and requiring the installation of water conserving devices in new construction. This goal and its policies describe these methods and encourage them as part of a water conservation program.

GOAL UT 9: Promote water conservation.

POLICIES:

UT 9.1 Encourage water purveyors to create and implement water conservation education programs.

UT 9.2 Require water conserving fixtures in new buildings.

UT 9.3 Promote the use of water conserving landscaping.

PURPOSE STATEMENT CF 5

Capital facilities should be planned for and constructed in a manner consistent with the other goals and policies of this comprehensive plan which address conservation and environmental issues. The following goal and the related policies are designed to protect public health and environmental quality through the placement and design of capital facilities.

GOAL CF 5: Protect public health and environmental quality through the appro-priate design and installation of capital facilities.

POLICIES:

CF 5.1 Promote conservation of energy, water and other natural resources in the location and design of capital facilities.

CF 5.2 Practice efficient and environmentally responsible maintenance and operating procedures.

PURPOSE STATEMENT NS 10, 11 & 12

The Yakima River and its many tributaries are perhaps the most dynamic and used natural features in Yakima County. Throughout its 200-mile course, water from the Yakima is withdrawn to feed agricultural operations that drive our economy. Irrigation and other water uses developed both inside and outside the Yakima Irrigation Project, developed under the 1903 Reclamation Act, are relatively unique in that all of the water for irrigation is generated, stored and distributed in the Valley. The tributaries, the Naches River and the Yakima River are used as the conduit for the water distributions system in the Valley. The Yakima River is used as the trunk of the water distributions system, is the most important component of the Yakima Project, and probably is the most important piece of infrastructure in the Valley. Agriculture, industry, recreation and the Cities within the basin are dependent on this distribution system for water supply for domestic, industrial, agricultural and residential uses. The demands of this economy are continuing to increase, while existing operations return flows of a far lesser quality. The combined historic actions of over withdrawal, pollution and vegetation removal have produced a waterway that exits Yakima County completely altered from the condition in which it begins near Snoqualmie Pass. To deal with the situation, efforts by many parties have been made to improve stream corridors within the County, especially in the areas of water quality and habitat. The following goals and policies address actions and attitudes that should guide decisions related to surface water.

GOAL NS10: Enhance the quantity and quality of surface water.

POLICIES:

NS 10.1 Improve water conservation through education and incentives.

NS 10.2 Protect water quality from the adverse impacts associated with erosion and sedimentation.

NS 10.3 Encourage the use of drainage, erosion and sediment control practices for all construction or development activities.

GOAL NS 11: Identify future needs and promote increased water supplies through coordinated development and conservation efforts.

POLICY:

NS 11.1 Support local and regional cooperative efforts which help to accomplish this goal.

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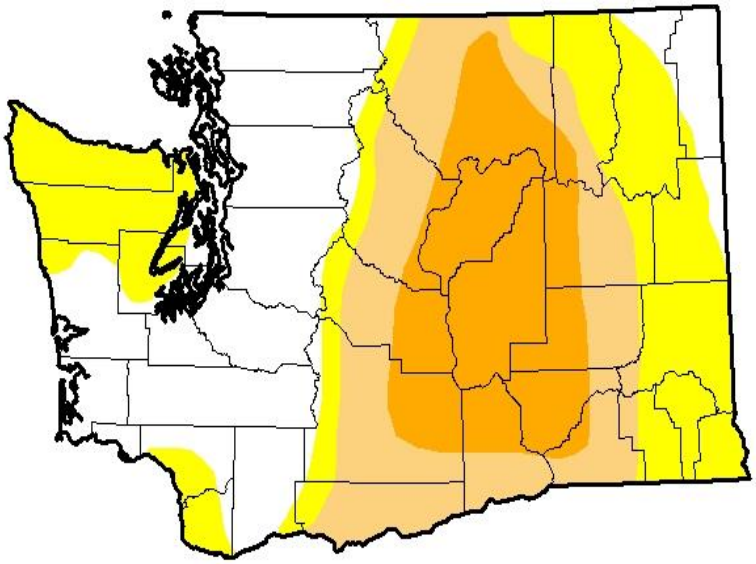
U.S. Drought Monitor

Washington



September 9, 2014

(Released Thursday, Sep. 11, 2014)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	32.70	67.30	40.27	19.99	0.00	0.00
Last Week 9/2/2014	32.70	67.30	40.32	19.99	0.00	0.00
3 Months Ago 6/10/2014	46.28	53.72	34.59	15.22	0.00	0.00
Start of Calendar Year 12/31/2013	18.08	81.92	0.00	0.00	0.00	0.00
Start of Water Year 10/1/2013	97.08	2.92	0.00	0.00	0.00	0.00
One Year Ago 9/10/2013	88.78	11.22	3.14	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brian Fuchs
National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Part Two—Hazard-Specific Information
Tab-3

Earthquake

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Earthquake

Definition

An earthquake is ground shaking caused by an abrupt shift along a fracture in the earth, called a fault.

History

Washington State, especially the Puget Sound basin, has a history of frequent earthquakes. More than 1,000 earthquakes are recorded in the state annually. A dozen or more cause shaking and occasional damage. Large earthquakes in 1949 (magnitude 7.1) and 1965 (magnitude 6.5) killed 15 people and caused more than $200 million (1984 dollars) in damage in several counties. The state experienced at least 20 damaging events in the last 125 years. Most earthquakes occur in Western Washington. However, some damaging events and the state's largest earthquake of 1872, occurred east of the Cascade Crest. Geologic evidence documents prehistoric magnitude 8 to 9.5 coastal earthquakes and magnitude 7+ shallow depth earthquakes in major urban areas.

The most recent earthquake, on February 28, 2001, was a deep, 6.8 magnitude earthquake located 17.6 kilometers northeast of Olympia in the Puget Sound. One person died of a heart attack, over 700 people were injured, and damages were upward of $1 billion at the time of the earthquake.

Hazard Identification and Vulnerability Assessment

Large oceanic and continental crustal plates move 3-4 centimeters annually in the Pacific Northwest over the surface of the earth. These plates may move in sideswipe or head-on collisions. Where they collide they build up stresses and then release energy as earthquakes. Washington is located at the middle of an offshore head-on collision convergent boundary called the Cascadia Subduction Zone that extends from southern British Columbia to northern California. The inland extent of related earthquake activity is the Cascade Mountain Range where the volcanoes mark the melting edge of the subducting (sinking) Juan de Fuca Plate that is made of oceanic crust. The overriding plate is known as the North American Plate and is made of continental crust.

Washington is vulnerable to earthquakes originating from three sources: in the subducting slab, in the overriding plate, and between the colliding plates. Historically, the most damaging events occur at depths of 15 to 60 miles in the subducting plate.

Earthquakes cause damage by strong ground shaking and by the secondary effects of ground failures, tsunamis, and seiches. The strength of ground shaking (strong motion) generally decreases or attenuates with distance from the earthquake source. Shaking can be much higher when earthquake waves are amplified by bedrock and then pass into softer geologic materials such as unconsolidated sediments.

Ground failures caused by earthquakes include fault rupture, ground cracking, slumps, landslides, rockfalls, liquefaction, uplift and subsidence. Faults often do not rupture through to the surface.

Unstable or unconsolidated ground is most at risk to the remaining effects. Any of these failures will effect structures above or below them.

Earthquakes can cause large and disastrous slides, including debris avalanches from volcanoes. Strong shaking can cause cohesive sediments to lose strength. Loss of strength in clay-rich soils can cause landslides and other ground failures. Liquefaction occurs when water-saturated sands, silts or gravels are shaken so violently that the grains lose their points of contact and rearrange themselves, squeezing the water out of the shrinking pores and causing it to flow outward forming sand "boils" or causing lateral spreading of overlying layers. Liquefaction causes loss of bearing strength under structures, triggers slides, and floats low-density structures, such as fuel tanks and pilings.

Conclusion

Washington ranks second in the nation after California among states susceptible to earthquake loss according to a Federal Emergency Management Agency (FEMA) study. The study predicts an annualized loss of $228 million. It is important to protect our economic base. The functionality of our critical facilities and lifelines such as hospitals, fire stations, schools, power, communications, transportation, fuel delivery systems, dams, etc. will be even more vitally important than the immediate dollar losses following a major earthquake. This requires a focus on implementing mitigation measures in our communities in all areas of our lives, including home, school, business, and government:

- Examine, evaluate, and enforce building and zoning codes.
- Identify geologically hazardous areas and adopt land use policies.
- Provide public information on actions to take before, during, and after an earthquake.
- Develop and maintain mitigation, preparedness, response, and recovery programs.

History of Earthquakes in Eastern Washington

The state's two largest crustal earthquakes felt by European settlers occurred in Eastern Washington – the 1872 quake near Lake Chelan and the 1936 earthquake near Walla Walla. Residents of Spokane strongly felt a swarm of earthquakes in 2001; the largest earthquake in the swarm had a magnitude of 4.0. The recent Spokane earthquakes were very shallow, with most events located within a few miles of the surface. The events occurred near a suspected fault informally called the Latah Fault; however, the relation between the fault and the swarm is uncertain. Geologists have mapped the Spokane area, but none confirmed the presence of major faults that might be capable of producing earthquakes. State geologists continue to investigate the geology and earthquake risk in Spokane.

Elsewhere in Eastern Washington, geologists have uncovered evidence of a number of surface faults; however, they have not yet determined how active the faults are, nor determined the extent of the risk they pose to the public. One fault, **Toppenish Ridge**, appears to have been the source of two earthquakes with magnitudes of 6.5 to 7.3 in the past 10,000 years.

Eastern Washington Jurisdictions Most Vulnerable

For the State Hazard Mitigation Plan, primary factors used to determine which counties are most vulnerable to future earthquakes are:
· The Annualized Earthquake Loss, as calculated by HAZUS.
· The Annualized Earthquake Loss Ratio, as calculated by HAZUS.

Counties considered most at risk are those with an Annualized Earthquake Loss of at least $1 million or with an Annualized Earthquake Loss Ratio equal or greater than the state's ratio of 0.05. Twenty-one counties meet one of these two criteria. Additionally, Chelan, Kittitas, and Walla Walla Counties, which have greater seismic risk than most counties in Eastern Washington but do not have building stock to meet the above criteria, have been added to the list of jurisdictions most vulnerable at the advice of state and federal geologists and seismologists with expertise in earthquakes in Washington.

Hazard Profile
(Source: Washington State Hazard Mitigation Plan 2013)

Other factors, including the size of potentially vulnerable populations and age of the housing stock, also play a part in determining which counties are most vulnerable.

Factors considered include:
· The percentage of the total population of each of the following groups: people who do not speak English as their primary language, individuals with disabilities, senior citizens, people living in poverty, and children in school (kindergarten through 12th grade.

· The percentage of housing stock built before 1960.

Based on these factors, the following counties are at greatest risk and most vulnerable to earthquakes: Benton, Chelan, Clallam, Clark, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Kittitas, Lewis, Mason, Pacific, Pierce, San Juan, Skagit, Snohomish, Spokane, Thurston, Wahkiakum, Walla Walla, Whatcom, **Yakima**

Resources

Washington State Emergency Management Division
Washington State Department of Natural Resources, Geology and Earth Resources Division
Washington State Department of Transportation
University of Washington Geophysics Program
United States Geological Survey
Federal Emergency Management Agency

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low

Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing

Funding Source: Local; State; FEMA; Private; Other

Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Earthquake

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Adopt and Enforce Building Codes Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	H	Ongoing	In-Kind	
Incorporate Earthquake Mitigation into Local Planning	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Increase Earthquake Risk Awareness	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	

Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Part 2 Section 13 EQ 2015 Planning Updates

Yakima County Planning Division uses policies and ordinances to mitigate for Earthquakes and other geologic hazards. Yakima County Critical Areas Ordinance (Chapter 16C.08) and Yakima County Shoreline Master Program (Chapter 16D.08) provide guidelines for development in mapped geologically hazardous areas.

16C.08.01 Purpose and Intent.

(1) Geologically hazardous areas include those areas susceptible to erosion, sliding, earthquake or other geological events. They pose a threat to the health and safety of the citizens of Yakima County when incompatible development is sited in areas of significant hazard. Some risks due to geologic hazards might be capable of mitigation through engineering, design, or modified construction standards so the level of risk is reduced to an acceptable level. However, when mitigation is not feasible, development within geologically hazardous areas is best avoided.

(2) The purposes of this chapter are to:

(a) Minimize risks to public health and safety and reduce the risk of property damage by regulating development on or adjacent to geologically hazardous areas;

(b) Maintain natural geological processes while protecting existing and new development;

(c) Establish review procedures for development proposals in geologically hazardous areas.

(Ord. 13-2007 §1 (Exh. A)(16C.08.01), 2007).

16C.08.02 Mapping and Designation.

(1) Geologically hazardous areas are areas that are susceptible to one or more of the following types of hazards, based on WAC 365-190-080(4)(b) through (f):

(a) Erosion hazards;

(b) Landslide hazards, which in the Yakima County inventory includes:

(i) Oversteepened slope hazards;

(ii) Alluvial fan/flash flooding hazards;

(iii) Avalanche hazards; and

(iv) Stream undercutting hazards;

(c) Seismic hazards (referred to below as earthquake hazards);

(d) Volcanic hazards.

(2) The approximate location and extent of erosion hazard areas are shown on the county's critical area map titled "Erosion Hazard Areas of Yakima County." Erosion hazard areas were identified by using the "Soil Survey of Yakima County Area, Washington" and the "Soil Survey of Yakima Indian Reservation Irrigated Area, Washington, Part of Yakima County." The analysis utilized the general soil map unit descriptions of severe and very severe hazard of water erosion.

(3) The approximate location and extent of geologically hazardous areas are shown on the county's critical area map titled "Geologically Hazardous Areas of Yakima County." The following geologically hazardous areas, with the corresponding map code in parentheses, are mapped and classified using the stated criteria based on WAC 365-190-080(4)(b) through (f):

(a) Landslide Hazard Areas (LS). These include places where landslides, debris flows, or slumps have already occurred. Where sliding is presumed to have occurred within ten thousand years or less is shown as High Risk (LS3) on the map. Slides thought to be older than ten thousand years but still capable of movement are shown as Intermediate Risk (LS2). Areas where slides are absent are unlabeled and combined with other Low Risk areas.

(i) Oversteepened Slope Hazard Areas (OS). These include areas with slopes steep enough to create potential problems. High Risk areas (OS3) have a high potential to fail, and include slopes greater than forty percent, and consist of areas of rock fall, creep, and places underlain with unstable materials. Intermediate Risk areas (OS2) are less likely to fail but are still potentially hazardous. This category also includes some slopes between fifteen and forty percent. Low Risk areas, unlikely to fail, are unlabeled and combined with other Low Risk categories.

(ii) Alluvial Fan/Flash Flooding Hazard Areas (AF). These are areas where flash flooding can occur, and are often associated with inundation by debris from flooding. They include alluvial fans, canyons, gullies, and small streams where catastrophic flooding can occur. They do not include all areas where flash flooding may occur with Yakima County. Flooding may also occur in larger streams and rivers, but these are depicted in the "Flood Insurance Study for the Unincorporated Areas of Yakima County," dated March 2, 1998, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps, and any amendments which may thereafter be made by the Federal Emergency Management Agency, rather than on the geologically hazardous areas map. High Risk areas (AF3) are those most likely to experience flooding. These areas usually involve larger drainage areas, easily eroded sediments, and steeper gradients. Intermediate Risk areas (AF2) have some potential for flash flooding but involve smaller drainages and flatter slopes. Low Risk areas where flash flooding is unlikely are unlabeled and combined with other Low Risk areas on the map.

(iii) Avalanche Risk Hazard Areas (AR). Areas of avalanche hazards are limited (within the mapped boundaries) to areas near the Cascade Crest. High Risk areas (AF3) are those in areas of high snowfall where avalanche scars are visible and slopes are steep to moderately steep. These areas could also be rated OS3. Intermediate

Risk areas (AF2) are usually adjacent to AF3 areas but where vegetation is still in place and slopes are moderate. AF2 and AF3 areas are mapped on the basis of aerial photography and observed scars. Climatic data (snowfall, wind direction, etc.) are necessary for more detailed mapping. Low Risk areas, where avalanches are unlikely, are unlabeled and combined with other Low Risk geologic hazards.

(iv) Stream Undercutting Hazard Areas (SU). These areas are confined to banks near main streams and rivers where undercutting of soft materials may result. High Risk areas (SU3) include steep banks of soft material adjacent to present stream courses. Intermediate Risk areas (SU2) are banks along the edge of a floodplain but away from the present river course. Low Risk areas are unlabeled and combined with other Low Risk areas on the maps.

(b) Earthquake Activity Hazard Areas (EA). Recorded earthquake activity in Yakima County is mostly marked by low magnitude events and thus low seismic risk. One exception is an area along Toppenish Ridge where Holocene faulting may have produced earthquakes of as much as magnitude 7. Zones of surficial fault scarps are shown on High Risk areas (EA3) while areas adjacent to the scarps are assigned Intermediate Risk (EA2). The rest of the county is Low Risk, unlabeled, and combined with other low risk hazards.

(c) Suspected Geologic Hazard Areas (SUS). These are areas for which detailed geologic mapping is lacking but preliminary data indicate a potential hazard. No risk assessment (1-2-3) is given for these areas. Most are probably OS or LS hazards.

(d) Risk Unknown Hazard Areas (UNK). In these areas geologic mapping is lacking or is insufficient to make a determination. All of these areas are associated with other classified geologic hazards, and most are located in remote areas of Yakima County.

(4) Volcanic hazard areas are not mapped but are defined as areas subject to pyroclastic (formed by volcanic explosion) flows, lava flows and inundation by debris flows, mudflows or related flooding resulting from volcanic activity. Volcanic hazard areas in Yakima County are limited to pyroclastic (ash) deposits. While Yakima County contains a portion of Mt. Adams and is in close proximity to Mt. Rainier and Mt. St. Helens, the threat of volcanic hazards is minimal and limited to ash deposition. The more devastating effects of volcanic activity such as lava flows, and lahars (volcanic landslide or mudflow) are not possible due to intervening ridges. No specific protection requirements are identified for volcanic hazard areas.

(5) This chapter does not imply that land outside mapped geologically hazardous areas or uses permitted within such areas will be without risk. This chapter shall not create liability on the part of Yakima County, any officer, or employee thereof for any damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

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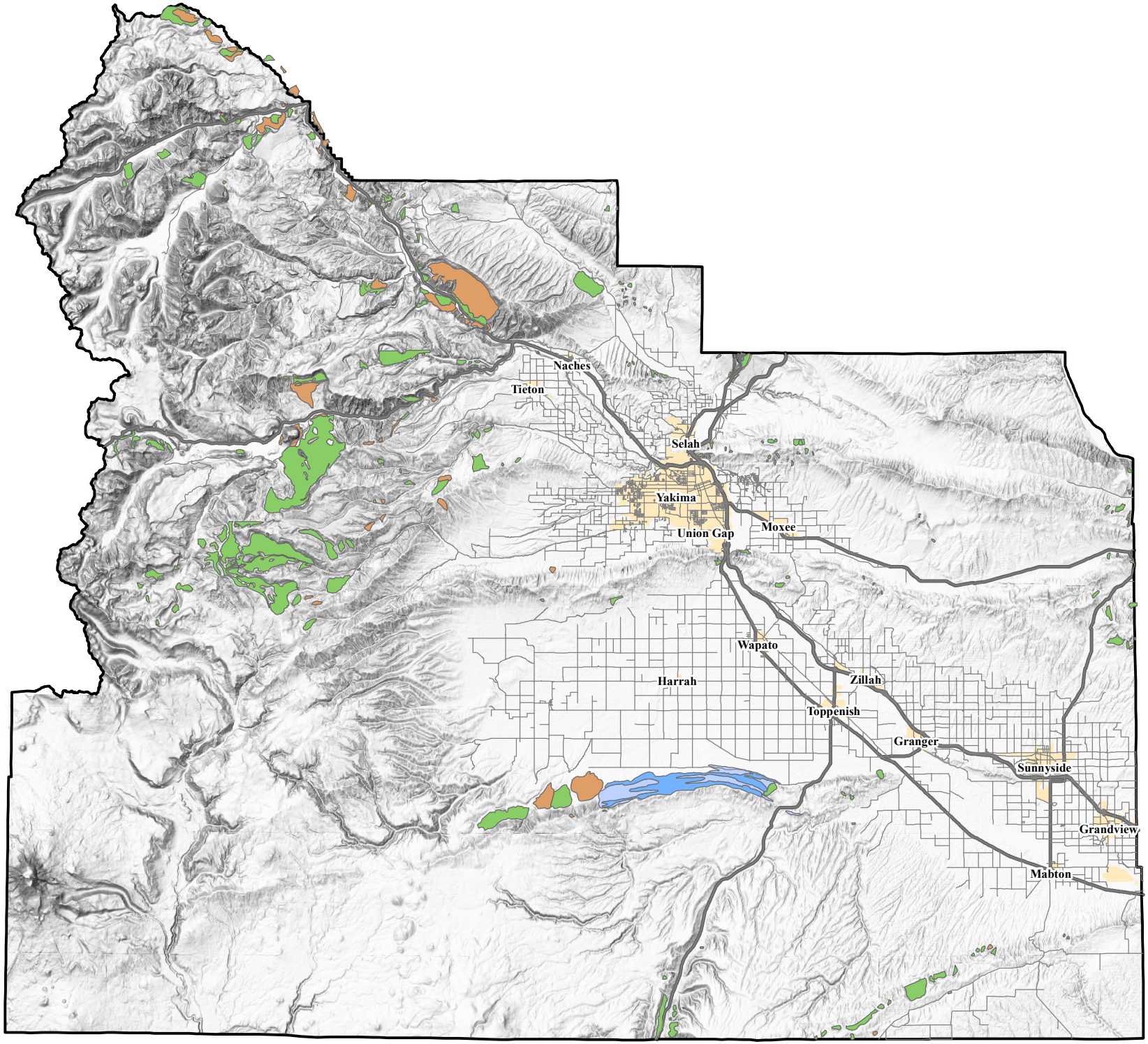
Status of County Building Codes with Earthquake Implications

International Building Codes
Chapter 16—Structural Design
Roof Snow Load
Wind Design Data
Earthquake Design Data
Flood Design Data
Chapter 9--Fire Protection Systems

Ordinance 5-2013 adopted the International Building Code, 2012 Edition on October 8, 2013



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Geologic Hazards

Geologic Hazards
- Earthquake Intermediate Risk
- Earthquake High Risk
- Landslide Intermediate Risk
- Landslide High Risk
- City Limits
- State & Federal Roads
- County Roads

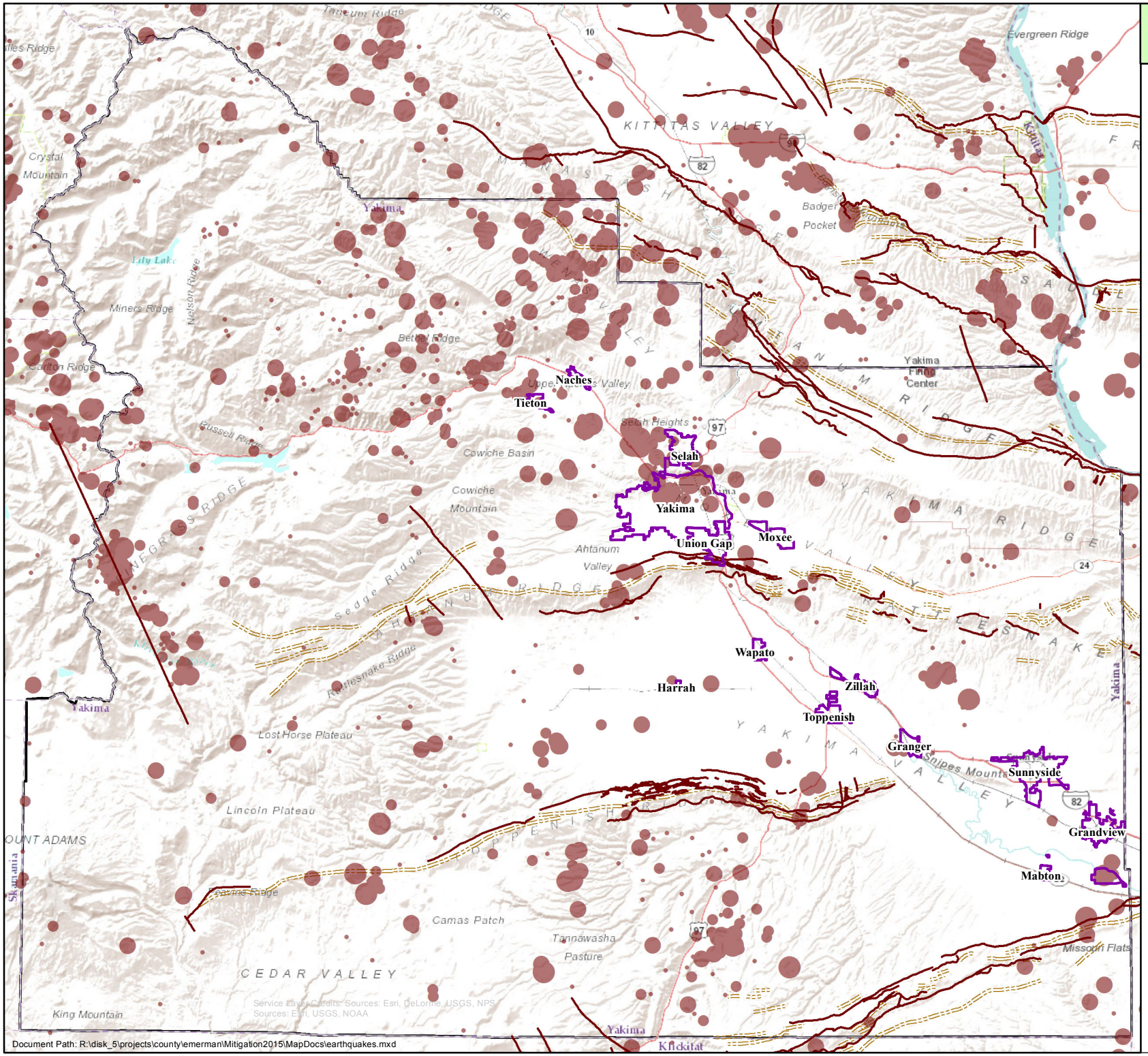
0 3.5 7 14 Miles

1 in = 9.4 miles

N
W E
S

Date: September 26, 2014

Document Path: R:\disk_5\projects\county\emerman\Mitigation2015\MapDocs\geo_hazards.mxd



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Earthquakes, Faults and Folds

City Limits

1970 to Present Earthquakes

- 1.0 - 1.5
- 1.6 - 2.0
- 2.1 - 2.8
- 2.9 - 5.4

Active Faults

Active Folds

Washington State Department of Natural Resources
Division of Geology and Earth Resources
Seismogenic Features of Washington State
December 2013

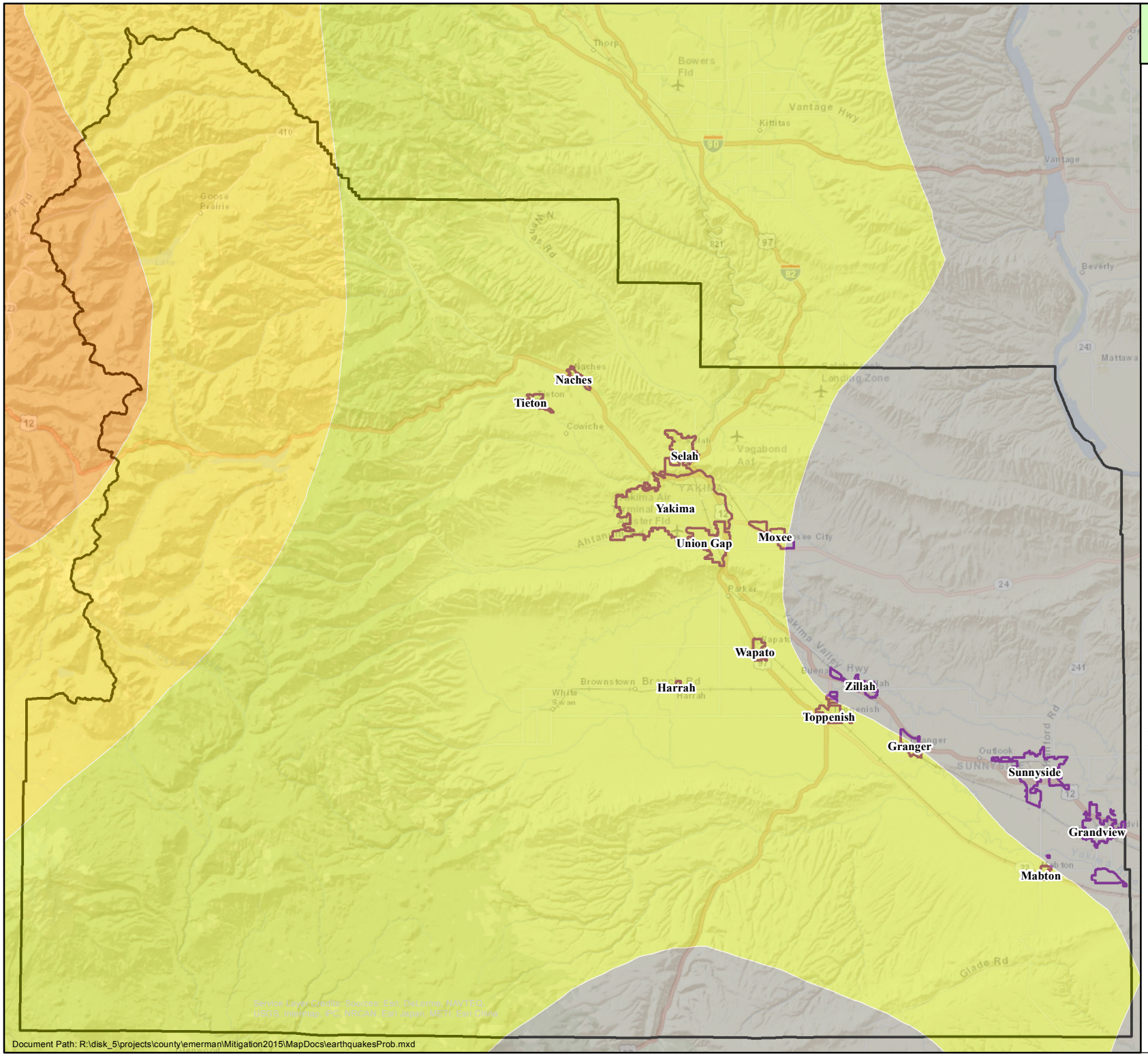
Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 18, 2014



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Two-percent probability of exceedance in 50 years map of peak ground acceleration

City Limits

Peak Acceleration, Expressed as a Fraction of Standard Gravity (g)

- .18
- .20
- .3
- .4

Petersen, M.D., Moschetti, M.P., Powers, P.M., Mueller, C.S., Haller, K.M., Frankel, A.D., Zeng, Yuehua, Rezaeian, Sanaz, Harmsen, S.C., Boyd, O.S., Field, Ned, Chen, Rui, Rukstales, K.S., Luco, Nico, Wheeler, R.L., Williams, R.A., and Olsen, A.H., 2014, Documentation for the 2014 update of the United States national seismic hazard maps: U.S. Geological Survey Open-File Report 2014–1091, 243 p., http://dx.doi.org/10.3133/ofr20141091.

Yakima County Hazard Mitigation Plan

Map Inset

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1 in = 9.4 miles

Date: September 18, 2014

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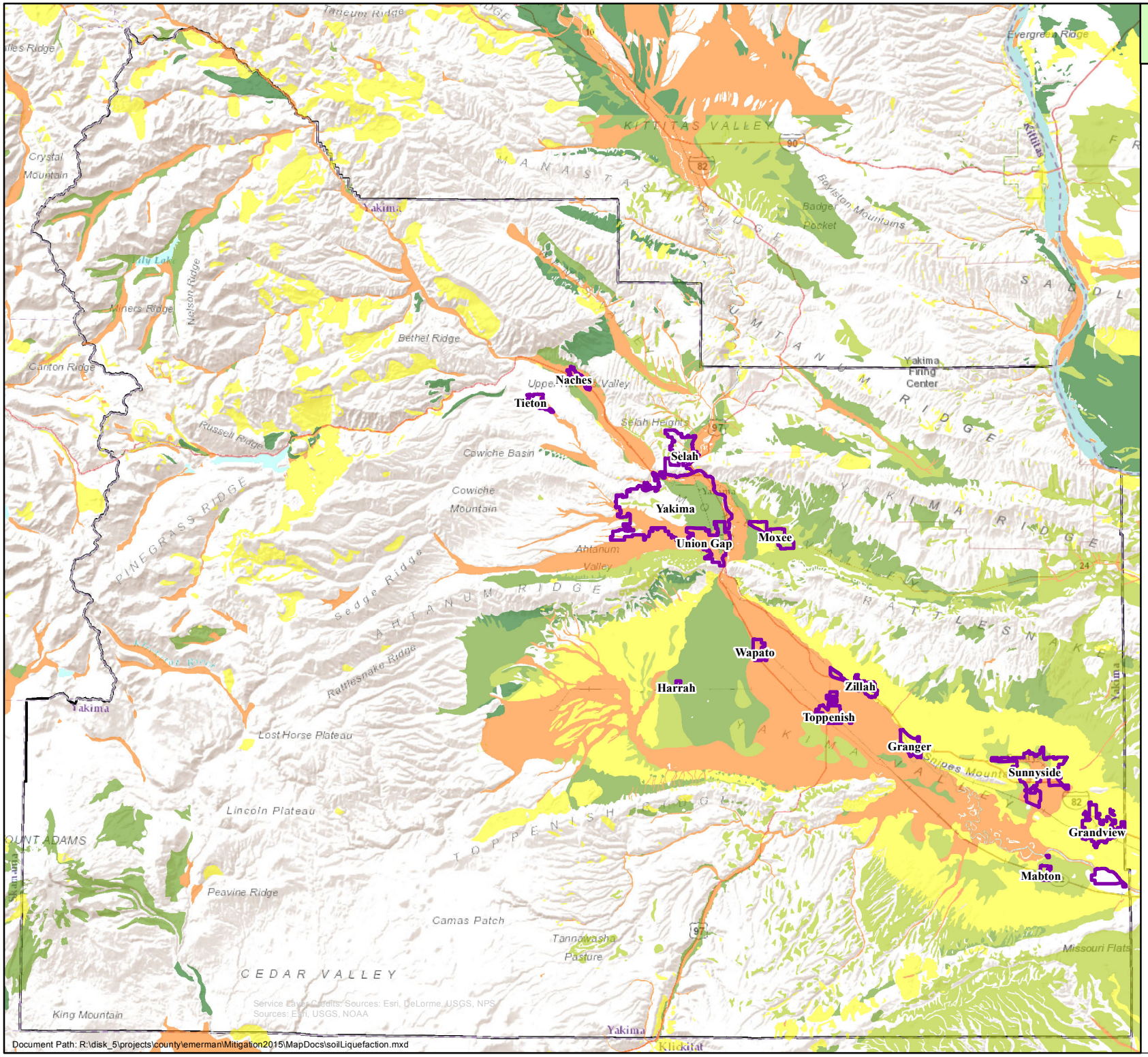

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Soil Liquefaction

City Limits

Soil Susceptibility to Liquefaction

- very low
- very low to low
- low
- low to moderate
- moderate to high

Washington State Department of Natural Resources
Division of Geology and Earth Resources
Seismic Ground Response
June 2010

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 18, 2014

Part Two—Hazard-Specific Information
Tab-4

Erosion

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EROSION

Definition

Wearing away of land, such as loss of riverbank, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time.

Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surge, and windstorms, but may be intensified by human activities.

Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure.

Soil Erosion

Erosion from irrigated agricultural lands has caused the waters of the lower Yakima River to become impaired by suspended sediment, turbidity, and the pesticide DDT, causing it to be placed on the state's 303(d) list of impaired waters. As a result of better irrigation practices through the conversion from furrow to sprinkler or drip systems, area farmers have achieved interim total maximum daily load (TMDL) criteria for turbidity at three of the four primary irrigation water return drains, and made significant progress towards meeting TMDL targets at all other sites.

Problem

The Yakima River flows for over 200 miles through south-central Washington, and is one of the most intensively irrigated and agriculturally diverse areas in the United States. The confluence of the Yakima and Naches Rivers (a tributary) at the city of Yakima divides the Yakima River into the "upper" and "lower" portions. During a normal irrigation season at least 300 tons of sediment contaminated with pesticides and other pollutants entered the lower Yakima River from irrigated farmland, interfering with fish and their habitat. Studies have shown that fish in the lower Yakima River have one of the highest concentrations of DDT in the country.

In 1996 the lower Yakima River was placed on Washington's 303(d) list for impairments from suspended sediment, turbidity, and DDT; and in 1998 the Washington State Department of Ecology (Ecology) established a TMDL. Implementation of the TMDL is scheduled over a 20-year time span, with interim targets set at 5-year intervals. The fifth year targets, set for 2002, included meeting the state water quality criterion for turbidity in the mainstem Yakima River, and achieving a maximum 90th percentile turbidity of 25 NTU (nephelometric turbidity units) at the mouths of the four major tributaries in the lower Yakima. Prior to the development of the TMDL, turbidity levels commonly reached 300 NTU or higher.

Project Highlights
To implement the TMDL a landmark partnership was formed between two irrigation districts in the Yakima Valley—the Sunnyside Valley Irrigation District and the Roza Irrigation District. Under the Roza-Sunnyside Board of Joint Control (Board), the two districts adopted a comprehensive Water Quality Policy, with support and input from local farmers and other landowners, that set specific on-farm turbidity targets. If on-farm targets are not met, the landowner is responsible for taking corrective action by submitting both a short-term and a long-term Water Quality Plan for how the targets will be achieved. If the landowner continues to be in violation of the water quality policies, the Board can reduce water delivery services to the farm until the plan has been implemented and subsequent monitoring indicates compliance. Over 200 plans have been filed with the irrigation districts.

The Board worked closely with many farmers who voluntarily converted well over 20,000 acres from water-intensive and erosive rill and furrow irrigation methods to sprinkler or drip systems to reduce erosion. Each year one lateral irrigation ditch is converted from open ditch to pipe, which reduces evaporation and, in many cases, delivers pressurized water to farms, making it easier for growers to utilize drip and sprinkler systems. Other best management practices implemented to control erosion include the construction of settling ponds, filter strips, and the use of polyacrylamide—a substance that binds to soil while allowing water infiltration.

Results
Effectiveness monitoring conducted by Ecology in 2003 shows that three of the four major agricultural drains met the TMDL criteria for turbidity. While the fourth drain did not meet the criteria, it did show a sediment load reduction of approximately 80 percent. Progress was also observed in the mainstem Yakima River, with reductions of total suspended sediment loadings between 50 and 70 percent in 2003 (as compared to 1995).

Partners and Funding
The success of this project is due to support from Ecology, South Yakima Conservation District, North Yakima Conservation District, Yakama Nation, Benton Conservation District, Roza Irrigation District, and Sunnyside Valley Irrigation District. Since 1994, funding has totaled more than $2.5 million. More than $1 million in section 319 funding supported Ecology's work in developing and implementing the TMDL; and approximately $200,000 in section 319 funding supported rill irrigation conversion, water quality monitoring, and other technical assistance. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service provided $2.3 million through the Watershed Protection and Flood Prevention Act (PL-566), along with additional support from USDA's Environmental Quality Incentives Program. Approximately $10 million in low-interest state revolving loan funds from Ecology supported upgrades to irrigation systems. Grants from the U.S. Geological Survey, Yakama Nation, and Washington State University Cooperative Extension Research Station at Prosser funded construction of settling ponds and filter strips. Additional support came from the Washington State Conservation Commission; conservation districts; and the U.S. Department of Interior's Bureau of Reclamation. This funding helped leverage over $6 million from landowners themselves.

SOURCE:
U.S. Environmental Protection Agency
Office of Water
Washington, DC
EPA 841-F-05-004V
September 2005

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Erosion

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Manage short-term erosion resulting from periodic natural events.	Yakima County Planning	L			

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Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Part 2 Section Erosion 2015 Planning Update

Yakima County Planning Division uses policies and ordinances to mitigate for Erosion and other geologic hazards. Yakima County Critical Areas Ordinance (Chapter 16C.08) and Yakima County Shoreline Master Program (Chapter 16D.08) provide guidelines for development in mapped geologically hazardous areas. Yakima County Comprehensive Plan update (Horizon 2040) will be completed by 2017. This update is expected to highlight geologic hazard mitigation goals and policies.

16C.08.01 Purpose and Intent.

(1) Geologically hazardous areas include those areas susceptible to erosion, sliding, earthquake or other geological events. They pose a threat to the health and safety of the citizens of Yakima County when incompatible development is sited in areas of significant hazard. Some risks due to geologic hazards might be capable of mitigation through engineering, design, or modified construction standards so the level of risk is reduced to an acceptable level. However, when mitigation is not feasible, development within geologically hazardous areas is best avoided.

(2) The purposes of this chapter are to:

(a) Minimize risks to public health and safety and reduce the risk of property damage by regulating development on or adjacent to geologically hazardous areas;

(b) Maintain natural geological processes while protecting existing and new development;

(c) Establish review procedures for development proposals in geologically hazardous areas.

(Ord. 13-2007 §1 (Exh. A)(16C.08.01), 2007).

16C.08.02 Mapping and Designation.

(1) Geologically hazardous areas are areas that are susceptible to one or more of the following types of hazards, based on WAC 365-190-080(4)(b) through (f):

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(b) Landslide hazards, which in the Yakima County inventory includes:

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(iv) Stream undercutting hazards;

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(d) Volcanic hazards.

(2) The approximate location and extent of erosion hazard areas are shown on the county's critical area map titled "Erosion Hazard Areas of Yakima County." Erosion hazard areas were identified by using the "Soil Survey of Yakima County Area, Washington" and the "Soil Survey of Yakima Indian Reservation Irrigated Area, Washington, Part of Yakima County." The analysis utilized the general soil map unit descriptions of severe and very severe hazard of water erosion.

(3) The approximate location and extent of geologically hazardous areas are shown on the county's critical area map titled "Geologically Hazardous Areas of Yakima County." The following geologically hazardous areas, with the corresponding map code in parentheses, are mapped and classified using the stated criteria based on WAC 365-190-080(4)(b) through (f):

(a) Landslide Hazard Areas (LS). These include places where landslides, debris flows, or slumps have already occurred. Where sliding is presumed to have occurred within ten thousand years or less is shown as High Risk (LS3) on the map. Slides thought to be older than ten thousand years but still capable of movement are shown as Intermediate Risk (LS2). Areas where slides are absent are unlabeled and combined with other Low Risk areas.

(i) Oversteepened Slope Hazard Areas (OS). These include areas with slopes steep enough to create potential problems. High Risk areas (OS3) have a high potential to fail, and include slopes greater than forty percent, and consist of areas of rock fall, creep, and places underlain with unstable materials. Intermediate Risk areas (OS2) are less likely to fail but are still potentially hazardous. This category also includes some slopes between fifteen and forty percent. Low Risk areas, unlikely to fail, are unlabeled and combined with other Low Risk categories.

(ii) Alluvial Fan/Flash Flooding Hazard Areas (AF). These are areas where flash flooding can occur, and are often associated with inundation by debris from flooding. They include alluvial fans, canyons, gullies, and small streams where catastrophic flooding can occur. They do not include all areas where flash flooding may occur with Yakima County. Flooding may also occur in larger streams and rivers, but these are depicted in the "Flood Insurance Study for the Unincorporated Areas

of Yakima County," dated March 2, 1998, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps, and any amendments which may thereafter be made by the Federal Emergency Management Agency, rather than on the geologically hazardous areas map. High Risk areas (AF3) are those most likely to experience flooding. These areas usually involve larger drainage areas, easily eroded sediments, and steeper gradients. Intermediate Risk areas (AF2) have some potential for flash flooding but involve smaller drainages and flatter slopes. Low Risk areas where flash flooding is unlikely are unlabeled and combined with other Low Risk areas on the map.

(iii) Avalanche Risk Hazard Areas (AR). Areas of avalanche hazards are limited (within the mapped boundaries) to areas near the Cascade Crest. High Risk areas (AF3) are those in areas of high snowfall where avalanche scars are visible and slopes are steep to moderately steep. These areas could also be rated OS3. Intermediate Risk areas (AF2) are usually adjacent to AF3 areas but where vegetation is still in place and slopes are moderate. AF2 and AF3 areas are mapped on the basis of aerial photography and observed scars. Climatic data (snowfall, wind direction, etc.) are necessary for more detailed mapping. Low Risk areas, where avalanches are unlikely, are unlabeled and combined with other Low Risk geologic hazards.

(iv) Stream Undercutting Hazard Areas (SU). These areas are confined to banks near main streams and rivers where undercutting of soft materials may result. High Risk areas (SU3) include steep banks of soft material adjacent to present stream courses. Intermediate Risk areas (SU2) are banks along the edge of a floodplain but away from the present river course. Low Risk areas are unlabeled and combined with other Low Risk areas on the maps.

(b) Earthquake Activity Hazard Areas (EA). Recorded earthquake activity in Yakima County is mostly marked by low magnitude events and thus low seismic risk. One exception is an area along Toppenish Ridge where Holocene faulting may have produced earthquakes of as much as magnitude 7. Zones of surficial fault scarps are shown on High Risk areas (EA3) while areas adjacent to the scarps are assigned Intermediate Risk (EA2). The rest of the county is Low Risk, unlabeled, and combined with other low risk hazards.

(c) Suspected Geologic Hazard Areas (SUS). These are areas for which detailed geologic mapping is lacking but preliminary data indicate a potential hazard. No risk assessment (1-2-3) is given for these areas. Most are probably OS or LS hazards.

(d) Risk Unknown Hazard Areas (UNK). In these areas geologic mapping is lacking or is insufficient to make a determination. All of these areas are associated with other classified geologic hazards, and most are located in remote areas of Yakima County.

(4) Volcanic hazard areas are not mapped but are defined as areas subject to pyroclastic (formed by volcanic explosion) flows, lava flows and inundation by debris flows, mudflows or related flooding resulting from volcanic activity. Volcanic hazard areas in Yakima County are limited to pyroclastic (ash) deposits. While Yakima County contains a portion of Mt. Adams and is in close proximity to Mt. Rainier and Mt. St. Helens, the threat of volcanic hazards is minimal and limited to ash deposition. The more devastating effects of volcanic activity such as lava flows, and lahars (volcanic landslide or mudflow) are not possible due to intervening ridges. No specific protection requirements are identified for volcanic hazard areas.

(5) This chapter does not imply that land outside mapped geologically hazardous areas or uses permitted within such areas will be without risk. This chapter shall not create liability on the part of Yakima County, any officer, or employee thereof for any damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

GENERAL SHORELINE POLICIES

Shorelines: Critical Areas, Restoration, and Vegetation Conservation

POLICIES:

NS 7.23 New development or new uses, including the subdivision of land, should not be established when it would be reasonably foreseeable that the development or use would require structural flood hazard reduction measures within the channel migration zone or floodway.

NS 7.24 Only allow new structural flood hazard reduction measures in shoreline jurisdiction when it can be demonstrated that they are necessary to protect existing development, that nonstructural measures are not feasible, that impacts on ecological functions and priority species and habitats can be successfully mitigated so as to assure no net loss, and that appropriate vegetation conservation actions are undertaken.

NS 7.25 Protect all shorelines of the state so that there is no net loss of ecological functions from both individual permitted development and individual exempt development.

NS 7.26 In development of the Shoreline Master Program, evaluate and consider cumulative impacts of reasonably foreseeable future development on shoreline ecological functions and other shoreline functions to ensure no net loss of ecological function. Develop a means to allocate the burden of addressing cumulative effects.

NS 7.27 Provide, where feasible and desirable, restoration of degraded areas along the shorelines of Yakima County.

NS 7.28 Critical areas within shoreline jurisdiction should be protected with the critical area policies and standards protecting all of the County's critical areas, including those for CMZ's and Flood Control.

NS 7.29 Protect shoreline streams, lakes, ponds, and wetlands with a vegetative buffer as described in the Critical Areas Ordinance.

NS 7.30 For existing agriculture encourage through a variety of voluntary means the maintenance of a permanent vegetative buffer between tilled areas and associated water bodies to reduce bank erosion, retard surface runoff, reduce siltation, improve water quality and provide habitat for fish and wildlife. For new agriculture, buffer requirements should be applied.

NS 7.31 Natural vegetation within shoreline jurisdiction should be retained to the greatest extent feasible. This should be accomplished by applying the stream corridor and wetland buffer

requirements. Activities covered by the State Forest Practices Act should not be subject to vegetation conservation standards, but should be subject to buffer requirements when under County jurisdiction. Require developers to indicate how they plan to preserve shore vegetation and control erosion.

NS 7.32 Selective pruning of trees for safety and view protection, and the removal of noxious weeds should be allowed.

NS 7.33 Upon completion of construction/maintenance projects on shorelines, disturbed areas should at a minimum be restored to pre-project configuration wherever possible, replanted with native species and provided maintenance care until the newly planted vegetation is established.

Shorelines: General Shoreline Modification

POLICIES

NS 7.88 Allow shoreline modifications only where they are shown to be necessary to support or protect an allowed primary structure or a legally existing shoreline use that is in danger of loss or substantial damage, or they are necessary for mitigation or enhancement work.

NS 7.89 Limit shoreline modifications to the minimum necessary to accomplish the objective, while still protecting ecological functions. Give preference to shoreline modifications that have a lesser impact on ecological functions.

Shorelines: Shore Stabilization

POLICIES

NS 7.90 New structural stabilization measures should only be allowed for the following instances, and then only when meeting specific criteria:

1. When necessary to protect an existing primary structures;
2. In support of new and existing development;
3. To protect projects for the restoration of ecological functions or hazardous substance remediation projects.

NS 7.91 Avoid flood protection and stabilization measures which result in or tend toward channelization of streams such as, hardening of stream banks, or fixing channel locations.

NS 7.92 All shore stabilization activities must be designed and constructed to accepted engineering standards.

Shorelines: Fill

POLICIES

NS 7.93 Allow normal and reasonable land grading and filling where necessary to develop a land area for a permitted use. There should be no substantial changes made in the natural drainage patterns and no reduction of flood water storage capacity that might endanger other areas. Allow fill within the ordinary high water mark only when necessary to support water dependent uses, public access, transportation facilities, mitigation, restoration, enhancement, and certain special situations listed in WAC 173-26-231(3)(c).

NS 7.94 In evaluating fill projects, such factors as total water surface reduction, navigation restriction, impediment to water flow and circulation, impediment to irrigation systems, reduction of water quality, and destruction of fish and wildlife habitat should be examined.

NS 7.95 Locate and design shoreline fills or cuts to avoid creating a hazard to adjacent life, property, and natural resources systems, and to provide all perimeters of fills with vegetation, retaining walls, or other mechanisms for erosion prevention.

PURPOSE STATEMENT NS 10, 11 & 12

The Yakima River and its many tributaries are perhaps the most dynamic and used natural features in Yakima County. Throughout its 200-mile course, water from the Yakima is withdrawn to feed agricultural operations that drive our economy. Irrigation and other water uses developed both inside and outside the Yakima Irrigation Project, developed under the 1903 Reclamation Act, are relatively unique in that all of the water for irrigation is generated, stored and distributed in the Valley. The tributaries, the Naches River and the Yakima River are used as the conduit for the water distributions system in the Valley. The Yakima River is used as the trunk of the water distributions system, is the most important component of the Yakima Project, and probably is the most important piece of infrastructure in the Valley. Agriculture, industry, recreation and the Cities within the basin are dependent on this distribution system for water supply for domestic, industrial, agricultural and residential uses. The demands of this economy are continuing to increase, while existing operations return flows of a far lesser quality. The combined historic actions of over withdrawal, pollution and vegetation removal have produced a waterway that exits Yakima County completely altered from the condition in which it begins near Snoqualmie Pass. To deal with the situation, efforts by many parties have been made to improve stream corridors within the County, especially in the areas of water quality and habitat. The following goals and policies address actions and attitudes that should guide decisions related to surface water.

GOAL NS10: Enhance the quantity and quality of surface water.

POLICIES:

NS 10.1 Improve water conservation through education and incentives.

NS 10.2 Protect water quality from the adverse impacts associated with erosion and sedimentation.

NS 10.3 Encourage the use of drainage, erosion and sediment control practices for all construction or development activities.

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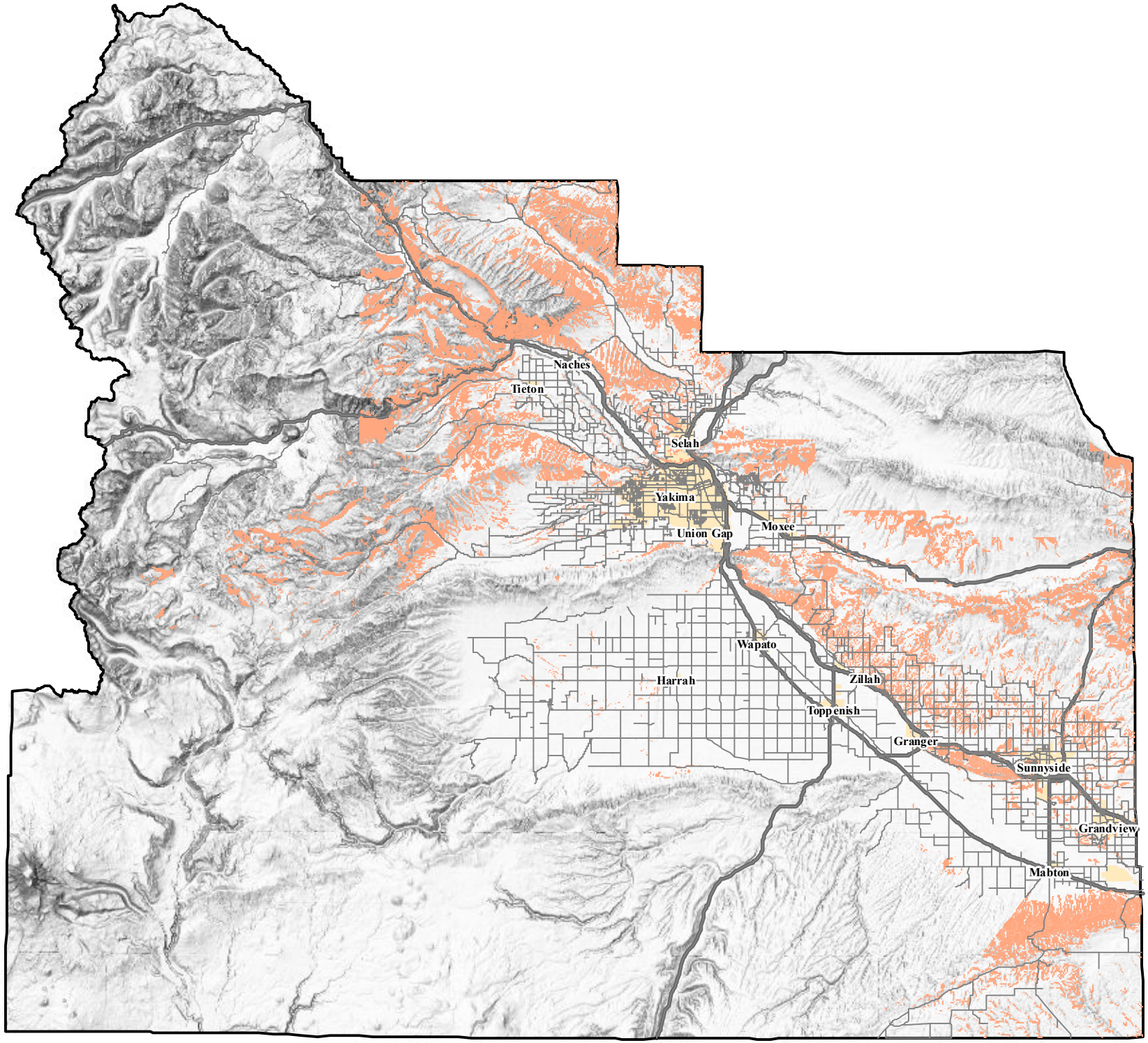

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Erosion Hazards

- Erosion Hazards
- City Limits
- State & Federal Roads
- County Roads

0 3.5 7 14 Miles

1 in = 9.4 miles

N
W E
S

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Part Two—Hazard-Specific Information
Tab-5

Extreme Temperatures

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EXTREME TEMPERATURES

Definition

Extreme heat and extreme cold constitute different conditions in different parts of the country. Extreme cold can range from near freezing temperatures in the southern United States to temperatures well below zero in the northern states.

Similarly, extreme heat is typically recognized as the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for an extended period. Fatalities can result from extreme temperatures, as they can push the human body beyond its limits (hyperthermia and hypothermia).

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Extreme Temperatures

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	

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Part Two—Hazard-Specific Information
Tab-6

Flood

Table of Contents

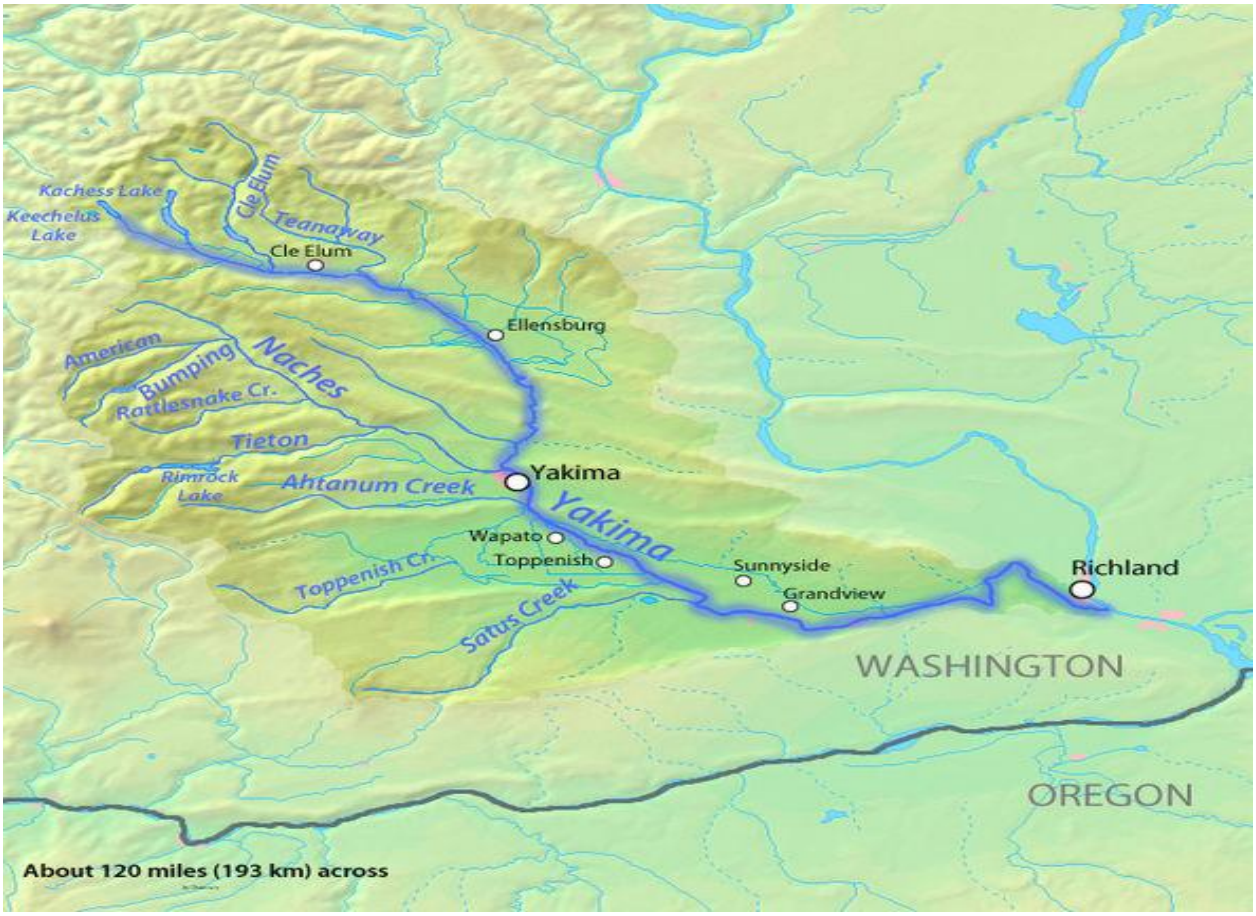
**It should be noted that although the various mitigation strategies and/or projects listed in Annexes x-xx are contained within existing county-wide projects, i.e., Flood Control Zone District, many of these mitigation strategies and/or projects would most likely benefit multiple jurisdictions and may ultimately be paid for from a variety of sources.

While these mitigation strategies and/or projects have been suggested by various county/city officials and staff throughout the plan development process, funding for these strategies and/or projects is dependent upon jurisdictions receiving future federal and/or state hazard mitigation grant funding.

FLOOD

A flood is an inundation of dry land with water. Types of floods in Yakima County are primarily river, surface water and flash. The following table and map identifies flood prone streams and rivers

Ahtanum Creek	From confluence of North and South Forks of Ahtanum Creek downstream to mouth at Yakima River excluding those reaches within Yakima Indian Reservation.
Ahtanum Creek (N. Fk.)	From confluence of Ahtanum Creek North Fork and Ahtanum Creek Middle Fork downstream to mouth at Ahtanum Creek South Fork.
Ahtanum Creek (S. Fk.)	From confluence of unnamed creek and Ahtanum Creek South Fork downstream to mouth at Ahtanum Creek (left bank only).
Cowiche Creek (S. Fork)	From an approximate point downstream through Cowiche Creek to mouth at Naches River.
Bumping River	From U.S.G.S. gaging station downstream to mouth at Naches and Little Naches rivers.
Little Naches River	From confluence of North Fork and Middle Fork Little Naches River downstream to mouth at Naches River.
Naches River	From confluence of Little Naches River and Bumping River downstream to mouth at Yakima River.
Rattlesnake Creek	From Snoqualmie National Forest boundary, downstream to mouth at Naches River.
Tieton River	Downstream to mouth at Naches River.
Yakima River	From the Kittitas County line downstream to Benton County line.
Toppenish Creek	
Satus Creek	



Yakima County Recent Flooding Events: 2010-2014

NOAA National Climatic Data Center
Storm Events Database
Begin Date: 1-1/2010
End Date: 01/31/2014

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2011-01-16 18:00:00.0 PST-8**
Begin Location	**7NNW PRIEST RAPIDS**
Begin Lat/Lon	**46.74/-120.99**
End Date	**2011-01-19 00:00:00.0 PST-8**
End Location	**5NNE NACHES**
End Lat/Lon	**46.8/-120.65**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**1.00K**
Crop Damage	**0.00K**
Episode Narrative	**A large Pacific weather system became established in mid January that produced copious amounts of rainfall with unseasonably warm conditions in parts of Washington. The heavy rainfall combined with snowmelt caused rapid runoff with 4 rivers and 7 different warning points reaching flood stage. Flood warnings were first issued on the morning of January 15 and the last flood warning ended on January 21st.**
Event Narrative	**In Yakima County, the flooding was contained to the low areas along the Yakima River including the Selah Golf Course and the Yakima Greenway. The Yakima River at Parker crested at 12.2 feet just after midnight on January 18th, 2.2 feet above flood stage.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2011-03-31 19:30:00.0 PST-8**
Begin Location	**4NNW TIETON**
Begin Lat/Lon	**46.75/-120.78**
End Date	**2011-03-31 23:59:00.0 PST-8**
End Location	**2ESE NACHES**
End Lat/Lon	**46.72/-120.66**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Heavy rainfall on melting snowpack along the east slopes of the Washington Cascades caused flooding along numerous streams in western Kittitas and Yakima counties. Reported rainfall included 2.5 inches in Easton and .69 inches in Cle Elum.**
Event Narrative	**The Naches River at Naches crested .2 feet above normal.**

***Event* Details**

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2011-04-01 00:00:00.0 PST-8**
Begin Location	**4WNW NACHES**
Begin Lat/Lon	**46.76/-120.77**
End Date	**2011-04-01 04:00:00.0 PST-8**
End Location	**2N GLEED**
End Lat/Lon	**46.69/-120.62**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**End of March heavy rainfall on melting snowpack along the east slopes of the Washington Cascades caused flooding along numerous streams in western Kittitas and Yakima counties. Reported rainfall included 2.5 inches in Easton and .69 inches in Cle Elum. Water was over the roads in 12 locations in upper Kittitas County and resulted in washouts of shoulders and some mudslides.**
Event Narrative	**Continuing from March 31, the river gage at Naches crested at .2 feet above flood stage.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2011-04-01 02:30:00.0 PST-8**
Begin Location	**1SSE UNION GAP**
Begin Lat/Lon	**46.53/-120.46**
End Date	**2011-04-02 05:45:00.0 PST-8**
End Location	**1SSE SAWYER**
End Lat/Lon	**46.45/-120.34**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**End of March heavy rainfall on melting snowpack along the east slopes of the Washington Cascades caused flooding along numerous streams in western Kittitas and Yakima counties. Reported rainfall included 2.5 inches in Easton and .69 inches in Cle Elum. Water was over the roads in 12 locations in upper Kittitas County and resulted in washouts of shoulders and some mudslides.**
Event Narrative	**The river gage at Parker crested 1.3 feet above flood stage.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**Newspaper**
NCDC Data Source	**CSV**
Begin Date	**2011-05-15 03:45:00.0 PST-8**
Begin Location	**4NW CLIFFDELL**
Begin Lat/Lon	**46.97/-121.11**
End Date	**2011-05-23 12:15:00.0 PST-8**
End Location	**4NW TIETON**
End Lat/Lon	**46.73/-120.82**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**An upper level low pressure system moved over the Pacific Northwest. Moist and unstable conditions ahead of the low triggered widespread thunderstorms with heavy rainfall and isolated large hail. This combined with the abundant spring snow-pack and wet ground to cause flooding. A 75 yard wide mudslide closed Highway 410 at milepost 87. As the upper low brought colder air. late season heavy snow ended the episode in the Blue Mountains. Snowfall amounts in inches included Touchet Snotel (7).**
Event Narrative	**Flooding closed sections of Highway 410 and other roads along the Naches River from Cliffdell to Yakima. High water and large debris damaged bridges. The Naches River crested at 20.4 on May 15th, which was 3.4 feet above flood stage. At Cliffdell, the river crested at 32.2 feet on May 15th, which was 1.3 feet above normal.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2011-05-15 16:30:00.0 PST-8**
Begin Location	**2SE POMONA**
Begin Lat/Lon	**46.69/-120.47**
End Date	**2011-05-17 15:30:00.0 PST-8**
End Location	**2SE UNION GAP**
End Lat/Lon	**46.53/-120.44**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**An upper level low pressure system moved over the Pacific Northwest. Moist and unstable conditions ahead of the low triggered widespread thunderstorms with heavy rainfall and isolated large hail. This combined with the abundant spring snow-pack and wet ground to cause flooding. A 75 yard wide mudslide closed Highway 410 at milepost 87. As the upper low brought colder air. late season heavy snow ended the episode in the Blue Mountains. Snowfall amounts in inches included Touchet Snotel (7).**
Event Narrative	**The Yakima River at Umtanum crested at 36.5 feet on May 16th, which was 1 foot above flood stage. At Parker the crest was 13.2 feet on May 16th, which was 3.2 feet above flood stage. Reported rainfall amounts on May 14-15 were between 3 and 4 inches.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**Law Enforcement**
NCDC Data Source	**CSV**
Begin Date	**2012-03-30 09:00:00.0 PST-8**
Begin Location	**1W SATUS**
Begin Lat/Lon	**46.28/-120.17**
End Date	**2012-03-30 09:00:00.0 PST-8**
End Location	**1W SATUS**
End Lat/Lon	**46.28/-120.17**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Heavy rainfall on snowpack caused flooding creeks and rivers in portions of Klickitat and Yakima Counties.**
Event Narrative	**Water from Satus Creek was over the West Satus Road and Marion Drain Road near Highway 22.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2012-04-23 21:45:00.0 PST-8**
Begin Location	**0N NACHES**
Begin Lat/Lon	**46.73/-120.7**
End Date	**2012-04-26 21:45:00.0 PST-8**
End Location	**4NNW TIETON**
End Lat/Lon	**46.76/-120.78**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Above normal temperatures and rainfall caused minor flooding on the Yakima and Naches Rivers.**
Event Narrative	**The Naches River at Naches crested at 18.27 feet on April 25 at 1 am. Flood stage is 17.8 feet.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2012-04-24 10:15:00.0 PST-8**
Begin Location	**0N PARKER**
Begin Lat/Lon	**46.5/-120.47**
End Date	**2012-04-25 21:00:00.0 PST-8**
End Location	**1NNE SOUTH BROADWAY**
End Lat/Lon	**46.62/-120.51**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Above normal temperatures and rainfall caused minor flooding on the Yakima and Naches Rivers.**
Event Narrative	**The Yakima River at Parker crested at 10.19 feet on April 25 at 2:15 pm. Flood stage is 10 feet.**

Event Details

Event	**Flood**
-- Flood Cause	**Planned Dam Release**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2012-06-04 22:00:00.0 PST-8**
Begin Location	**0N NACHES**
Begin Lat/Lon	**46.73/-120.7**
End Date	**2012-06-07 03:45:00.0 PST-8**
End Location	**3NNW ESCHBACH**
End Lat/Lon	**46.7/-120.66**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Snowmelt and increased reservoir releases caused minor flooding on the Naches River from June 4 to June 7.**
Event Narrative	**The Yakima River at Naches crested at 16.44 feet at 5:15 pm on June 6th. Flood stage is 16.0 feet.**

Event Details

Event	**Flood**
-- Flood Cause	**Planned Dam Release**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2012-06-17 06:00:00.0 PST-8**
Begin Location	**0N NACHES**
Begin Lat/Lon	**46.73/-120.7**
End Date	**2012-06-24 22:00:00.0 PST-8**
End Location	**1NNW BRACE**
End Lat/Lon	**46.65/-120.59**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Snowmelt and increased reservoir releases caused minor flooding on the Naches River from June 4 to June 7.**
Event Narrative	**The Yakima River at Naches crested on June 18 11 pm at 16.64 feet. Flood stage is 16.0 feet.**

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**River/Stream Gage**
NCDC Data Source	**CSV**
Begin Date	**2013-05-07 00:15:00.0 PST-8**
Begin Location	**1WNW BRACE**
Begin Lat/Lon	**46.63/-120.59**
End Date	**2013-05-15 14:30:00.0 PST-8**
End Location	**0WNW BRACE**
End Lat/Lon	**46.63/-120.59**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Extreme heat lead to a prolonged period of snow-melt along the Cascades. This allowed the Naches River near Naches to rise above flood stage for several days. Flood stage for the Naches River is 16 feet, and the river crested at 16.82 feet on May 12th.**
Event Narrative	

Hazard Identification and Vulnerability Assessment

Flooding is a natural feature of the climate, topography, and hydrology of Yakima County. Three planning concerns are sudden onset, access and flood elevation in relation to topography and structures. Other factors contributing to flood damage are water velocity, debris carried by water, duration of flood conditions, and ability of soil to absorb water. Flooding predominates throughout the winter and early spring due to melting snow, breakaway ice, and rainy weather.

- Several rivers in Eastern Washington also flood every two to five years, including the Spokane, Okanogan, Methow, **Yakima**, Walla Walla, and Klickitat. Flooding on rivers east of the Cascades results from periods of heavy rainfall, mild temperatures, and from the fall, winter and spring runoff of mountain snow pack.
- During the 1996-97 winter storms, areas not prone to river flooding experienced surface water flooding due to high groundwater tables Residents not living in a flood plain had several inches of water in basements, as a result of groundwater seepage through basement walls. Floods contaminated domestic water supplies, fouled septic systems, and inundated electrical and heating systems. Fire-fighting access was restricted, leaving homes vulnerable to fire. Lake levels were the highest in recent history, and virtually every area of the county had areas of ponding not previously seen.
- Eastern Washington is prone to flash flooding from rainstorms on , steep ravines, alluvial fans, dry or frozen ground, and light vegetation, which tend not to absorb moisture.

Much of the recent development in urbanizing areas within Yakima County occurs in or near flood plains. This development increases the likelihood of flood damages and diverts waters to places previously safe from flooding.

In Yakima County the towns, cities and county participate in the National Flood Insurance Program and have developed local ordinances to better regulate and direct development in flood plain areas. These local ordinances regulate planning, construction, operation, maintenance, and improvements - private or public. Ordinances ensure that work is properly planned, constructed, operated to minimize potential flood damage increase the security of life and avoid adversely influencing the regimen of a stream or body of water .

Many homes, located in flood plains, are vulnerable to flood damage. Adding to this vulnerability is new growth creating pressure to develop marginal land located near flood plains.

Floods cause loss of life and damage to structures, crops, land, flood control structures, roads, and utilities. Flood damages in Yakima County both from flood waters and mudslides exceed damages by all other natural hazards.

The public are made aware of hazardous areas and given information on flood insurance, mitigation, preparedness, response, and recovery. Local jurisdiction emergency management plans establish warning, evacuation, housing, and other emergency procedures. This includes awareness of potential disease, hazardous material release, or debris that may affect floodwater.

The Pacific Northwest River forecast Center of the National Weather Service, stationed in Pendleton, Oregon has an extensive river and weather monitoring system and provide flood watch and warning information to the County, the public and the Seattle district of the Corps of Engineers via radio, television, Internet, Teletype, and telephone.

The Seattle District office of the United States Army Corps of Engineers has the authority to assist public entities and levee owners in flood fighting and rescue operations and , under PL 84-99,to protect, repair, and restore federally constructed flood control works threatened, damaged, or destroyed by a flood.

Resources
Washington State Emergency Management Division
United States Army Corps of Engineers
Federal Emergency Management Agency
National Weather Service
NOAA Satellite and Information Service
National Climatic Data Center

Flood Risk and Damage Prone Areas within Yakima County
Flood risk within Yakima County has been largely identified through damage from large historic flood events, specifically the floods of November 1906, December 1933, May 1948, January 1974, November 1995, February 1996, and January 1997. The largest Yakima River floods of record were in 1906 and 1933, the former prior to the construction of the five Bureau of Reclamation dams located in the headwaters that provide some level of flood control, particularly for higher frequency floods. Frequency analysis for the Yakima and Naches Rivers indicate that the 100-year flood has not been attained within the current flow record. The 1996 flood is estimated at a 50-year flood on the Naches and 70-yr flood on the Yakima Rivers. The following tributaries, located on the Western slopes, have produced significant flood damage and are considered flood prone: Rattlesnake, Cowiche, Ahtanum, White Hollow, Satus and Toppenish Creeks.

The flood damage associated with historic floods led to the construction beginning in 1947, in cooperation with the Corps of Engineers, of flood control levees on the Yakima and Naches mainstems to mitigate flood damages. All of the levees have failed historically leading to redesigns, indicating that flood protection has limits related to flood peak magnitude and flood duration. The first and largest levee system is the Yakima Authorized Flood Control Project of 8 miles of levee constructed in 1947 through 1948 protecting the City of Yakima, Town of Union Gap and community of Terrace Heights. The level of protection for this project exceeds the 100-year flood. Since then an additional seven miles of PL84-99 levees, with much lower levels of protection (10 to 25 years), have been constructed to protect communities and irrigation intakes. Most of these levees are on the steeper more dangerous Naches River. As homes have been built behind these levees, risk and damages have escalated for larger floods above the 20 year flood. County regulations for inclusion in the National Flood Insurance Program were introduced in 1985 and have reduced this potential.

During the 1996 flood, the following communities experienced significant damage: Selah, Wapato and Toppenish on the Yakima River; Rock Creek, The Nile, Town of Naches, Gleed and Ramblers Park on the Naches River; Wiley City, Ahtanum and Emma Lane on Ahtanum Creek, and White Swan on Toppenish Creek within Yakima Nation. Flood damages are not well represented in Yakima County by insurance claims due to the relative absence of flood insurance for older flood prone homes. Of the above locations Rock Creek, the Town of Naches and Ramblers Park were behind PL84-99 levees that were overcome and resulted in larger scale devastation. Efforts to reinforce these three levees are either complete or underway. In addition, bridges severely damaged on the mainstem during the 1996 flood have been replaced with structures with opening widths that are multiples of the original; at SR-24 and Donald-Wapato highway on the Yakima River, and Powerhouse Road (Ramblers Park) on the Naches River.

Prioritization of County-wide Flood Hazard Mitigation Measures

Comprehensive Flood Hazard Mitigation Plans (CFHMPs) have addressed larger areas with the exception of the lower reach of the Yakima River. The County has also remapped a large portion of the County floodplain and generated a continually updated FEMA flood risk database including Hazus Level 2 derived average annualized losses and areas of mitigation interest.

Attached is a map of the average annualized losses (AALs) developed from Hazus Level 2 Analysis and areas of mitigation interest (AOMIs) based on AALs that will direct future County flood hazard mitigation efforts.

County-wide Hazus Level 2 Risk Assessment: 2014 Areas of Mitigation Interest (AOMIs) and Average Annualized Losses

Modeled Area	Recommended AALs for AOMIs*	Location	Number of Structures	AAL/Structure *	AOMI Map Reference #
Naches River - Upper Reach	$22,426	Elk Valley Lane	58	$387	23
	$12,144	Left Bank above DOT Levee	10	$1,214	26
	$9,822	Left Bank across from Nile Creek Ln	21	$468	24
Naches River - Lower Reach	$264,252	S. Naches Rd Bridge Near Town	101	$2,616	16
	$135,610	Pence Road	88	$1,541	15
	$47,000	Low Road	8	$5,875	17
	$44,170	Craig Road and Jennings Lane	78	$566	27
	$39,330	S. Naches Road N. of Young Grade	11	$3,575	21
	$39,186	Powerhouse Road	12	$3,266	22
Yakima River - Gap to Gap Reach	$46,168	Bell Rd. and Riverside Rd.	9	$5,130	18
Yakima River - Lower Reach	$1,507,620	Northeast Wapato	470	$3,208	4
	$528,826	Northeast Toppenish	867	$610	1
	$51,598	Track Rd. and Phillip John Rd.	13	$3,969	3
Wide Hollow Creek	$30,800	Union Gap Main Street near I-82	10	$3,080	11
	$20,540	Bay Street and Ahtanum Road	6	$3,423	10
	$20,044	S. 80th and Wide Hollow Road	6	$3,341	9
	$15,354	Holiday and Spring Ave - South Union Gap	7	$2,193	20
Shaw Creek	$93,418	72nd Ave. and Viola Ave. S. of Nob Hill Blvd.	54	$1,730	14
	$61,928	South of 88th Ave. and Tieton Dr.	39	$1,588	12
	$12,634	80th Ave. and Nob Hill Blvd.	71	$178	13
Ahtanum Creek - Lower Reach	$19,978	Emma Lane	15	$1,332	5
	$15,020	52nd Ave. and Washington St.	16	$939	7

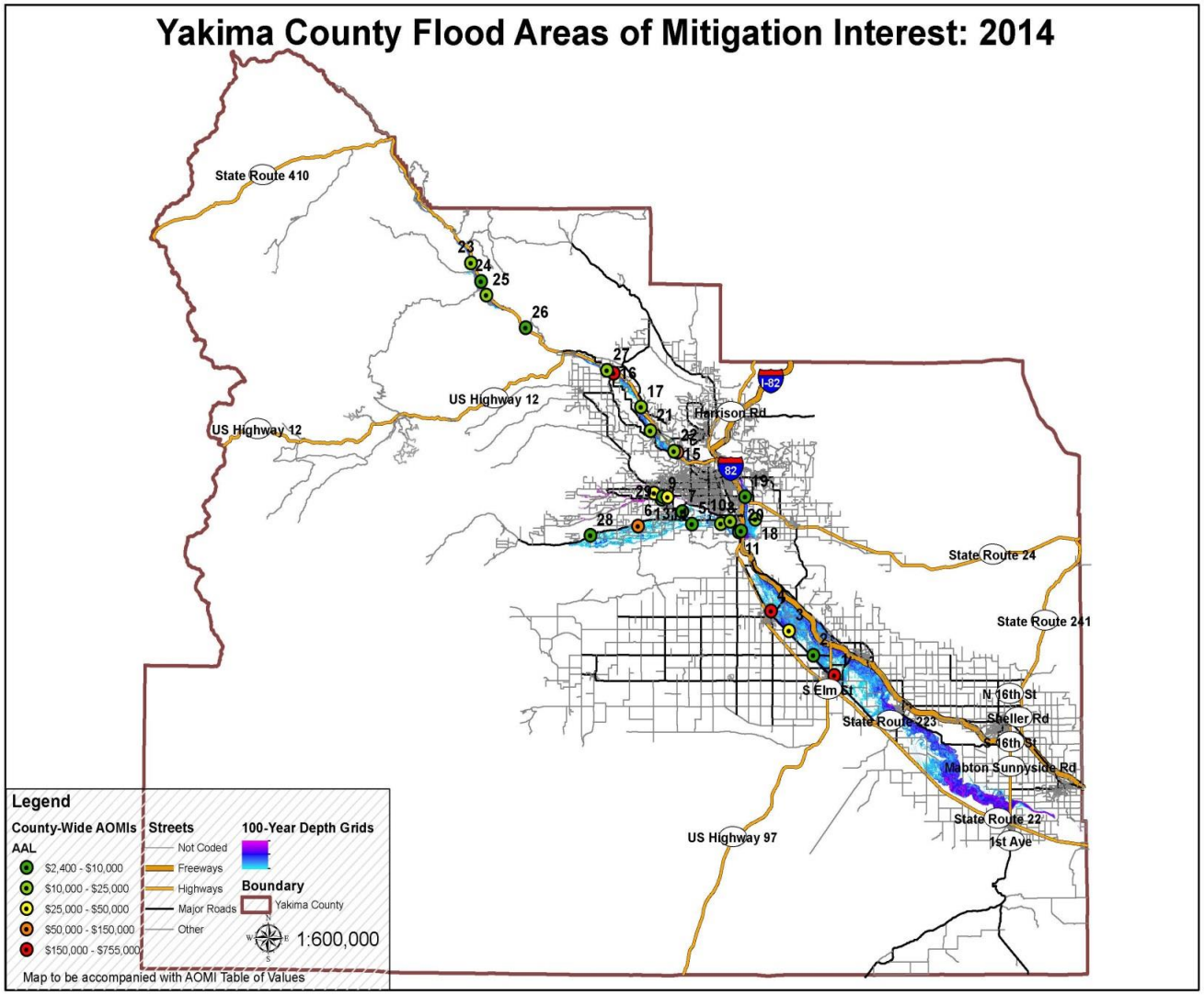
* - Recommended AAL values are twice the Hazus Level 2 generated values based on model calibration and verification in Yakima County.

Note: The Yakima River above Selah gap, Cowiche Creek, Wenas Creek, Satus Creek, Toppenish Creek, Tieton River and the upper reach of the Ahtanum Creek were not included in the risk assessment. Cottonwood Creek was assessed, however only $1 AAL was identified.

Note: Average Annualized Losses (AALs) include local depth grids and georeferenced building data such as footprint, location, type, replacement cost, etc. AALs include building and content losses computed for an annual average loss through risk assessments from 10-year, 25-year, 50-year, 100-year, and 500-year flooding events.

Note: Level 2 Risk Assessment AAL values were based on 2012 dollars.

Note: AOMIs 2, 6, 8, 19, and 25 have been removed due to prioritization



Since 1894 the Yakima River has flooded 47 times, since 1970 the area was declared a national disaster 8 times due to flooding. The Naches River and several tributaries experienced flooding at the same time of the Yakima River flood events.

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low

Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing

Funding Source: Local; State; FEMA; Private; Other

Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Flood

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Protect and Restore Natural Flood Mitigation Features	Yakima County Planning	H	Ongoing	In-Kind	
Preserve Floodplains as Open Space	Yakima County Planning	H	Ongoing	In-Kind	
Update Special Subject Flood Response Plan to the 2014 CEMP	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	
Yakima County Flood Control Zone District Activities and Projects					
Form Partnerships to Support Floodplain Management	Yakima County FCZD and Local Planning Department	See CFHMPs See Comprehensive Plan			
Improve Flood Risk Assessment	Yakima County FCZD and Local Planning Department	See CFHMPs See Comprehensive Plan			
Join or Improve Compliance with NFIP	Local Floodplain Official	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Participate in the CRS	Local Floodplain Official	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Remove Existing Structures from Flood Hazard Areas	Local Floodplain Official	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Improve Stormwater Drainage System Capacity	City Engineers				

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	**Timeline:** Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing		**Funding Source:** Local; State; FEMA; Private; Other		**Estimated Cost:** Actual; Estimated
Conduct Regular Maintenance for Drainage Systems and Flood Control Structures	County Road Maintenance Division and Local Jurisdictions	Ongoing	Ongoing	Ongoing	Ongoing
Protect Infrastructure	County Engineer and City Engineers	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Construct Flood Control Structures	County Engineer and City Engineers	See CFHMPs	See CFHMPs	See CFHMPs	See CFHMPs
Increase Awareness of Flood Risk and Safety	Yakima County FCZD and Local Jurisdictions	ongoing	ongoing	ongoing	ongoing
Educate Property Owners about Flood Mitigation Techniques	Yakima County FCZD and Local Jurisdictions		ongoing	**ongoing**	**ongoing**

Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action Item		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Action Status	O Action completed O Action canceled O Action on schedule Anticipated completion date: _____ O Action delayed Explain: _____	

Summary of Action Progress for this Report Period

1. **What was accomplished for this Action during this reporting period?**
   _____
   _____
2. **What obstacles, problem, or delays did the Action encounter?**
   _____
   _____
3. **If uncompleted, is the Action still relevant? Should the Action be changed or revised?**
   _____
   _____
4. **Other comments**
   _____
   _____

Flood Control Zone District

On January 13, 1998, the Board of Yakima County Commissioners established the Yakima Countywide Flood Control Zone District. *"The purpose of the Flood Control Zone District (FCZD) will be to address flood management needs within the county. The activities of the district could include, but are not limited to, flood warning and emergency response, flood proofing and elevation of structures, property acquisition, implementation of consistent development regulations that recognized the impacts of flooding, basin wide flood planning, and the identification, engineering, and construction of capital projects to mitigate and/or address flooding problems".*

Toppenish 1996

County Flood management initiatives initially addressed planning requirements including NFIP flood remapping and state required Comprehensive Flood Hazard Mitigation Plans , that were used to identify specific mitigation measures, projects and tools. Additional details are provided below

FCZD Activities and Projects

The Yakima County-wide Flood Control Zone District performs a variety of actions to reduce flood hazard within the County.

Among these are:

- Preparation and implementation of Comprehensive Flood Hazard Management Plans (RCW 86.16)
- Remapping and maintenance of the Flood Insurance Rate Maps within the County.
- Studies and inventories related to floodplain function, channel and floodplain processes, and monitoring the effects of floods during flood events.
- Cooperation with other jurisdictions in water quality, quantity, and habitat plans and projects within the Yakima Basin as a whole.
- Review of development proposals for consistency with flood and stormwater plans covered by RCW 86.15

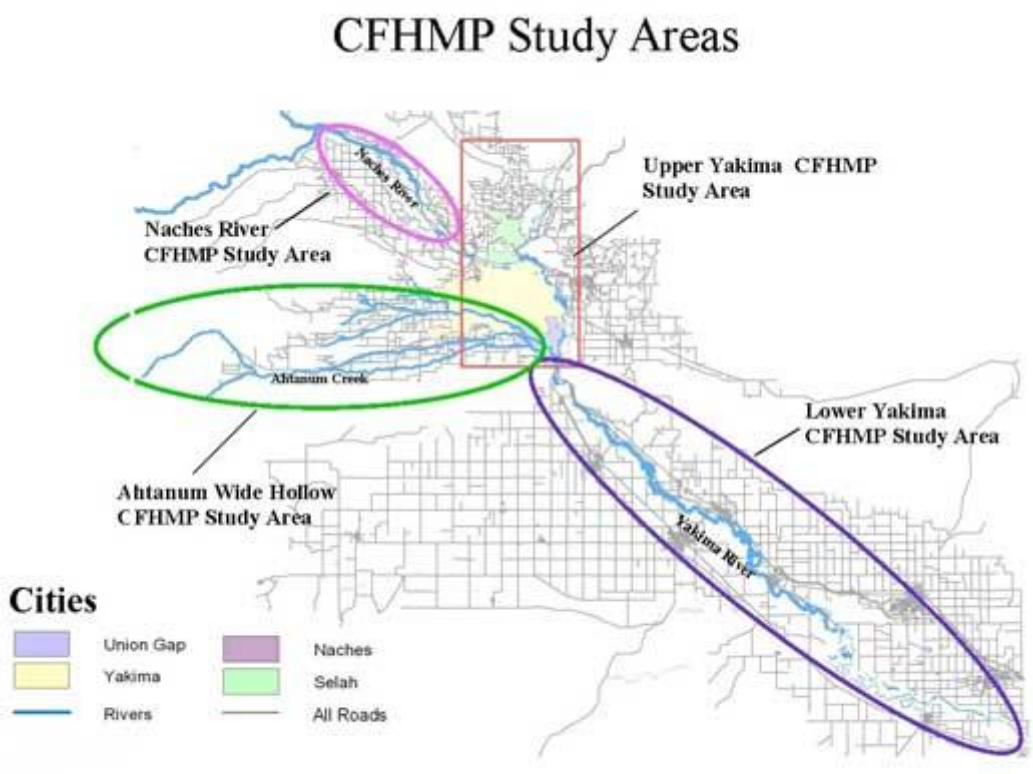
COMPREHENSIVE FLOOD HAZARD MANAGEMENT PLANS

C F H M Ps contain recommendations on future flood hazard management alternatives for problematic areas. Once the County developed plan is adopted, it serves as a policy document, for the County and Cities that adopt it. The Plans themselves are not a regulatory document, but identifies and prioritizes flood control and mitigation projects for the community. Community adoption of the plans increases the chances of State and Federal funding of projects and post flood disaster relief.

The main steps in a CFHMP are as follows:

- Establish a citizen and agency participation process
- Set goals and objectives for flood hazard management
- Determine the need for flood hazard management measures
- Identify & evaluate alternative flood hazard management measures
- Develop a flood hazard management strategy
- Submit the final CFHMP to Ecology

Yakima County has completed, or is currently working on, three Comprehensive Flood Hazard Management Plans: The Upper Yakima River CFHMP, The Naches River CFHMP, and the Ahtanum-Wide Hollow CFHMP. The Lower Yakima River CFHMP will be initiated upon agreement with the Yakama Nation, where much of the floodplains lie.



Click on map for larger image

NACHES RIVER CFHMP

The Naches River CFHMP covers the Naches River from the "Y" at the confluence of the Naches and Tieton Rivers to the Twin Bridges northwest of Yakima. The Naches River Comprehensive Flood Hazard Management Plan was adopted by the participating agencies on the following dates:

Board of County Commissioners – 8/22/06
Naches Town Council – 9/11/06
Department of Ecology – 10/12/07

UPPER YAKIMA RIVER CFHMP

The Upper Yakima River CFHMP covers the Yakima River between the mouth of the Yakima River Canyon to Union Gap, and the Naches River from it's mouth at the Yakima River up to the Twin Bridges. The Plan was adopted by the County in 1998, and amended in 2007 as new information has emerged about the condition of the Yakima River. The amended 2007 Upper Yakima River CFHMP was adopted by the participating agencies on the following dates:

Board of County Commissioners - 6/19/07
Selah City Council – 6/26/07
Union Gap City Council – 08/13/07
Yakima City Council – 5/6/08
Department of Ecology – 1/22/10

AHTANUM-WIDE HOLLOW CFHMP

The Ahtanum-Wide Hollow CFHMP covers the entire Ahtanum and Wide Hollow watersheds, focusing on the Ahtanum Valley Floor, West Valley, Union Gap, and parts of Yakima. The Yakama Nation is a partner in the project - Ahtanum Creek forms the northern boundary of the Yakama Reservation. The plan was adopted by the following jurisdictions on the following dates:

Board of County Commissioners - 10/16/12
Union Gap City Council – 1/28/13
Yakima City Council – 10/15/13
Department of Ecology – 10/31/13

Flood Hazard Mitigation Measures within Yakima County

Since 1948 the County has maintained, with the Corps of Engineers as a partner, a number of levees, which increased with time until the late 1970s. The table below notes such development in parts of the County

In 1985 the County joined the National Flood Insurance Program. In 1998 the County adopted the first of three Comprehensive Flood Hazard Mitigation Plans (CFHMP) noted above, complete with mitigation recommendations and then formed a county-wide Flood Control Zone District to further administer flood risk measures for the County and the County contained jurisdictions that provide potential measures and refine early flood response. The table below summarizes the County large physical mitigation measures in flood prone areas, and includes the requisite State flood hazard mitigation plans (CFHMP) and FEMA flood mapping restudies that provide for the local hazard measures. This table is limited to primary projects by the established flood hazard areas.

History of Large Structural Flood Mitigation Measures by Historic Damage Area

Flood Prone community	River or Creek	Year	Physical Flood Mitigation Measures
Town of Selah	Yakima	1997	Property buyouts, conversion to Golf Course
	Yakima	1998	CFHMP Upper Yakima
City of Yakima	Yakima	1948	Construct Federal levee
	Yakima	1998	CFHMP Upper Yakima

	Yakima	2006	SR24 bridge replacement
	Yakima	2009, 2010, 2011	Recent levee repairs
Terrace Heights (unincorporated)	Yakima	1948	Construct Federal levee
	Yakima	1998	CFHMP Upper Yakima
	Yakima	2006	SR24 bridge replacement
	Yakima	2009, 2010, 2011	Recent levee repairs
	Yakima	2012	Levee setbacks
Town of Union Gap	Yakima	1948	Construct Federal levee
	Yakima	1998	CFHMP Upper Yakima
	Yakima	2017	Scheduled levee setback projects
Town of Wapato	Yakima	2005	Donald-Wapato bridge replacement
	Yakima	to be scheduled	CFHMP Lower Yakima requires tribal leadership
Town of Toppenish	Yakima	2005	Donald-Wapato bridge replacement
	Yakima	to be scheduled	CFHMP Lower Yakima requires tribal leadership
Rock Creek (unincorporated)	Naches	1977	Construct PL84-99 Levee
	Naches	2011	Recent levee repair/raising
	Naches	2016	Complete FEMA mapping restudy
Nile (unincorporated)	Naches	2016	Complete FEMA mapping restudy
	Naches	2010	Construct PL84-99 Levee
Town of Naches	Naches	1974	Construct PL84-99 Levee
	Naches	2006	Recent levee repair

	Naches	2008	FEMA mapping restudy
	Naches	2007	CFHMP Lower Naches
	Naches	2011	Recent levee repair/raising
	Naches	2017	Scheduled levee setback
Gleed (unincorporated)	Naches	2008	FEMA mapping restudy
	Naches	2007	CFHMP Lower Naches
	Naches	2008	FEMA mapping restudy
	Naches	2011	Recent levee repair/raising
	Naches	2017	Scheduled McCormick Levee setback
Ramblers park (unincorporated)	Naches	1974	Construct PL84-99 Levee
	Naches	2006	Powerhouse road Bridge replacement
	Naches	2006	Recent levee repair/raising
	Naches	2007	CFHMP Lower Naches
	Naches	2008	FEMA mapping restudy
	Naches	2012	Levee damage initiated first setback repair
	Naches	2017	Scheduled Ramblers Levee setback completion
City of Yakima	Naches	2006	Channel improvement 16 avenue
White Swan (unincorporated)	Toppenish	to be scheduled	CFHMP Lower Yakima requires tribal leadership
Wiley City (unincorporated)	Ahtanum	2013	CFHMP Ahtanum/Wide Hollow
	Ahtanum	2015	FEMA mapping restudy completion
Ahtanum (unincorporated)	Ahtanum	2013	CFHMP Ahtanum/Wide Hollow

	Ahtanum	2015	FEMA mapping restudy completion
Emma lane (unincorporated)	Ahtanum	2013	CFHMP Ahtanum/Wide Hollow
	Ahtanum	2015	FEMA mapping restudy completion
	Ahtanum	2017	Scheduled HMGP project completion
City of Yakima	Ahtanum, Wide Hollow	2013	CFHMP Ahtanum/Wide Hollow
	Ahtanum	2015	FEMA mapping restudy completion
	Wide Hollow	2017	Scheduled Shaw Creek PDM project completion
Town of Union Gap	Ahtanum, Wide hollow	2013	CFHMP Ahtanum/Wide Hollow
	Wide Hollow	2015	FEMA mapping restudy completion

Flood control improvements (as defined in the FCZD State RCW's) can be categorized as:

Facilities - These typically include flood control "works" such a levees or floodgates designed to provide a specific level of flood protection. The majority of flood control works are constructed in cooperation or partnership with other agencies such as the Corps of Engineers, the NRCS (historically), or the Washington State Department of Transportation.

Construction or Demolition Projects – These projects typically seek to reduce flood hazard by improving floodplain function or removal of structures has or has a high likelihood of being damaged by floods. Construction projects that do not result in permanent facilities would include projects such as channel relocation, channel expansion, or alteration of floodplains to increase flood water storage or conveyance. Demolition projects also include the demolition of structures such as repetitive flood damage structures (including roadways or other infrastructure), old or abandoned levees, and old or abandoned irrigation diversion or distribution facilities.

Floodplain Storage and Conveyance Preservation Projects - This type of project will normally involve acquisition of fee simple or other rights to property. These projects will usually be located in the FEMA floodway in detailed study areas, or in other high hazard areas in non-detailed or unmapped floodplains only after study and documentation of the hazard. The primary purpose of any real property or property rights acquisition shall solely be for flood hazard reduction and mitigation purposes consistent with the District's goals and objectives and the District's authorities.

A complete list of the flood hazard projects and measures across the County is found in our annual (May 2014) Project Activities Update document provided in the hazard plan (see Annex x). Activities therein are grouped both geographically and by activity type: i.e., CFHMPs, flood preparedness and response, enhancement of problem knowledge and datasets, public education, coordination of interagency projects, flood hazard projects and completed activities/projects.

Critical Areas Ordinance and Shoreline Master Program

Why should we protect Critical Areas?

The health of our natural setting contributes to a quality of life that attracts people and businesses to Yakima County and keeps them here.

In updating the Critical Areas Ordinance and Shoreline Master Program, our goal is to:

- To preserve the county's natural resources for future generations.
- To prevent injury or loss of life and protect health from natural disasters.
- To protect public and private investments by minimizing damage from natural events.
- To reduce costs to society and local economy resulting from not protecting Critical Areas.

Mission Statement

In updating the Critical Areas Ordinance and Shoreline Master Program, our goal is to:

- Create an Ordinance that is user friendly to property owners.
- Provide better information in the atlas for easier decision making.
- Consider the rights of property owners during the update process. Meet State requirements to update the Critical Areas Ordinance and Shoreline Master Program.
- Meet State requirements to use Best Available Science.

Project Philosophy

In updating the Critical Areas Ordinance and Shoreline Master Program together, our overall philosophy is:

- Provide cost savings by revising both CAO and SMP together.
- Eliminate duplication and confusion by completing integration of CAO and SMP.
- Make the ordinance more readable and understandable.
- Complete updates and integration with currently available grant money rather than using Yakima County General funds in the future

Project Approach

In updating the Critical Areas Ordinance and Shoreline Master Program, our overall approach is:

- Use as much of the existing CAO and SMP as possible - avoid rewriting what is still usable.
- Acknowledge existing CAO and SMP regulatory standards before considering new standards.
- Apply BAS in a reasonable and responsible manner.
- Engage the public in the update process in an organized and easy to understand manner.

Critical Areas

What are Critical Areas?
Critical Areas are explained under two categories: Environmentally Sensitive Areas and Hazardous Areas. Environmentally Sensitive Areas include streams, rivers, lakes, ponds, wetlands, and wildlife habitat. Hazardous areas include; flood hazards, geological hazards, steep slopes, erosion hazards, volcanic hazards, and critical aquifer recharge areas.

As required by the Washington State Growth Management Act (GMA), there are five Critical Areas that all counties and cities are required to protect. These include:

Wetlands: Found throughout Yakima County, wetlands provide numerous valuable functions, including but not limited to providing wildlife and fish habitat, water quality enhancement, flood and erosion control, and aquifer recharge and discharge.

Frequently flooded areas: These include streams and rivers and have the potential to pose a risk to public and private property and public health. Regulation of these lands protects people and property from food hazards and allows natural floodplain functions to continue.

Critical Aquifer Recharge Areas (CARA's): CARA's perform many important biological and physical functions that benefit the County and its residents, including storing and conveying ground water. Protection of aquifer recharge areas is necessary to protect valuable groundwater resources.

Fish and wildlife habitat conservation areas: Habitat areas perform many physical and biological functions that include but are not limited to providing opportunities for food, cover, nesting, breeding, and movements for fish and wildlife, maintaining and promoting diversity of species and habitat, and helping to maintain air and water quality.

Geologic hazards: Although these areas are primarily located in rural areas of the county, they pose a risk to public and private property and to the natural systems that make up the County's environment. Such areas are susceptible to landslides, erosion, seismic activity, volcanic activity, or mining hazards. Future developments should be directed to more geologically stable areas and away from unsuitable ground.

Why they important / Why do they need to be protected?

Critical Areas requirements protect key functions that enhance our environment and protect us from hazards. Critical Areas can be explained as environmentally sensitive areas and areas which are hazardous to human health and/or property.

Environmentally sensitive areas include: fish and wildlife habitat, water quality, food chain support, and fresh water recharge and discharge. These functions are important to protect in order to maintain a high Quality of Life here in Yakima County.

Potential hazards to human health and/or property associated with Critical Areas include but are not limited to: aesthetics and recreation, clean drinking water, landslide hazards, and flood hazards. These areas must be protected in order to increase public health and safety.

Costs associated with Critical Areas are also an important reason for these areas to be protected. Once areas are damaged or lost, they are very expensive to restore. The costs of floods, landslides, and contaminated drinking water are not only monetarily expensive but can also cost lives.

The Yakima River alone has exceeded flood stage 45 times since 1894. Yakima County has been declared a federal disaster area nine times since 1970, which includes the most recent flooding in 1995 and 1996. These floods have cost millions of dollars and represent one specific example of why Critical Areas are important and why they need to be protected.

16C.01.01 Title and Authority.

Yakima County Code (YCC) Title 16C is established pursuant to RCW 36.70A.060 (Growth Management Act Natural resource lands and critical areas – Development regulations), RCW Chapter 43.21C (State Environmental Policy Act), and federal requirements for eligibility in the National Flood Insurance Program, pursuant to the Code of Federal Regulations (CFR). This title shall be known as the "Critical Areas Ordinance of Yakima County, Washington."
(Ord. 13-2007 §1 (Exh. A)(16C.01.01), 2007).

16C.01.05 Applicability.

(1) Except as provided in subsections (3) and (4) below, the provisions of this title shall apply to any new development, construction or use within the unincorporated portion of Yakima County designated as a critical area outside shoreline jurisdiction, as determined by the Shoreline Master Program (YCC Title 16D), and upon any land mapped and designated as a special flood hazard area under the National Flood Insurance Program; however, this title does not apply to the situations below, except that the flood hazard protection provisions of Chapters 16C.05.20 through 16C.05.72 will continue to apply as determined by the applicability provision in Section 16C.05.20

Part 2 Section 8 Flood 2015 Planning Update

Yakima County Planning Division uses policies and ordinances to mitigate for floods. Yakima County Critical Areas Ordinance (Titles 16A and 16C) and Yakima County Shoreline Master Program (Title 16D) implements policies that restrict development in the floodplain and floodway and protect hydrologically related critical areas. These critical areas include flood hazard areas and wetlands, which provide flood flow attenuation and other flood mitigation functions.

16C.06.01 Purpose and Intent.

(1) The stream corridor system includes hydrologically related critical areas, streams, lakes, ponds, and wetlands, and is part of a fragile and highly complex relationship of geology, soils, water, vegetation, and wildlife. The purpose of this chapter is to establish guidelines, policies, and standards to help conserve, protect, and, where feasible, restore and enhance this complex relationship. These regulations have been designed to:

(a) Meet the requirements of the Growth Management Act (RCW 36.70A.172) to protect the functions and values of fish and wildlife habitat, wetlands, stream undercutting geologic hazards and frequently flooded areas; and to give special consideration to anadromous fish;

(b) Meet eligibility requirements of the National Flood Insurance Program (NFIP).

(2) The guidelines, policies, and standards of this chapter are intended to:

(a) Provide alternatives for necessary development, construction, and uses within a designated stream corridor and other hydrologically related critical areas;

(b) Prevent further degradation in the quantity and quality of surface and subsurface waters;

(c) Conserve, restore, and protect sensitive or unique fish and wildlife habitats, vegetation, and ecological relationships;

(d) Protect public and private properties from adverse effects of improper development within hazardous or sensitive areas of the stream corridor;

(e) Provide a zero net loss of natural wetlands functions and values together with a gain of wetlands in the long term, if reasonably possible through voluntary agreements or government incentives;

(f) Establish measures to protect streams, lakes, ponds, and wetlands;

(g) Recognize that, based on WAC 365-190-080(5) (Fish and Wildlife Habitat Conservation Areas), wildlife habitat conservation means land management for maintaining species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created. This does not mean maintaining all individuals of all species at all times, but it does mean cooperative and coordinated land use planning is critically important.

16C.06.03 Hydrologically Related Critical Area Features.

The stream corridor and other hydrologically related critical areas include one or more of the following features:

(1) Any floodway and floodplain identified as a special flood hazard area. Special flood hazard areas are those identified by the Federal Insurance Administration in the Flood Insurance Study for Yakima County which, together with accompanying Flood Insurance Maps, is hereby adopted by reference and declared to be a part of this title as set forth in Chapters 16C.05.20 through 16C.05.72;

(2) Perennial and intermittent streams, excluding ephemeral streams, including the stream main channel and all secondary channels within the ordinary high water mark;

(3) Naturally occurring ponds under twenty acres and their submerged aquatic beds; and manmade lakes and ponds created within a stream channel designated under subsection (2) above;

(4) All wetlands, that meet the definition found in Section 16C.02.425, as required by WAC 365-190-080(1), and as designated in Section 16C.07.02(1) of the wetland chapter;

(5) Where specifically cited, any flood-prone area not included in a designated floodway and floodplain but indicated as flood-prone by U.S. Soil Conservation Service soil survey data or geologic evidence developed through professional geologists or engineers;

(6) A buffer area extending on a horizontal plane from the ordinary high water mark of a stream channel, lake, or pond, designated in this section or from the edge of a wetland designated in this section according to the distances set forth in Section 16C.06.16 (Vegetative Buffers).

Plan 2015 Comprehensive Plan Goals and Policies

As of this writing in 2014, Yakima County was awaiting adoption of a new Subdivision and Zoning ordinance, which will provide additional flood mitigation though zoning and development standards. Yakima County Comprehensive Plan update (Horizon 2040) will be updated by 2017. This update is expected to highlight flood hazard mitigation goals and policies, which include:

GOAL NS17: Prevent the loss of life or property and minimize public and private costs associated with repairing or preventing flood damages from development in frequently flooded areas.

NS 17.1 Support comprehensive flood control planning.

NS 17.2 Yakima County should conduct additional analysis and mapping of frequently flooded areas in cases where the 100-year floodplain maps prepared by the Federal Emergency Management Agency do not adequately reflect the levels of risk or the geographic extent of flooding.

NS 17.3 Direct new critical facility development away from areas subject to catastrophic, life-threatening flood hazards where the hazards cannot be mitigated.

NS 17.4 Where the effects of flood hazards can be mitigated, require appropriate standards for subdivisions, parcel reconfigurations, site developments and for the design of structures. {Amended 12/98}

NS 17.5 Plan for and facilitate returning Shoreline rivers to more natural hydrological conditions, and recognize that seasonal flooding is an essential natural process.

NS 17.6 When evaluating alternate flood control measures on Shoreline rivers:

1) consider the removal or relocation of structures in the FEMA 100-year floodplain;

2) where feasible, give preference to nonstructural flood hazard reduction measures over structural measures;

3) structural flood hazard reductions measures should be consistent with the County's comprehensive flood hazard management plan.

Shorelines: Floodway / Channel Migration Zone (CMZ) Environment

POLICIES

NS 7.17 The Floodway/Channel Migration Zone environment should protect the water areas; islands, associated overflow channels, and channel migration areas. This environment acknowledges the river's need to move within parts of its floodplain, and emphasizes the preservation of the natural hydraulic, geologic and biological functions of the county's shorelines that are constrained by severe biophysical limitations.

NS 7.18 A Floodway/Channel Migration Zone designation should be assigned to shoreline areas that are within mapped Channel Migration Zones and/or within a designated FEMA Floodway. The extent of the Floodway/Channel Migration Zone should never extend beyond the 100-year flood plain.

NS 7.19 Generally, commercial, industrial, mining, non-water oriented recreation, roads, utilities, parking areas, and residences should not be located in the Floodway/Channel Migration Zone Environment. Other uses (recreation, resource uses, etc.) should be carefully limited to protect shoreline functions. Restrict activities that may degrade the actual or potential value of this environment, and severely restrict development in hazardous areas. Modifications that harden or fix stream banks and channels should be discouraged.

Shorelines: Residential Development

POLICIES

NS 7.77 Design subdivisions at a density, level of site coverage, and occupancy compatible with the physical capabilities of the shoreline and water, and locate them to prevent the need for new shore stabilization or flood hazard reduction measures.

NS 7.78 Restrict subdivisions in areas subject to flooding.

NS 7.79 Encourage cluster development wherever feasible to maximize use of the shorelines by residents, maximize both on-site and off-site aesthetic appeal, and minimize disruption of the natural shorelines.

CRITICAL AREAS PURPOSE STATEMENT 8

Critical Areas are an important part of the natural setting in Yakima County. Their protection is required by the Growth Management Act and important to the quality of life of the residents of this county. Critical Areas include groundwater, fish and wildlife habitat (which includes surface waters), wetlands, frequently flooded areas, and geologic hazards. The protection of critical areas must include certain general approaches, which are provided for in the goals and policies below.

Goal NS 8: Establish critical areas protection measures to protect environmentally sensitive areas, and protect people and property from hazards.

Critical Areas: General

POLICIES

NS 8.1 Use the best available science in a reasonable manner to develop regulations to protect the functions and values of critical areas.

NS 8.2 Ensure proposed subdivisions, other development, and associated infrastructure are designed at a density, level of site coverage, and occupancy to preserve the structure, values and functions of the natural environment or to safeguard the public from hazards to health and safety.

NS 8.3 Use a preference-based system of mitigation sequencing for the County's stream, lake, pond, wetland, floodplain and fish and wildlife habitat critical areas that reduces impacts using approaches ranging from avoidance to replacement.

NS 8.4 In order to encourage Critical Area protection and restoration, the density and lot size limits stipulated in other policies may be adjusted or exceeded to accomplish clustering and bonus provisions adopted under the (Critical Areas Ordinance) CAO. The use of incentive based programs is encouraged

Critical Areas: Frequently Flooded Areas

GOAL NS17: Prevent the loss of life or property and minimize public and private costs associated with repairing or preventing flood damages from development in frequently flooded areas.

NS 17.1 Support comprehensive flood control planning.

NS 17.2 Yakima County should conduct additional analysis and mapping of frequently flooded areas in cases where the 100-year floodplain maps prepared by the Federal Emergency Management Agency do not adequately reflect the levels of risk or the geographic extent of flooding.

NS 17.3 Direct new critical facility development away from areas subject to catastrophic, life-threatening flood hazards where the hazards cannot be mitigated.

NS 17.4 Where the effects of flood hazards can be mitigated, require appropriate standards for subdivisions, parcel reconfigurations, site developments and for the design of structures. {Amended 12/98}

NS 17.5 Plan for and facilitate returning Shoreline rivers to more natural hydrological conditions, and recognize that seasonal flooding is an essential natural process.

NS 17.6 When evaluating alternate flood control measures on Shoreline rivers:

1) consider the removal or relocation of structures in the FEMA 100-year floodplain;

2) where feasible, give preference to nonstructural flood hazard reduction measures over structural measures;

3) structural flood hazard reductions measures should be consistent with the County's comprehensive flood hazard management plan.

Critical Areas: Wetlands

GOAL NS 18: Provide for long term protection and no net loss of wetland functions and values.

POLICIES:

NS 18.1 Preserve, protect, manage, and regulate wetlands for purposes of promoting public health, safety and general welfare by:

1. Conserving fish, wildlife, and other natural resources of Yakima County;
2. Regulating property use and development to maintain the natural and economic benefits provided by wetlands, consistent with the general welfare of the County;
1. Protecting private property rights consistent with the public interest; and

4. Require wetland buffers and building setbacks around regulated wetlands to preserve vital wetland functions and values.

NS 18.2 Adopt a clear definition of a regulated wetland and a method for delineating regulatory wetland boundaries.

NS 18.3 Classify regulated wetland areas to reflect their relative function, value and uniqueness.

NS 18.4 Develop a wetlands data base.

NS 18.5 Manage and mitigate human activities or actions which would have probably adverse impacts on the existing conditions of regulated wetlands or their buffers.

NS 18.6 Require mitigation for any regulated activity which alters regulated wetlands and their buffers. Develop ratios, performance standards, monitoring, and long-term protection.

PURPOSE STATEMENT POS 1

Open space comes in various sizes, shapes, and types, and performs various functions. Categories of open space include hazardous critical areas; ecological critical areas; long-term commercially significant resource lands; recreation, education, and cultural sites; lands which shape urban form by defining where one city ends and the next begins; aesthetic value lands; and urban reserve lands. The way that Yakima County defines and protects its open space will depend on which functions of open space it emphasizes.

Undeveloped, undisturbed lands are obvious examples of open space. Yet lands which are actively farmed or even logged periodically can also create a sense of openness. The following goal and policies address the other functions of open space.

GOAL POS 1: Encourage the retention of open space and development of recreational opportunities.

POLICIES:

POS 1.1 Include hazardous critical areas, ecological critical areas, long-term commercially significant resource lands, lands which shape urban form, aesthetic value lands, selected cultural resources (archaeological sites, historic landscapes, and traditional cultural properties) and urban reserve lands in the County's definition of open space lands.

Community Rating System

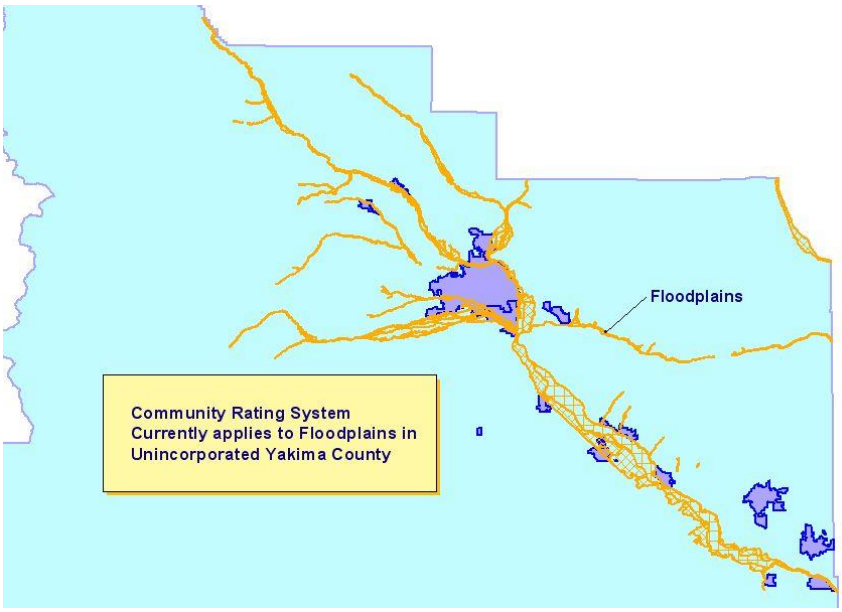
Brief Description:

Need • CRS is a program through FEMA that allows NFIP communities to earn points that in turn reduce property owners' premium costs for flood insurance. Points are earned through various activities that are aimed at reducing loss of life and property due to flooding. Each NFIP community has to join the CRS individually (cities and county).

Intent • The CRS program reduces flood risk through proven community approaches. Yakima County enrolled in this program to reduce insurance premium costs for property owners, while reducing flood risk. Additional goal is to gain CRS program experience so that the FCZD can assist any city who also wishes to join this FEMA program.

Benefits • The County has been reduced from a ten to eight rating with a net reduction of 10% on flood risk insurance premiums for property owners in the floodplain. Increased interest by the cities to sign-up for this program has been exhibited.

Community Rating System – Reducing Flood Insurance Costs



CRS Points and Classifications

Credit points earned, classification awarded, and premium reductions given for communities in the National Flood Insurance Program Community Rating System.

		Premium Reduction	
Credit Points	**Class**	**SFHA***	**Non-SFHA****
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

*Special Flood Hazard Area

**Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. The CRS credit for AR and A99 zones are based on non-SFHAs (B, C, and X). Credits are: classes 1-6, 10% and classes 7-9, 5%. Premium reductions are subject to change.

Yellow highlight is Unincorporated Yakima County rating classification

INSURANCE SERVICES OFFICE, INC.
MARLENE JACOBS, CFM 4811 SE MELDRUM AVE, PORTLAND, OR 97267
OFFICE (503) 342-6138 CELL (541) 704-5434 EMAIL: mjacobs@iso.com

October 9, 2015

Ms. Dianna Woods
CRS Coordinator
128 North Second Street, Room 416
Yakima, Washington 98901

Dear Ms. Woods:

This is to acknowledge receipt of the 2014 Community Rating System (CRS) Recertification for Yakima County, Washington. The completed and signed AW-214 and requested enclosures have been reviewed and everything appears to be in order. This completes the Recertification process for 2014 and your community remains in good standing as a CRS Class 8 community for the next year.

Thank you for your cooperation in completing the annual CRS Recertification form. Please do not hesitate to contact me when I can be of future assistance.

Yours sincerely,

Marlene Jacobs

Marlene Jacobs, CFM
ISO/CRS Specialist

Cc: Mr. John Graves, DHS/FEMA Region X
Mr. Michael Riedy, DHS/FEMA Region X
Mr. Scott McKinney, Washington State NFIP Coordinator
Ms. Sherry Harper, ISO Planning Technical Coordinator
Ms. Cristina Martinez, ISO Floodplain Technical Coordinator

National Flood Insurance Program Participation

Yakima County along with the communities of Yakima, Selah, Zillah, Wapato, Tieton, Naches, Sunnyside, Toppenish, and Union Gap are listed in the *Federal Emergency Management Agency, Community Status Book Report, Communities Participating in the National Flood Program*.

As recommended in Yakima County Comprehensive Flood Management Plans, jurisdictions are encouraged to update their local flood related ordinances to meet NFIP requirements.

NFIP Participation

CID	Community	Number of Policies	Total Coverage	Total Premium	Total Claims Since 1978	Total Paid Since 1978
530217	Yakima County	675	$ 141,995,500	$ 604,622	195	$ 1,011,646
530223	Naches, Town of	15	$ 4,516,200	$ 21,567	4	$ 27,325
530226	Selah, City of	6	$ 2,434,000	$ 13,608	48	$ 699,671
530227	Sunnyside, City of	0	$ 0	$ 0	1	$ 0
530265	Tieton, City of	7	$ 853,900	$ 98,249	0	$ 0
530228	Toppenish, City of	325	$ 62,695,800	$ 199,164	8	$ 43,550
530229	Union Gap, City of	22	$ 3,536,200	$ 10,436	1	$ 3,291
530230	Wapato, City of	101	$ 12,738,200	$ 121,496	9	$ 30,433
530311	Yakima, City of	115	$ 36,086,800	$ 98,249	10	$ 14,963
530232	Zillah, City of	2	$ 560,000	$ 816	0	$ 0
	County Total	**1,268**	**$ 265,416,600**	**$ 2,336,414**	**276**	**$ 3,661,758**

Community: Each local jurisdiction, i.e. cities and towns, have this form included in their annex.

Level of NFIP Participation	Continued Compliance Actions
Does your community have a dedicated Floodplain Manager or NFIP Coordinator? Is floodplain management an auxiliary duty? Is there a Certified Floodplain Manager on staff? Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Identify need for additional staff Identify training needs of existing staff Are there potential ordinance changes to consider to strengthen requirements? Are there potential improvements to permitting process or other administrative aspects of the community's NFIP program? Could your community enhance its floodplain services? Consider outreach and education to provide in the community. Outreach can be targeted to increase NFIP policies, promote NFIP services, or increase knowledge of local flood risk, among other topics. Consider a variety of audiences, such as elected officials or builders.

Yakima County

Level of NFIP Participation	Continued Compliance Actions
Does your community have a dedicated Floodplain Manager or NFIP Coordinator? No. Is floodplain management an auxiliary duty? Yes. Is there a Certified Floodplain Manager on staff? Yes, there are four. Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Identify need for additional staff. One staff member so public outreach staff has time to implement flood education and outreach. Identify training needs of existing staff. Are there potential ordinance changes to consider to strengthen requirements? Not at this time. Are there potential improvements to permitting process or other administrative aspects of the community's NFIP program? Yes. Could your community enhance its floodplain services? Yes. Consider outreach and education to provide in the community. On-going with multiple new map projects. Outreach can be targeted to increase NFIP policies, promote NFIP services, or increase knowledge of local flood risk, among other topics. One staff member responds to questions about NFIP policies and maps. More will be done when staffing need listed above is filled. Consider a variety of audiences, such as elected officials or builders. Map outreach includes a variety of audiences. Two workshops aimed at insurance agents and lenders have been conducted locally. Periodic map update presentations have been done for local surveyors' organization.

Repetitive Loss Properties

The Federal Emergency Management Agency (FEMA) defines a repetitive loss property as, ". . those [properties] for which two or more losses of at least $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year since 1978." A property is defined as a "severe repetitive loss property" when it meets one of these conditions:

1. Four or more separate flood claim payments have been made and each claim payment exceeds $5,000; or
2. At least two flood claim payments have been made and the cumulative payments exceed the value of the property.

NFIP Repetitive Losses

CID	Community	# of Variances	# of Repetitive Losses	CAC Date	CAV Date	FIRM Date	CRS
530217	Yakima County	0	20	03/05/2009	02/19/2015	07/17/2012	Yes
530223	Naches, Town of	0	0	02/24/1996	05/03/2006	11/18/2009	
530226	Selah, City of	0	12	02/24/1996	05/22/2008	11/18/2009	
530227	Sunnyside, City of	0	0	03/05/2009		11/18/2009	
530265	Tieton, City of	0	0	02/24/1996		11/18/2009	
530228	Toppenish, City of	0	0	03/05/2009	11/01/2011	11/18/2009	
530229	Union Gap, City of	0	0	02/24/1996	08/13/2014	07/17/2012	
530230	Wapato, City of	0	0	07/12/2006	08/12/2014	11/18/2009	
530311	Yakima, City of	0	0	02/24/1996	08/11/2014	07/17/2012	
530232	Zillah, City of	0	0	11/08/2006	06/22/1994	11/18/2009	

There are no severe repetitive loss properties identified in Yakima County.

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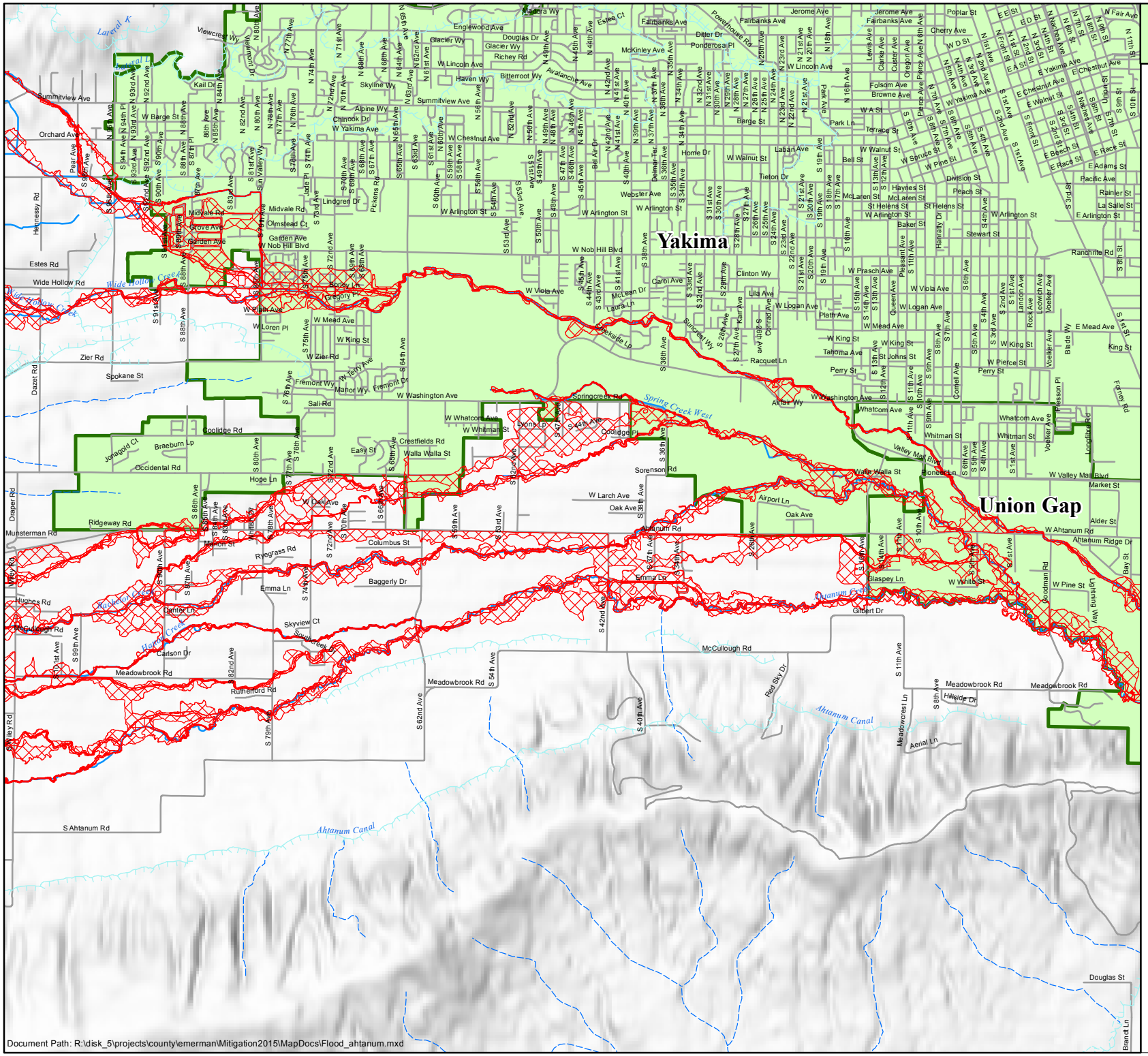

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Ahtanum Stream Flood Impact Area

FLOODWAY
100 Year
City Limits

Streams
Perennial Stream
Lake or Pond
Aquaduct
Canal or Ditch
Intermittent Stream
Siphon

All Roads

Yakima County Hazard Mitigation Plan

Map Inset

0 1,700 3,400 6,800 Feet

1 in = 4,700 ft

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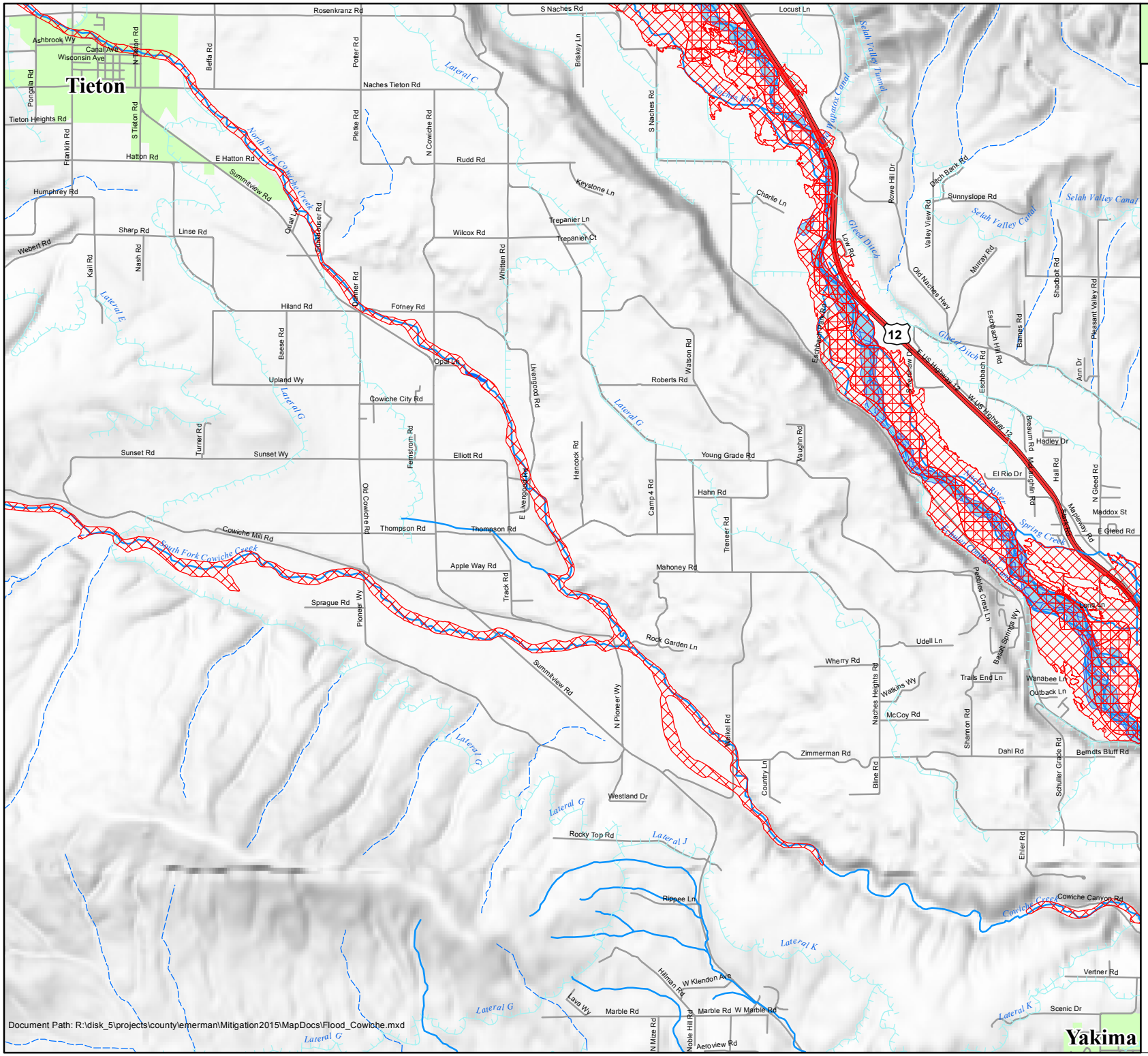
S



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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Cowiche Canyon Stream Flood Impact Area

- FLOODWAY
- 100 Year
- City Limits

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

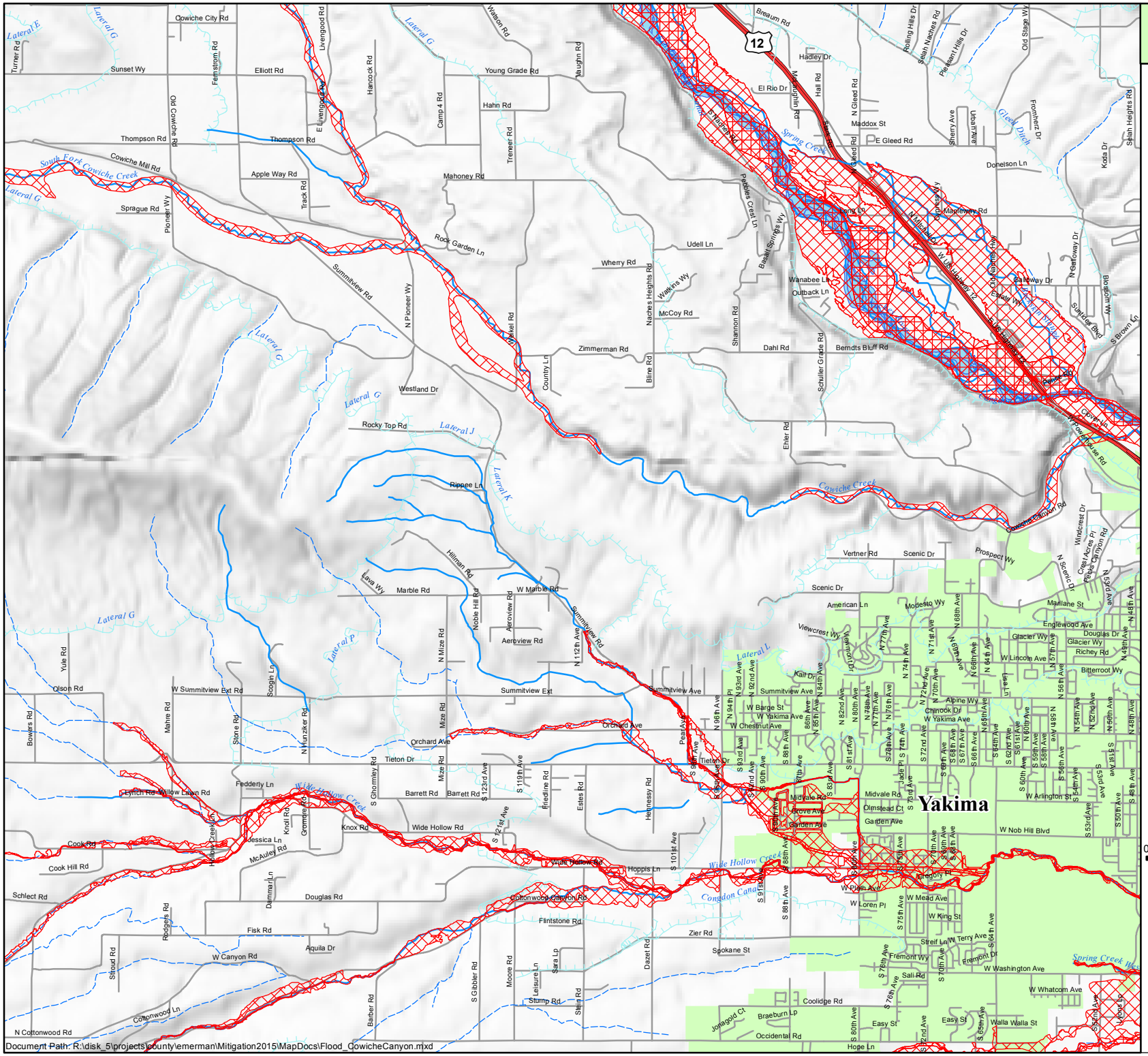
- State & Fed Roads
- All Roads

Yakima County Hazard Mitigation Plan

Map Inset

0 1,750 3,500 7,000 Feet

1 inch = 4,700 feet



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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Cowiche Canyon Stream Flood Impact Area

Floodway

100 Year

Streams
- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- State & Fed Roads
- All Roads
- City Limits

Yakima County Hazard Mitigation Plan

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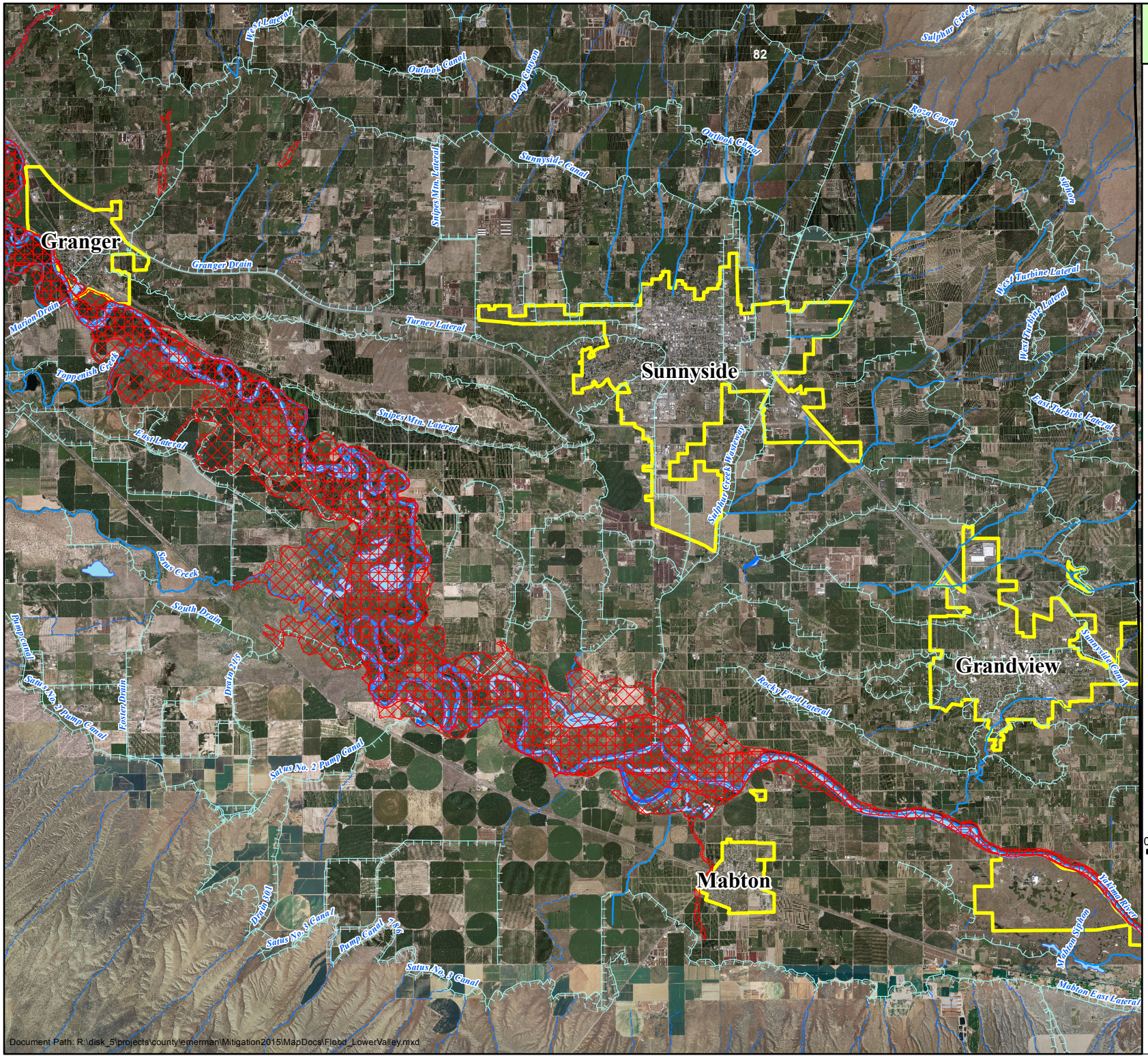
1 in = 1 miles

Date: Sept 24, 2014



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

City of Granger, Sunnyside, Mabton, and Grandview Flood Impact Areas

- FLOODWAY
- 100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- City Limits

2013 Yakima County Orthophotos

Yakima County Hazard Mitigation Plan

Map Inset

0 0.5 1 2 3 Miles

1 in = 1.9 miles

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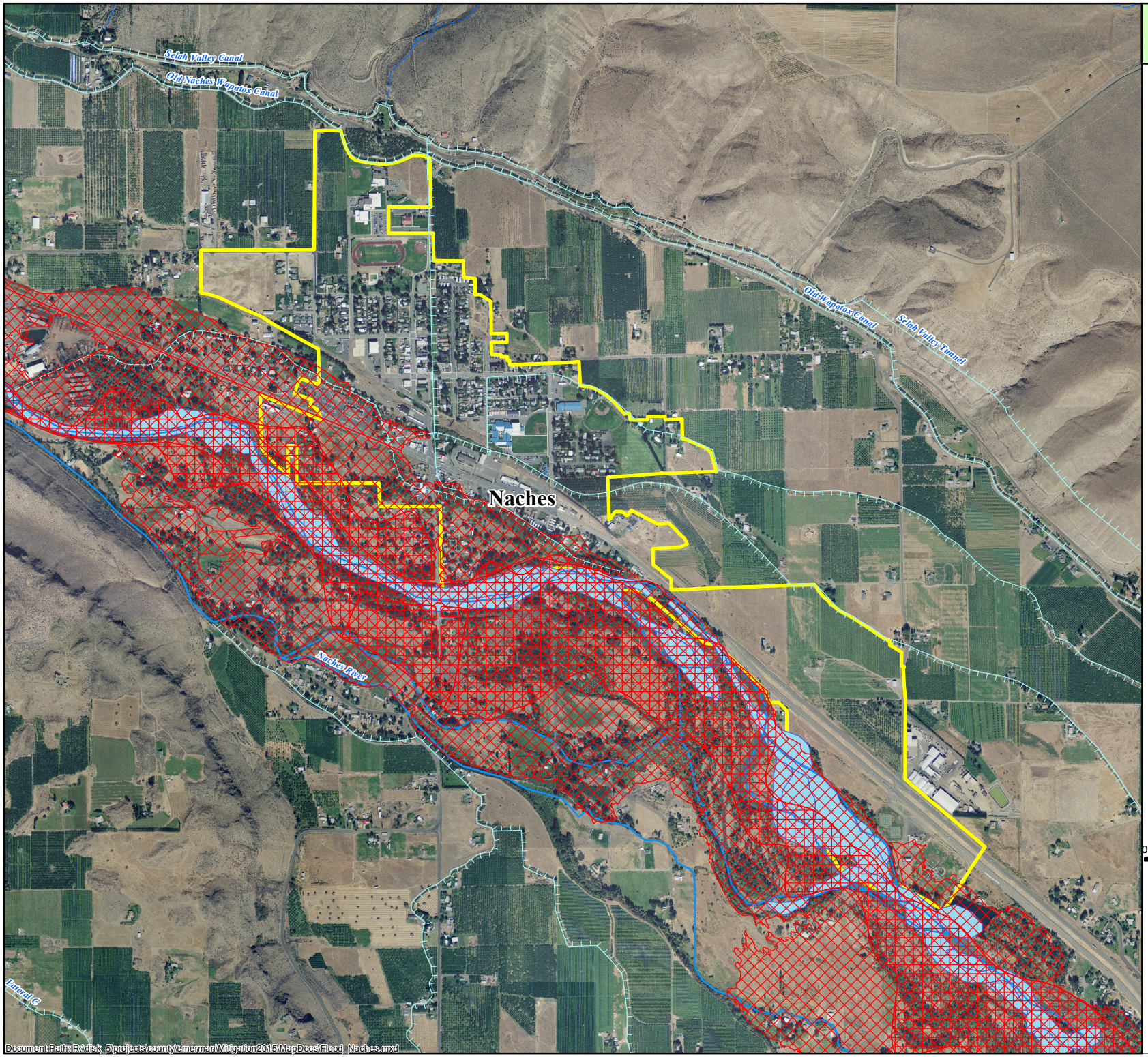

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Town of Naches Flood Impact Area

- FLOODWAY
- 100 Year
- City Limits

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

2005 Ortho-photo mosaic
taken 9/19 - 9/23

Yakima County Hazard Mitigation Plan

Map Inset

0 600 1,200 2,400 Feet

1 inch = 1,500 feet

N W E S

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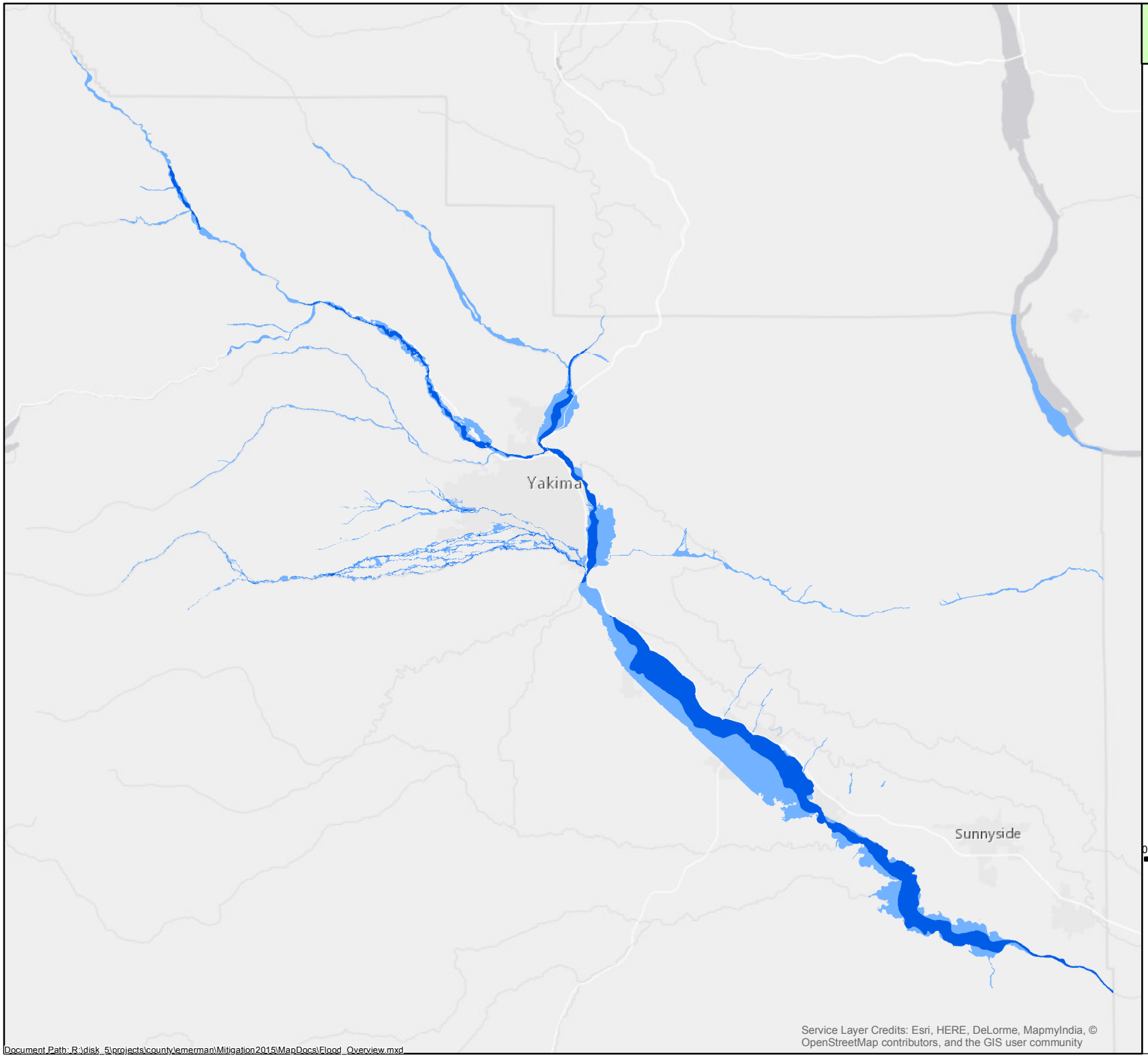

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Flood Impact Area

FLOODWAY
100 Year

2013 Yakima County Orthophoto

Yakima County Hazard Mitigation Plan

Map Inset

0 15,000 30,000 60,000 Feet

1 inch = 38,111 feet

N
W E
S

Service Layer Credits: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

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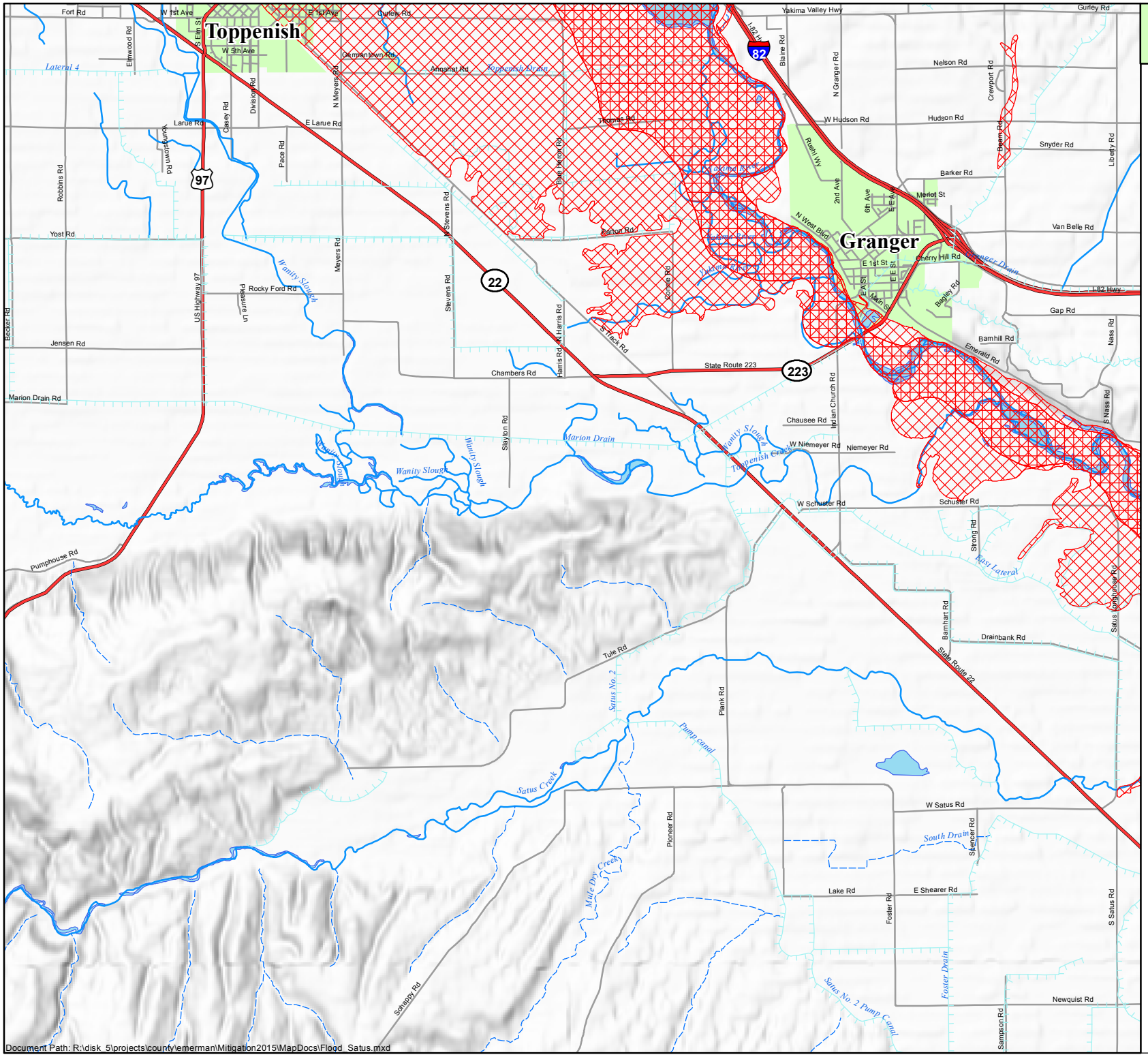

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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Satus Stream Flood Impact Area

- FLOODWAY
- 100 Year
- City Limits

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

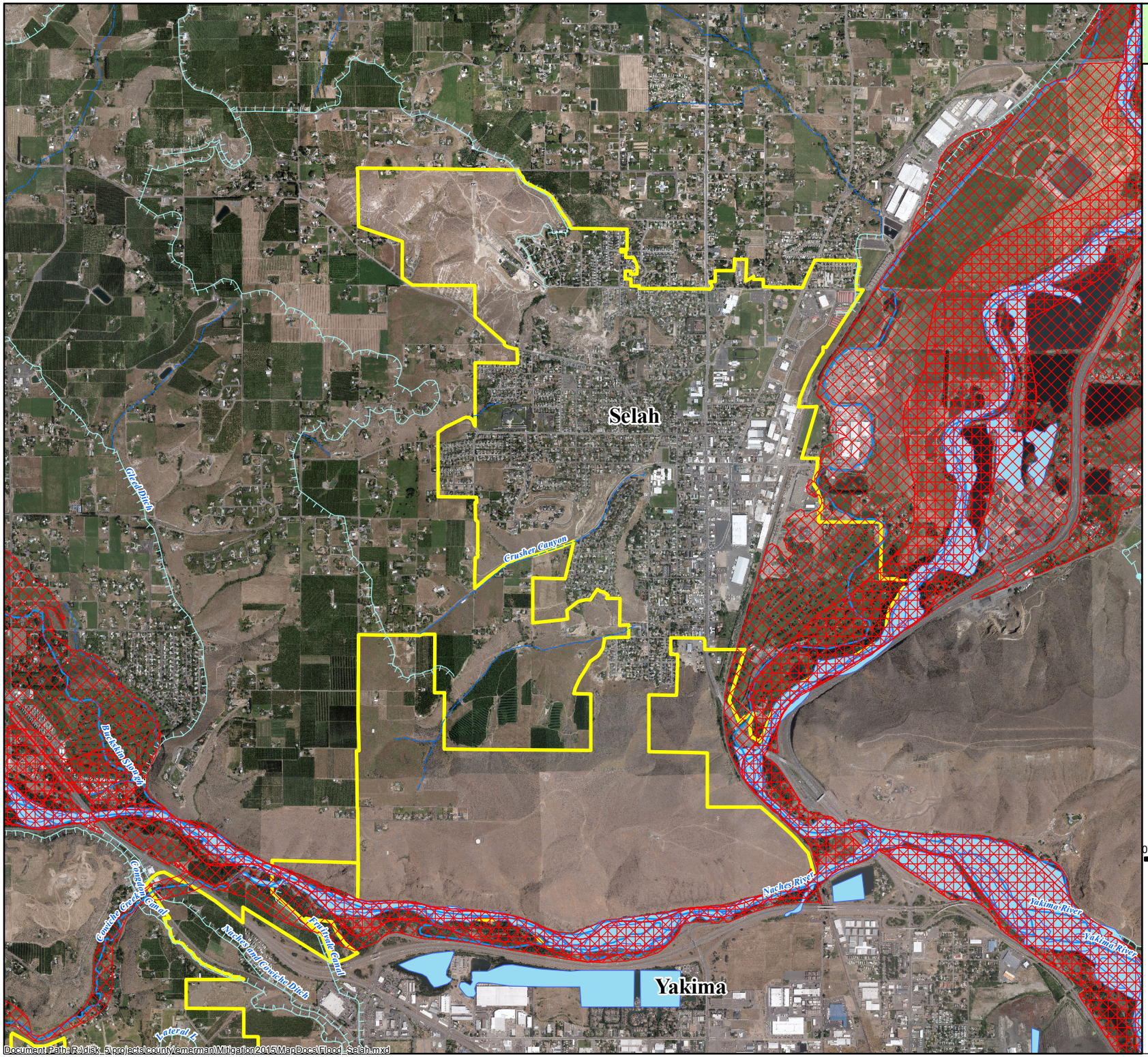
- State & Fed Roads
- All Roads

Yakima County Hazard Mitigation Plan

Map Inset

0 0.45 0.9 1.8 Miles

1 in = 1.2 miles



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

City of Selah Flood Impact Area

- FLOODWAY
- 100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- City Limits

2013 Yakima County Orthophoto

Yakima County Hazard Mitigation Plan

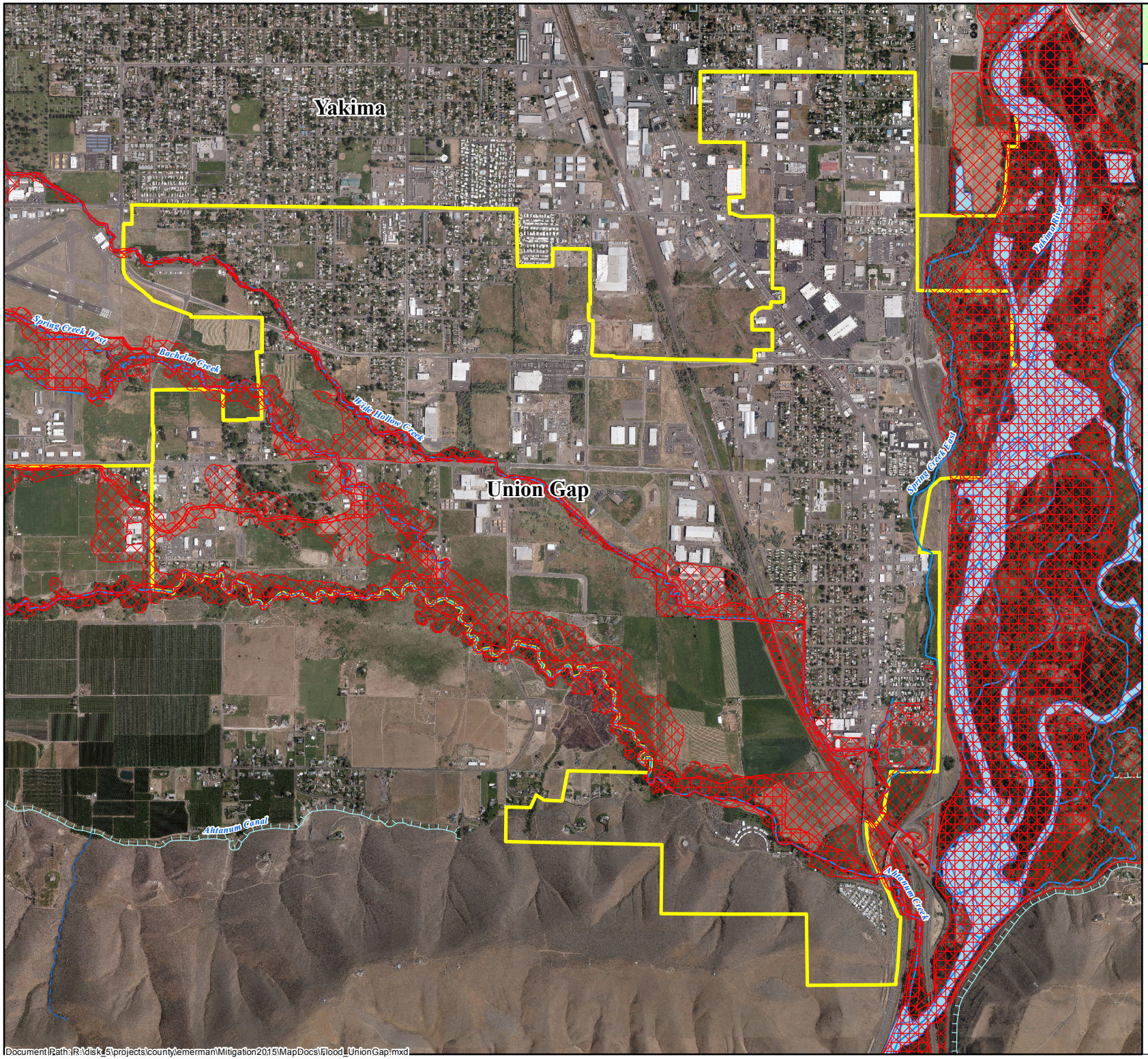
Map Inset

0 1,200 2,400 4,800 Feet

1 inch = 3,000 feet

N W E S

Date: Sept 25, 2014



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

City of Union Gap Flood Impact Area

FLOODWAY
100 Year

Streams
Perennial Stream
Lake or Pond
Aquaduct
Canal or Ditch
Intermittent Stream
Siphon

City Limits

2013 Yakima County Orthophoto

Yakima County Hazard Mitigation Plan

Map Inset

0 900 1,800 3,600 Feet

1 inch = 2,400 feet

N
W E
S

Date: Sept 25, 2014

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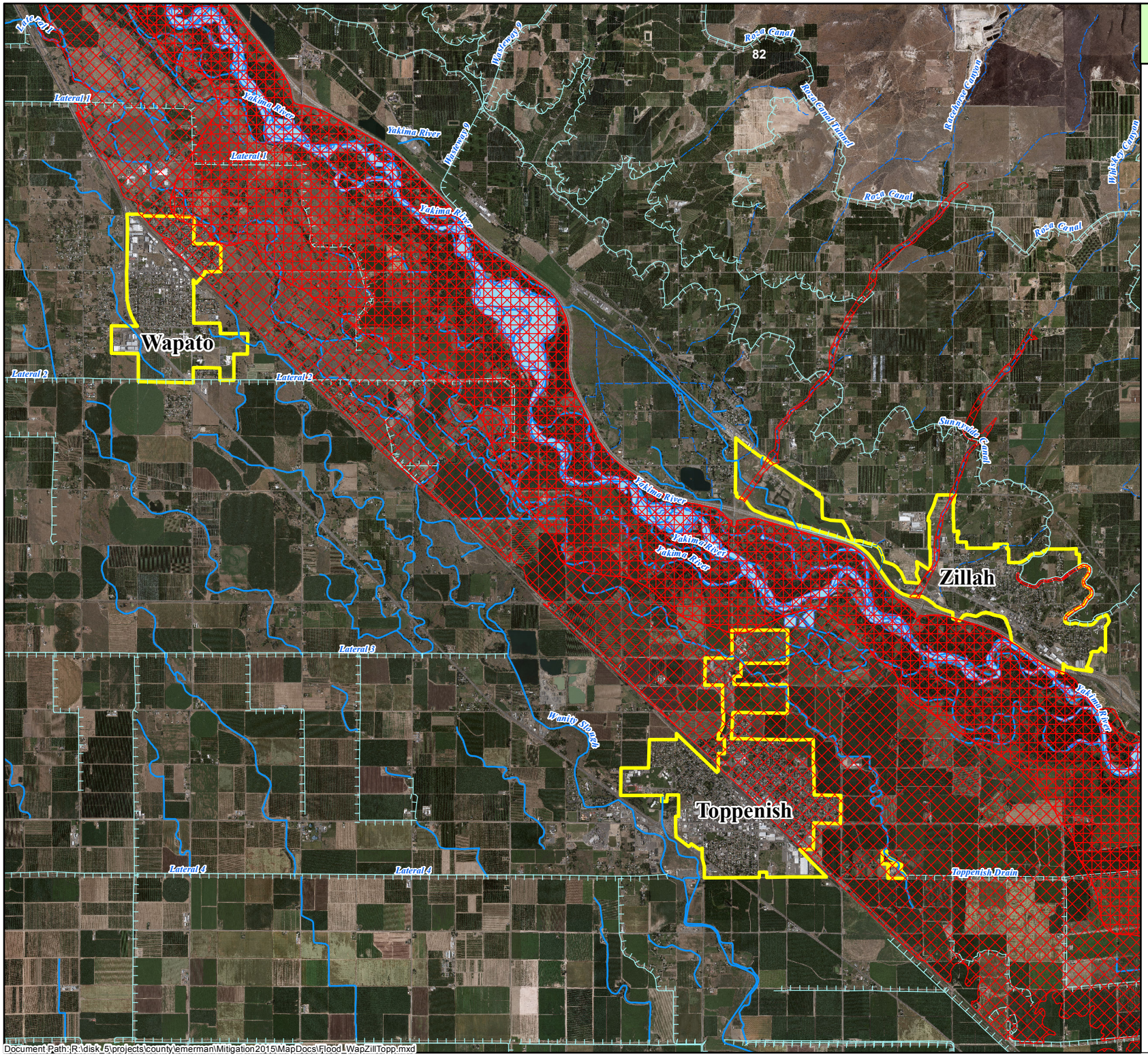

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

City of Wapato, Zillah and Toppenish Flood Impact Area

- FLOODWAY
- 100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- City Limits

2005 Ortho-photo mosaic
taken 9/19 - 9/23

Yakima County Hazard Mitigation Plan

Map Inset

0 0.45 0.9 1.8 Miles

1 in = 1.2 miles

N W E S

Date: Sept 25, 2014

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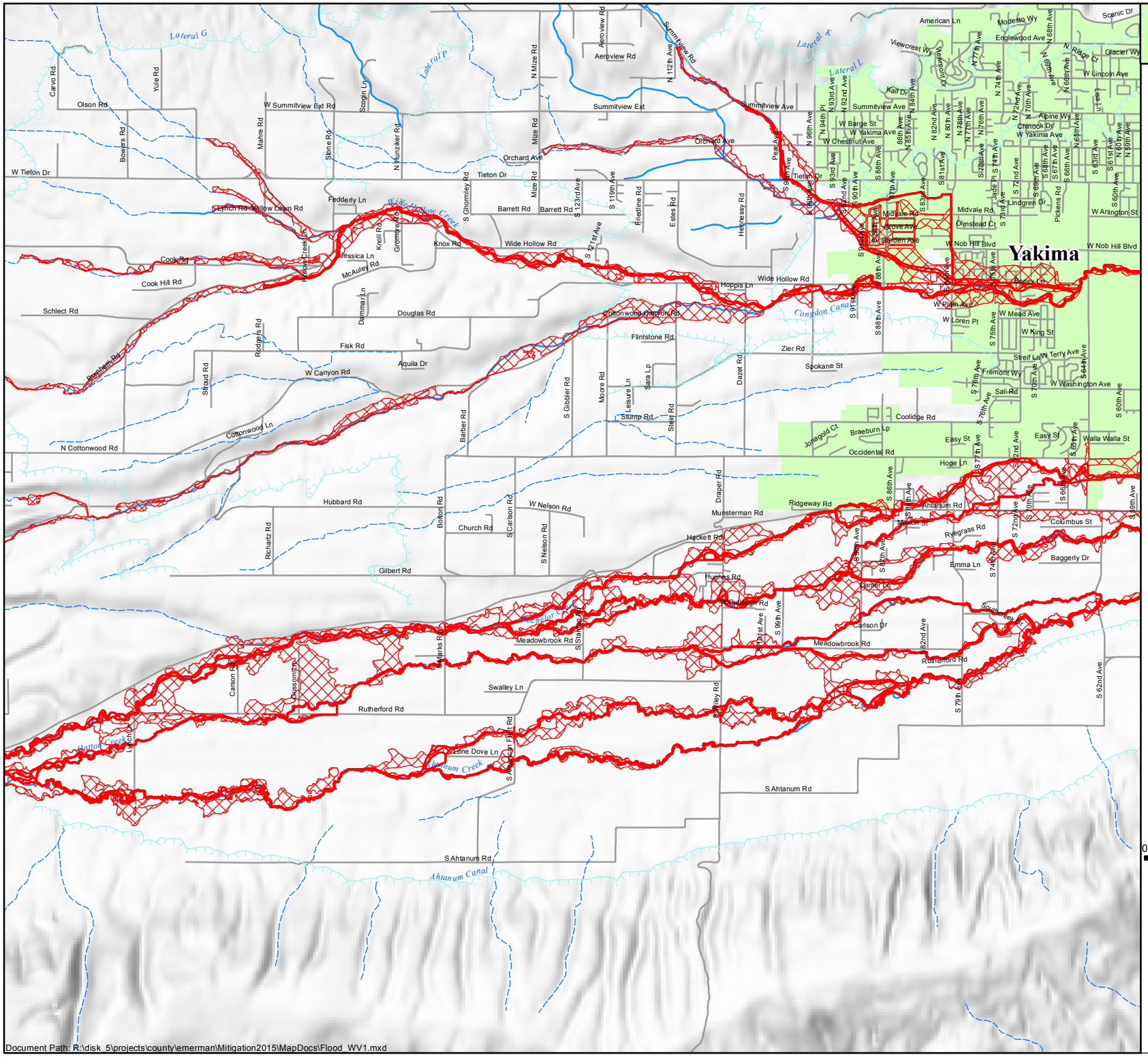

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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

West Valley Stream Flood Impact Area

Yakima County Hazard Mitigation Plan

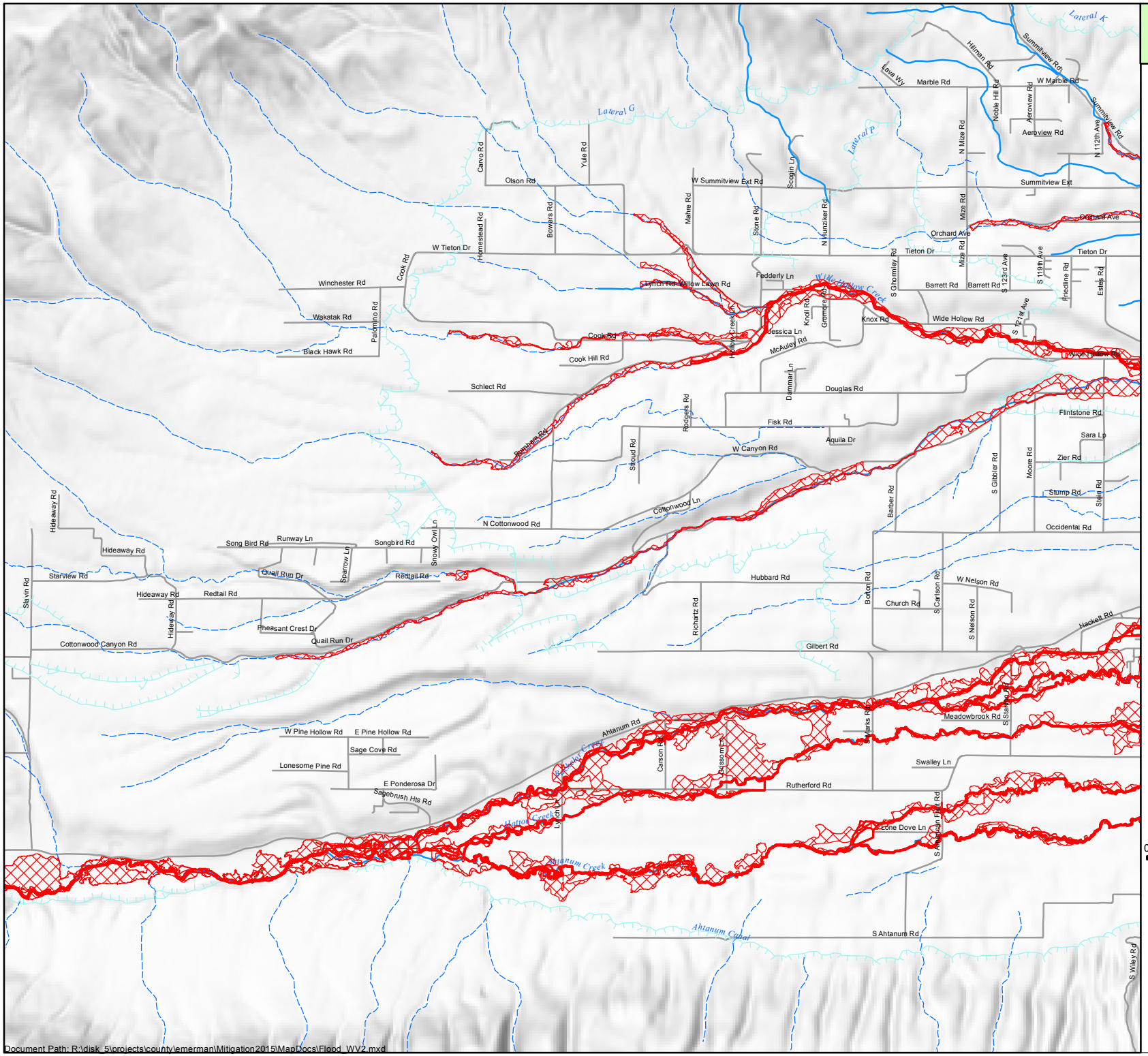
Map Inset

0 0.375 0.75 1.5 Miles

1 in = 1 miles

N
W E
S

Date: Sept 25, 2014



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

West Valley Stream Flood Impact Area

FLOODWAY

100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

All Roads

Yakima County Hazard Mitigation Plan

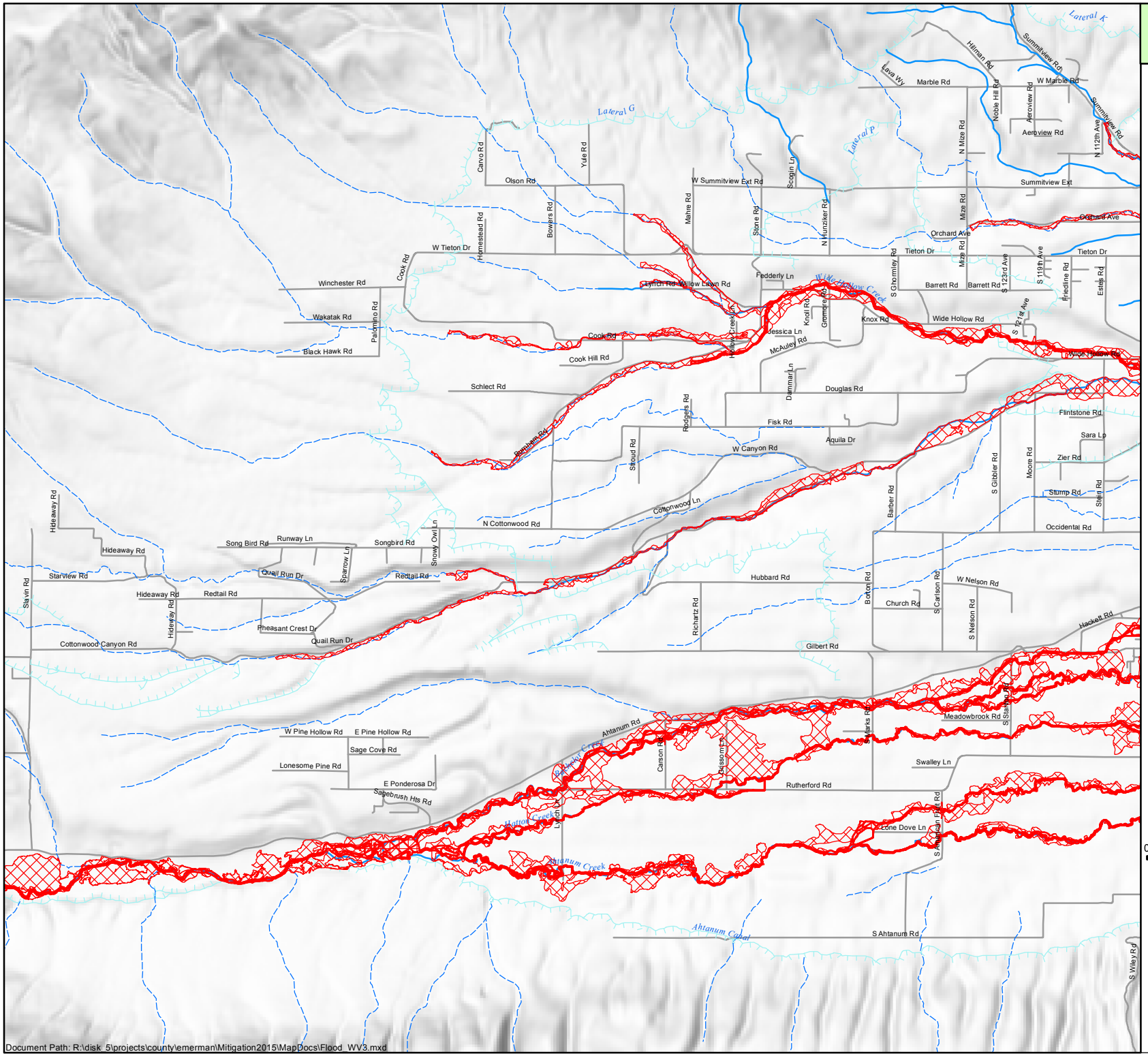
Map Inset

0 0.375 0.75 1.5 Miles

1 in = 1 miles

N W E S

Document Path: R:\disk_5\projects\county\emerman\Mitigation2015\MapDocs\Flood_WV2.mxd



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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

West Valley Stream Flood Impact Area

- FLOODWAY
- 100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- All Roads

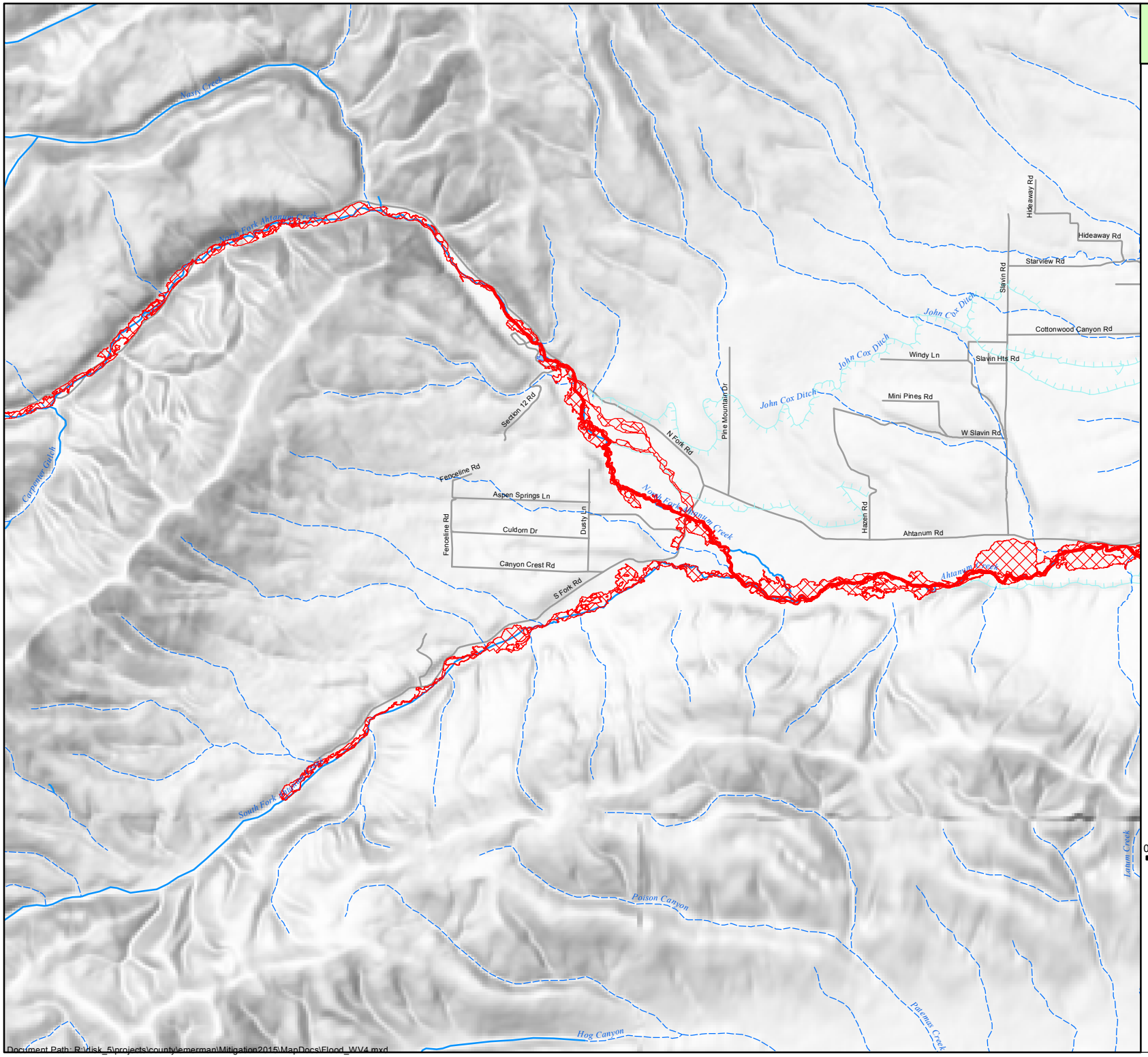
Yakima County Hazard Mitigation Plan

Map Inset

0 0.375 0.75 1.5 Miles

1 in = 1 miles

N W E S



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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

West Valley Stream Flood Impact Area

- FLOODWAY
- 100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- All Roads

Yakima County Hazard Mitigation Plan

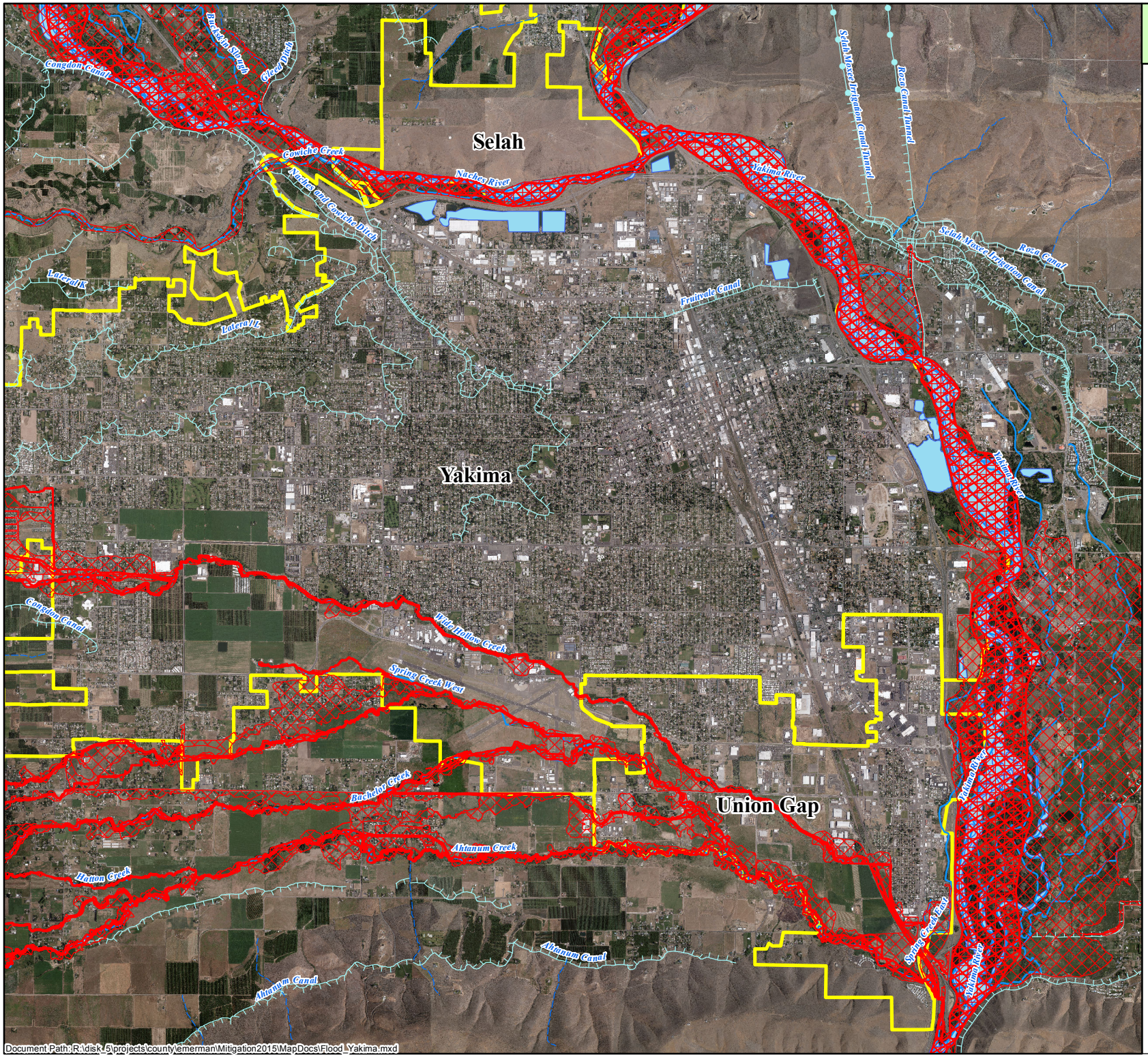
Map Inset

0 0.375 0.75 1.5 Miles

1 in = 1 miles

N W E S

Date: Sept 25, 2014



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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

City of Yakima Flood Impact Area

- FLOODWAY
- 100 Year

Streams

- Perennial Stream
- Lake or Pond
- Aquaduct
- Canal or Ditch
- Intermittent Stream
- Siphon

- City Limits

2013 Yakima County Orthophotos

Yakima County Hazard Mitigation Plan

Map Inset

0 0.375 0.75 1.5 Miles

1 in = 1 miles

N W E S

Date: Sept 25, 2014

Part Two—Hazard-Specific Information
Tab-7

Hail Storms

Table of Contents

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HAIL STORMS

Definition

A potentially damaging outgrowth of severe thunderstorms. Hailstorms frequently accompany thunderstorms, so their locations and spatial extents overlap.

Hail can cause substantial damage to vehicles, roofs, landscaping, and other areas of the built environment. U.S. agriculture is typically the area most affected by hail storms, which cause severe crop damage even during minor events.

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Yakima County Recent Hail Events: 2010-2014
NOAA National Climatic Data Center
Storm Events Database
Begin Date: 2010
End Date: 2014

Event Details

Event	**Hail**
Magnitude	**1.00 in.**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**State Official**
NCDC Data Source	**CSV**
Begin Date	**2010-07-31 11:48:00.0 PST-8**
Begin Location	**8S RIMROCK TIETON ARPT**
Begin Lat/Lon	**46.51/-121.09**
End Date	**2010-07-31 11:48:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Episode Narrative	**An upper level low brought unstable conditions and thunderstorms with heavy rainfall, hail, and flash flooding during the afternoon.**
Event Narrative	**Fire crews reported 1 inch diameter hail.**

Event Details

Event	**Hail**
Magnitude	**1.00 in.**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**Trained Spotter**
NCDC Data Source	**CSV**
Begin Date	**2010-07-31 14:10:00.0 PST-8**
Begin Location	**3S BROWNSTOWN**
Begin Lat/Lon	**46.36/-120.6**
End Date	**2010-07-31 14:10:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Episode Narrative	**An upper level low brought unstable conditions and thunderstorms with heavy rainfall, hail, and flash flooding during the afternoon.**
Event Narrative	**One inch hail reported by spotter.**

Event Details

Event	**Hail**
Magnitude	**0.75 in.**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**COOP Observer**
NCDC Data Source	**CSV**
Begin Date	**2010-07-31 14:10:00.0 PST-8**
Begin Location	**4W YAKIMA**
Begin Lat/Lon	**46.6/-120.58**
End Date	**2010-07-31 14:10:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Episode Narrative	**An upper level low brought unstable conditions and thunderstorms with heavy rainfall, hail, and flash flooding during the afternoon.**
Event Narrative	**Observer reported 1/2 to 3/4 inch hail.**

Event Details

Event	**Hail**
Magnitude	**0.88 in.**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**Trained Spotter**
NCDC Data Source	**CSV**
Begin Date	**2010-07-31 14:25:00.0 PST-8**
Begin Location	**2E AHTANUM**
Begin Lat/Lon	**46.57/-120.58**
End Date	**2010-07-31 14:25:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Episode Narrative	**An upper level low brought unstable conditions and thunderstorms with heavy rainfall, hail, and flash flooding during the afternoon.**
Event Narrative	**Spotter reported thunderstorm with heavy rainfall and hail to nickel size.**

Event Details

Event	**Hail**
Magnitude	**1.00 in.**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**Law Enforcement**
NCDC Data Source	**CSV**
Begin Date	**2010-07-31 14:30:00.0 PST-8**
Begin Location	**0N YAKIMA**
Begin Lat/Lon	**46.6/-120.5**
End Date	**2010-07-31 14:30:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Episode Narrative	**An upper level low brought unstable conditions and thunderstorms with heavy rainfall, hail, and flash flooding during the afternoon.**
Event Narrative	**Yakima Sheriff Dispatch reported 1 inch diameter hail.**

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Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low

Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing

Funding Source: Local; State; FEMA; Private; Other

Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Hail					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Recommend warning signage at local parks, county fairs, and other outdoor venues	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	

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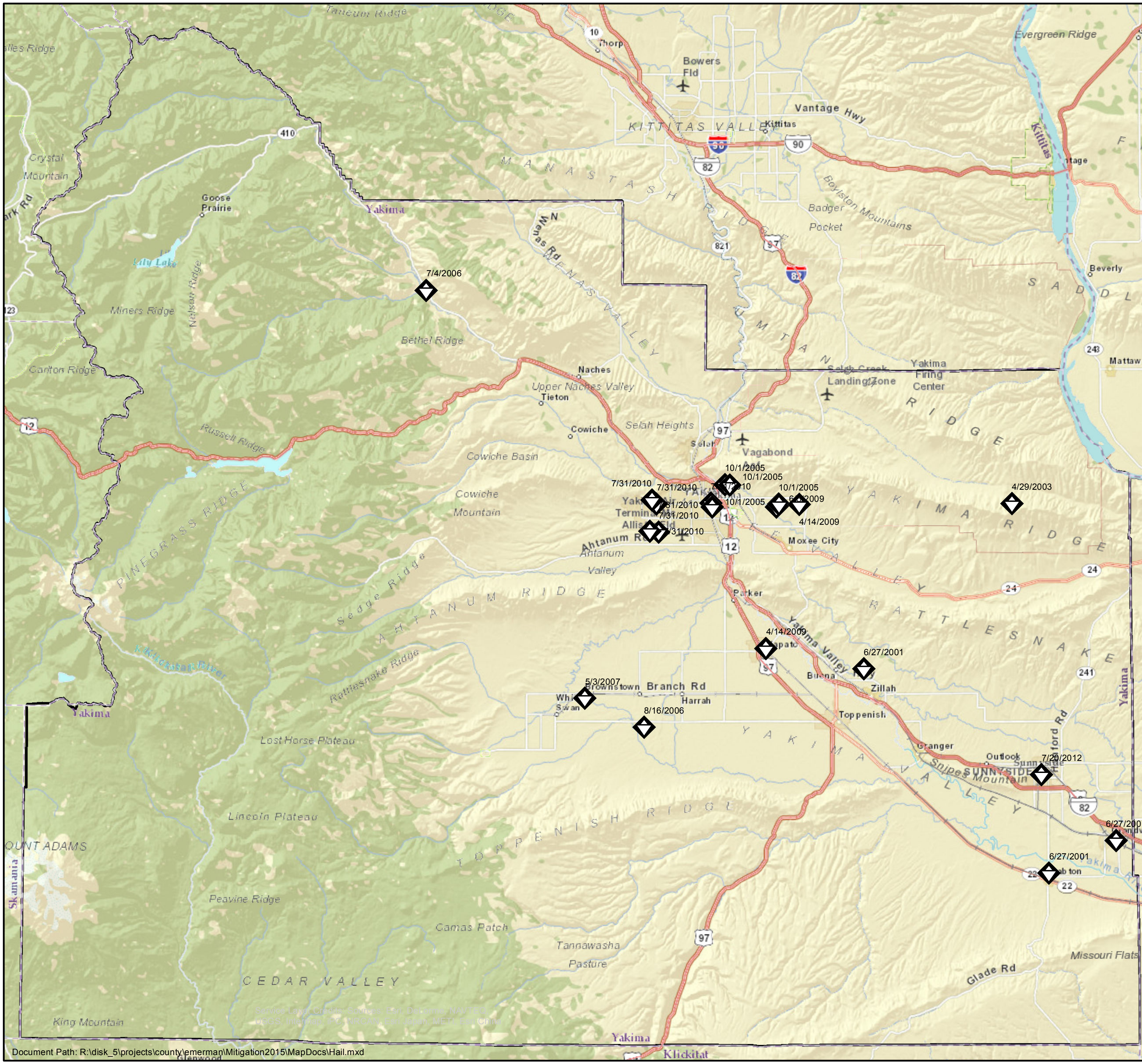

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Hail Storms Reported 2000 to 2013

◇ Hail Storms

NOAA - Severe Weather Database 2013.

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Part Two—Hazard-Specific Information
Tab-8

Hazardous Materials

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HAZARDOUS MATERIALS

Definition

Hazardous materials are materials, which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, or property when released. A release may occur by spilling, leaking, emitting toxic vapors, or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. The hazard can be explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, biological agent, and radioactive.

Hazard Identification and Vulnerability Assessment

Hazardous material incidents are intentional and/or unintentional releases of a material, that because of their chemical, physical, or biological nature, pose a potential risk to life, health, environment, or property. Each incident's impact and resulting response depends on a multitude of interrelated variables that range from the quantity and specific characteristic of the material to the conditions of the release and area/population centers involved. Releases may be small and easily handled with local response resources or rise to catastrophic levels with long-term consequences that require representatives of federal, state, and local governments to be present at the scene, with each level consisting of personnel from between five and 15 different agencies.

The Yakima County Hazardous Materials Plan consists of several agencies, each responsible for specific elements of the program. A number of strategies have evolved to limit risk, respond to, and recover from hazardous materials releases, intentional discharges, illegal disposals, or system failures. A comprehensive system of laws, regulations, and resources are in place to provide for technical assistance, environmental compliance, and emergency management.

The Yakima County LEPC, in concert with local fire and law enforcement officials, conduct hazard identification, vulnerability analysis, and risk assessment activities for their jurisdictions. Federal and state statutes require LEPCs to develop and maintain emergency response plans based on the volumes and types of substances found in, or transported through, their districts.

Conclusion

The state developed and adopted standardized hazardous materials emergency response training. Training and supporting materials are available to Yakima County public emergency responders. Hazard identification, vulnerability analysis, and risk assessment documentation and databases for hazardous materials incident are maintained by the Washington State Departments of Ecology, Health, Transportation, and the Washington State Patrol.

Resources

Washington State Emergency Management Division

Washington State Department of Ecology
Washington State Department of Health
Washington State Department of Transportation
Washington State Patrol
United States Environmental Protection Agency

Transportation

Major highway system
Interstate 82 runs through the heart of Yakima County. The modern freeway links with Interstate 90 at Ellensburg, just 35 miles north of Yakima and Interstate 84 to the south. I-90 connects Seattle with New York City. Major highways include US Routes 12 and 97, and State Routes 22, 24, 241and 410.

Motor freight carriers
Within Yakima County there are 10 trucking firms for heavy hauling, 1 for liquid or dry bulk, 2 for local cartage, and 38 for motor freight.

Railroads
Rail shipment to and from Yakima County is available via Burlington Northern Santa Fe railroad with 292 active spurs throughout the county.

Pipeline

Definition

Pipelines are transportation arteries carrying liquid and gaseous fuels. Pipelines are buried and above ground.

Hazard Identification and Vulnerability Assessment

Buried and exposed pipelines are vulnerable to breaks and punctures caused by earth movement, material failure, operator error, construction defects, and tampering. Fuel leaks cause hazardous materials spills, fires, and explosions. Williams Pipeline West (WPW) owns an interstate pipeline with service from Canada, through Sumas, and north from New Mexico. WPW has lines through Whatcom, Skagit, Snohomish, King, Pierce, Thurston, Lewis, Cowlitz, Clark, Skamania, Klickitat, Benton, **Yakima,** Kittitas, Douglas, Franklin, Grant, Adams, Walla Walla, Lincoln, Spokane, and Whitman counties.

WPW has distributors that extend service to homes and businesses. The distribution lines are smaller with less capacity and lower impact. Distribution companies include Puget Sound Energy, **Cascade Natural Gas Corporation**, Northwest Natural Gas Company, and the Avista Company.

Most pipelines are buried; however, there are exposed areas. Pipelines and right-of-ways are frequently surveyed for land movement. By law, an entire pipeline has 26 fixed wing or rotary wing aerial surveys per year. At least once a year, someone walks the ROW. When indications of potential problems occur, more surveys are conducted, especially following increased rainfall.

If a pipeline moves during land movement, it can sheer. When the sheer moves across abrasive materials or comes in contact with an ignition source, then sparks can cause the fuel to explode or burn. Monitoring markers are used to denote creeping soil movement for potential strain on the pipe.

Conclusion

Pipeline breaks and punctures are reduced by compliance with safety measures set by the Federal Pipeline Safety Law and following prescribed operations and maintenance procedures. Breaks are reduced by operating with proper pipeline pressure, installing correct thickness and grade of the steel and monitoring its wear, and reducing third party damage from excavators, driving over the lines, and encroachment of pipeline right-of-ways. Disruption of pipeline service impacts our ability to heat homes and businesses and fuel equipment. It can cause the price of fuel to increase.

Resources

Washington State Emergency Management Division
Washington State Utilities and Transportation Commission
Washington State Department of Community, Trade and Economic Development
Energy Policy Unit
Washington State Department of Transportation
Washington State Department of Ecology
United States Department of Transportation, Office of Pipeline Safety

Radiological

Definition

Radiological hazard is the uncontrolled release of radioactive material that can harm people or damage the environment.

History

In Washington State, there have been no radiological releases affecting local jurisdictions from any nuclear power generating system.

For more than 40 years, United States Department of Energy-Hanford Site (DOE Hanford Site) manufactured nuclear materials for the nation's defense programs. Chemical and radioactive wastes contaminate many areas of the site. Clean up of the Hanford Site is the largest environmental restoration effort in the nation today. There was a potential for airborne release of radiation during the May 14, 1997 explosion in the plutonium reclamation facility at Hanford.

Hazard Identification and Vulnerability Assessment

Washington State areas capable of radiological release are the Energy Northwest's Columbia Generating Station (CGS) nuclear power plant located 14 miles north northwest of Richland, the DOE Hanford Site, military bases, medical and research facilities, private industry, and trucks, trains, aircraft, and vessels transiting the state carrying radiological materials.

Energy Northwest operates the commercial nuclear power plant called Columbia Generating Station near Richland. Effects of an emergency at the plant could range from no radioactive release to a radioactive release that would initiate the evacuation of the general population within an approximate radius of 10 miles of the facility. Sirens, tone alert radios, and local media stations would alert the community. Radioactive materials from a release may enter the human food chain via crops or dairy products out to an approximate radius of 50 miles from the facility. Meteorological conditions can influence the size of the contaminated area.

The DOE Hanford Site includes spent nuclear fuel storage tanks, mixed waste storage tanks, and other nuclear waste. Large quantities of industrial chemicals and wastes are stored and used around the DOE Hanford Site. An incident could lead to a radiological or chemical hazardous material release. Those vulnerable to the effects of an incident include the site employees and people in the Richland and surrounding area. Contamination of people, animals, food producers, food processors, and facilities is possible. The event with the most likely offsite consequences is a chlorine leak from one of the water purification facilities.

The Washington State Department of Health licenses nearly 400 facilities in the state that use radioactive materials. These are categorized in three major groups: medical, industrial, and laboratory. Hospitals, clinics, laboratories, and research facilities routinely use radiation in the diagnosis and treatment of medical and dental patients. Industrial applications include various flow gauges, research and development facilities, and radiography to non-destructive test welds and castings for flaws.

Medical, industrial, and research use of radiological materials similarly dictate the need for local emergency planning.

Another aspect that contributes to the hazard is public perception. Even if not exposed to an actual physical threat, many people may panic, believing radiation may have affected them.

Conclusion

The Columbia Generating Station emergency preparedness programs of Energy Northwest, the state, and the surrounding counties: Adams, Benton, Franklin, Grant, Walla Walla, and **Yakima** are ready to respond to emergencies. State and county plans are updated annually. These plans meet criteria established by the Nuclear Regulatory Commission, Washington State, and Federal Emergency Management Agency and are exercised regularly to ensure their effectiveness. The facility, federal, state, and local jurisdictions participate in these exercises and are trained to respond to actual emergencies, if required.

While the probability of a catastrophic hazardous material release is small, the consequences from the radiological and chemical hazardous materials are significant. Emergency management programs provide a tested emergency response capability designed to protect the people around hazardous areas.

Generally, shielding, limited exposure time, and increased distance from the source are the keys to effective mitigation and response.

Resources

Washington State Emergency Management Division
Washington State Department of Agriculture
Washington State Department of Health
United States Department of Energy
United States Department of Defense
United States Nuclear Regulatory Commission
Federal Emergency Management Agency

Extremely Hazardous Substances

EPCRA Section 302 Extremely Hazardous Substances (EHSs)
The presence of EHSs in quantities at or above the Threshold Planning Quantity (TPQ) requires certain emergency planning activities to be conducted. The extremely hazardous substances and their TPQs are listed in 40 CFR Part 355, Appendices A and B. For section 302 EHSs, Local Emergency Planning Committees (LEPCs) must develop emergency response plans and facilities must notify the State Emergency Response Commission (SERC) and LEPC if they receive or produce the substance on site at or above the EHS's TPQ. Additionally if the TPQ is met, facilities with a listed EHS are subject to the reporting requirements of EPCRA section 311 (provide material safety data sheet or a list of covered chemicals to the SERC, LEPC, and local fire department) and section 312 (submit inventory- Tier I or Tier II). The minimum threshold for section 311-312 reporting for EHS substances is 500 pounds or the TPQ, whichever is less.

Yakima County has in its data base over two hundred facilities subject to this reporting.

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated
Hazard-Specific Action Items
2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Hazardous Materials—Fixed Sites

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	

Hazardous Materials—Transportation

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	

Pipeline

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	

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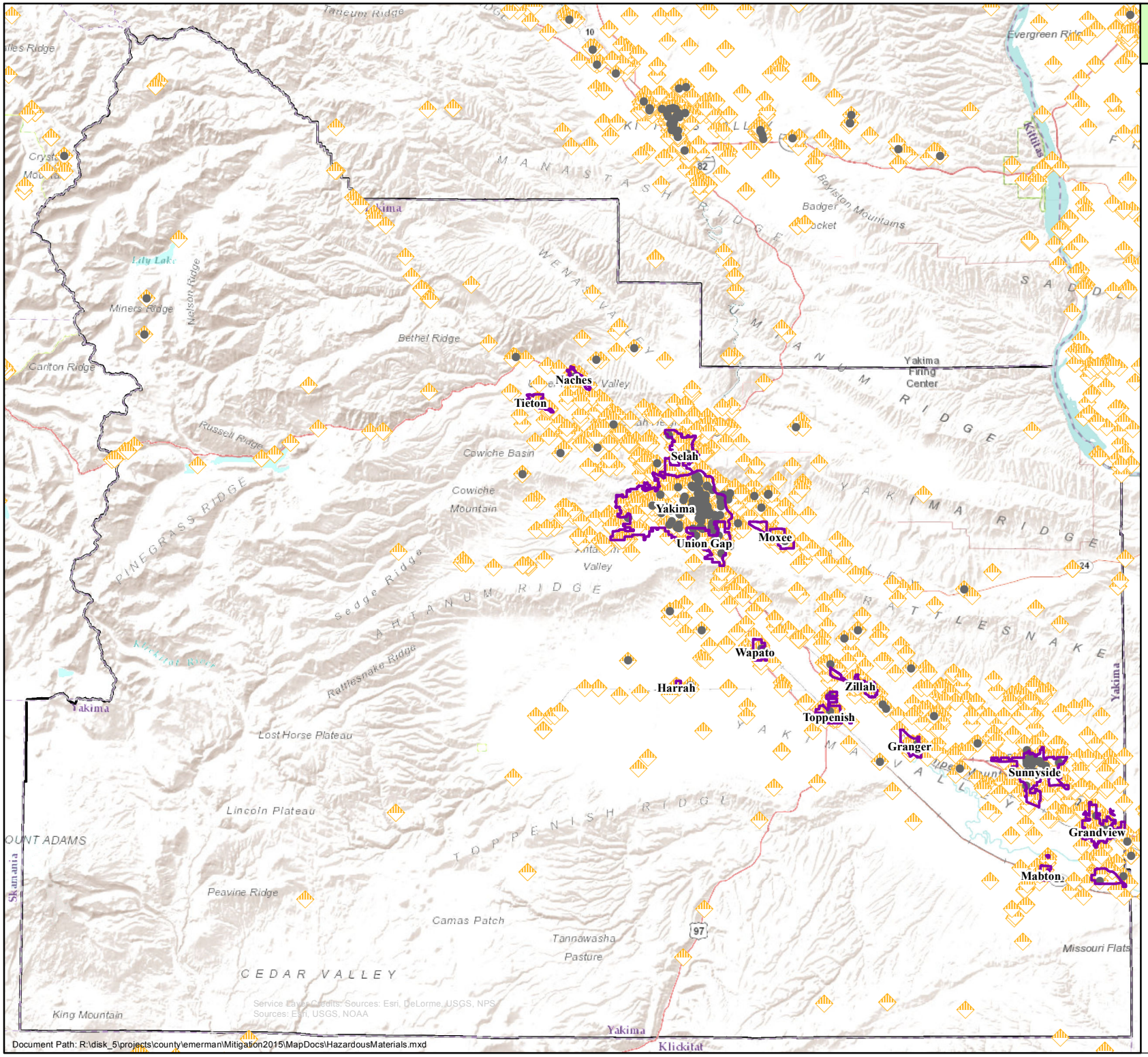

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YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Facilities that are Potential Sources of Hazardous Materials

City Limits
State Clean-up Sites
Facility

Washington State Department of Ecology
Publication_Date: 20120629
Facility/Site Database
http://www.ecy.wa.gov/services/gis/data/data.htm#f
Downloaded on September 26, 2014

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 18, 2014

Part Two—Hazard-Specific Information
Tab-9

Landslide

Table of Contents

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LANDSLIDE

Definition

Landslide is the sliding movement of masses of loosened rock and soil down a hillside or slope. Landslide causes depend on rock type, precipitation, seismic shaking, land development and zoning practices, soil composition, moisture, and slope steepness.

History

From November 1996 through March 1997, a series of wet winter storms delivered snow, freezing rain, and warm rain, producing floods and landslides. Prior to the storms, the late autumn months had above normal precipitation, building soil moisture, and heavy snow packs. The combination of pre-existing soil moisture, heavy rain, and rapid snow melt brought soils to saturation. On the gentler plains, perching of water and emergence of ground water from shallow aquifers caused flooding in low lying areas.

Massive landslides of large rock debris, snow, and ice occurred on Mount Adams between August and October 1997. The slide in October was approximately 1,500 feet thick and 750 feet wide with an estimated volume at three million cubic meters of rock. The slide was attributed to heavy rain in addition to the exceptionally wet weather in 1995 through 1997.

Irrigation in parts of Eastern Washington has reactivated ancient slides and caused others where none previously existed. The White Bluffs of the Ringold Formation near Richland lie on the eastern edge of the U.S. Department of Energy's Hanford Energy Reservation. These bluffs are soft clay stone, siltstone, and sandstone susceptible to sliding when saturated by irrigation.

On October 11, 2009, a landslide occurred at approximately RM 22.3 (T 15N, R15E, Sec. 2) on the Naches River in Yakima County. The landslide was a rotational slump, approximately 16 million cubic yards in size. State Route 410 was obliterated in the slide area for a quarter mile, and the Naches River was completed blocked by landslide debris on the western side of the slide. On the eastern portion of the slide the bed of the Naches River were uplifted 30 to 50 feet. The landslide also deformed areas adjacent to the slide through the formation of pressure ridges and valley which elevated the ground surface along the slide face itself and at several locations adjacent to the slide, most notably at the furthest extent of the landslide toe south of the former channel of the Naches River. At the time of the landslide, the flow in the Naches River was approximately 320 CFS. Immediately after the landslide a pool formed upstream of the landslide, the pool filled, water was routed into a new channel that developed along the landslide face, with a much smaller quantity of water (approximately 30 cfs) routed across Nile Loop Road, down the Carmack Ditch Channel and into adjacent fields.

The slide material at the upstream slide/river interface extends westward within 100 feet of the Nile Road at a bend. This point is a valley natural high point, and as the river is perched in its valley at this location, overflows flow almost laterally across the valley to the other valley wall. Flow paths immediately after the landslide are shown in the photo above.

Flow paths also blocked Nile Loop Road shown in the photo below, and also several locations downstream. These blockages in combination with the obliteration of SR 410 resulted in loss of road access to the upper Nile Valley and the remainder of the area formerly served by SR 410 – Chinook Pass to Enumclaw, for three days.

Hazard Identification and Vulnerability Assessment

Landslides range from shallow debris flows to deep-seated slumps. These take lives, destroy homes, businesses, and public buildings, undermine bridges, derail railroad cars, cover clam and oyster beds, interrupt transportation infrastructure, and damage utilities. Sinkholes affect roads and utilities. Losses go unrecorded because of no claims to insurance companies, no report to emergency management, no media coverage, or because transportation damages are recorded as maintenance.

Due to population density and desire of people to have a home with a view, an increasing number of structures are built on top of or below slopes subject to land sliding. Inconsistent slope mapping and land use regulations in landslide areas make the public unaware of the risk associated in building in potentially vulnerable areas. Land is not stable indefinitely. People believe that if a bluff has remained stable for the last 50 years, it will remain so for the next 50 years regardless of the development or maintenance.

Land stability cannot be absolutely predicted with current technology. The best design and construction measures are still vulnerable to slope failure. The amount of protection, usually correlated to cost, is proportional to the level of risk reduction. Debris and vegetation management is integral to prevent landslide damages. Corrective measures help, but still leaves the property vulnerable to risk.

These are characteristics that may be indicative of a landside hazard area:

- ✓ Bluff retreat caused by sloughing of bluff sediments, resulting in a vertical bluff face with little vegetation.
- ✓ Pre-existing landside area.
- ✓ Tension or ground cracks along or near the edge of the top of a bluff.
- ✓ Structural damage caused by settling and cracking of building foundations and separation of steps from the main structure.
- ✓ Toppling, bowed or jack-sawed trees.
- ✓ Gullying and surface erosion.
- ✓ Mid-slope ground water seepage from a bluff face.

Conclusion

By studying the effects of landslides in slide-prone areas, **Yakima County** can plan for the future. More needs to be done to educate the public and to prevent development in vulnerable areas. WAC 365-190-080 states that geologically hazardous areas pose a threat to the health and safety of citizens when incompatible development is sited in areas of significant hazard. Some hazards can be mitigated by engineering, design, or construction so that risks are acceptable. When technology cannot reduce the risk to acceptable levels, building in hazardous areas should be avoided.

Ordinances identifying geological hazards are now in place in most cities and counties. Information regarding steep slope hazards is available from local planning and building department. Landslide losses are reduced 95-100 percent where the established ordinances are rigorously applied.

The least expensive and most effective landslide loss reduction measure is by avoidance. The next most economical solution is mitigation using qualified expertise with an investigation report review process. The most costly is repair of landslide damages. The cost of proper mitigation is about one percent of the costs otherwise incurred through losses and litigation.

Resources

Washington State Emergency Management Division
Washington State Department of Natural Resources
Federal Emergency Management Agency
United States Army Corps of Engineers
National Weather Service

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Yakima County Recent Landslide Events: 2010-2014
NOAA National Climatic Data Center
Storm Events Database
Begin Date: 2010
End Date: 2014

Event Details

Event	**Flood**
-- Flood Cause	**Heavy Rain / Snow Melt**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**Newspaper**
NCDC Data Source	**CSV**
Begin Date	**2011-05-15 03:45:00.0 PST-8**
Begin Location	**4NW CLIFFDELL**
Begin Lat/Lon	**46.97/-121.11**
End Date	**2011-05-23 12:15:00.0 PST-8**
End Location	**4NW TIETON**
End Lat/Lon	**46.73/-120.82**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**An upper level low pressure system moved over the Pacific Northwest. Moist and unstable conditions ahead of the low triggered widespread thunderstorms with heavy rainfall and isolated large hail. This combined with the abundant spring snow-pack and wet ground to cause flooding. A 75 yard wide mudslide closed Highway**

	410 at milepost 87. As the upper low brought colder air. late season heavy snow ended the episode in the Blue Mountains. Snowfall amounts in inches included Touchet Snotel (7).
Event Narrative	**Flooding closed sections of Highway 410 and other roads along the Naches River from Cliffdell to Yakima. High water and large debris damaged bridges. The Naches River crested at 20.4 on May 15th, which was 3.4 feet above flood stage. At Cliffdell, the river crested at 32.2 feet on May 15th, which was 1.3 feet above normal.**

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Landslide/Mudslides

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Manage development in landslide hazard areas	Yakima County Planning Yakima County Building Official/Code Enforcement	M	Ongoing	In-Kind	

Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Part 2 Section 9 Landslide 2015 Planning Updates

Yakima County Planning Division uses policies and ordinances to mitigate for Landslides and other geologic hazards. Yakima County Critical Areas Ordinance (Chapter 16C.08) and Yakima County Shoreline Master Program (Chapter 16D.08) provide guidelines for development in mapped geologically hazardous areas. In addition, Yakima County limits development in landslide susceptible areas through zoning; most geologic hazard areas are in zoning districts that have minimum lot sizes of at least 40 acres, which prevents dense residential development.

16C.08.01 Purpose and Intent.

(1) Geologically hazardous areas include those areas susceptible to erosion, sliding, earthquake or other geological events. They pose a threat to the health and safety of the citizens of Yakima County when incompatible development is sited in areas of significant hazard. Some risks due to geologic hazards might be capable of mitigation through engineering, design, or modified construction standards so the level of risk is reduced to an acceptable level. However, when mitigation is not feasible, development within geologically hazardous areas is best avoided.

(2) The purposes of this chapter are to:

(a) Minimize risks to public health and safety and reduce the risk of property damage by regulating development on or adjacent to geologically hazardous areas;

(b) Maintain natural geological processes while protecting existing and new development;

(c) Establish review procedures for development proposals in geologically hazardous areas.

(Ord. 13-2007 §1 (Exh. A)(16C.08.01), 2007).

16C.08.02 Mapping and Designation.

(1) Geologically hazardous areas are areas that are susceptible to one or more of the following types of hazards, based on WAC 365-190-080(4)(b) through (f):

(a) Erosion hazards;

(b) Landslide hazards, which in the Yakima County inventory includes:

(i) Oversteepened slope hazards;

(ii) Alluvial fan/flash flooding hazards;

(iii) Avalanche hazards; and

(iv) Stream undercutting hazards;

(c) Seismic hazards (referred to below as earthquake hazards);

(d) Volcanic hazards.

(2) The approximate location and extent of erosion hazard areas are shown on the county's critical area map titled "Erosion Hazard Areas of Yakima County." Erosion hazard areas were identified by using the "Soil Survey of Yakima County Area, Washington" and the "Soil Survey of Yakima Indian Reservation Irrigated Area, Washington, Part of Yakima County." The analysis utilized the general soil map unit descriptions of severe and very severe hazard of water erosion.

(3) The approximate location and extent of geologically hazardous areas are shown on the county's critical area map titled "Geologically Hazardous Areas of Yakima County." The following geologically hazardous areas, with the corresponding map code in parentheses, are mapped and classified using the stated criteria based on WAC 365-190-080(4)(b) through (f):

(a) Landslide Hazard Areas (LS). These include places where landslides, debris flows, or slumps have already occurred. Where sliding is presumed to have occurred within ten thousand years or less is shown as High Risk (LS3) on the map. Slides thought to be older than ten thousand years but still capable of movement are shown as Intermediate Risk (LS2). Areas where slides are absent are unlabeled and combined with other Low Risk areas.

(i) Oversteepened Slope Hazard Areas (OS). These include areas with slopes steep enough to create potential problems. High Risk areas (OS3) have a high potential to fail, and include slopes greater than forty percent, and consist of areas of rock fall, creep, and places underlain with unstable materials. Intermediate Risk areas (OS2) are less likely to fail but are still potentially hazardous. This category also includes some slopes between fifteen and forty percent. Low Risk areas, unlikely to fail, are unlabeled and combined with other Low Risk categories.

(ii) Alluvial Fan/Flash Flooding Hazard Areas (AF). These are areas where flash flooding can occur, and are often associated with inundation by debris from flooding. They include alluvial fans, canyons, gullies, and small streams where catastrophic flooding can occur. They do not include all areas where flash flooding may occur with Yakima County. Flooding may also occur in larger streams and rivers, but these are depicted in the "Flood Insurance Study for the Unincorporated Areas of Yakima County," dated March 2, 1998, with accompanying flood insurance rate

maps (FIRMs) and flood boundary and floodway maps, and any amendments which may thereafter be made by the Federal Emergency Management Agency, rather than on the geologically hazardous areas map. High Risk areas (AF3) are those most likely to experience flooding. These areas usually involve larger drainage areas, easily eroded sediments, and steeper gradients. Intermediate Risk areas (AF2) have some potential for flash flooding but involve smaller drainages and flatter slopes. Low Risk areas where flash flooding is unlikely are unlabeled and combined with other Low Risk areas on the map.

(iii) Avalanche Risk Hazard Areas (AR). Areas of avalanche hazards are limited (within the mapped boundaries) to areas near the Cascade Crest. High Risk areas (AF3) are those in areas of high snowfall where avalanche scars are visible and slopes are steep to moderately steep. These areas could also be rated OS3. Intermediate Risk areas (AF2) are usually adjacent to AF3 areas but where vegetation is still in place and slopes are moderate. AF2 and AF3 areas are mapped on the basis of aerial photography and observed scars. Climatic data (snowfall, wind direction, etc.) are necessary for more detailed mapping. Low Risk areas, where avalanches are unlikely, are unlabeled and combined with other Low Risk geologic hazards.

(iv) Stream Undercutting Hazard Areas (SU). These areas are confined to banks near main streams and rivers where undercutting of soft materials may result. High Risk areas (SU3) include steep banks of soft material adjacent to present stream courses. Intermediate Risk areas (SU2) are banks along the edge of a floodplain but away from the present river course. Low Risk areas are unlabeled and combined with other Low Risk areas on the maps.

(b) Earthquake Activity Hazard Areas (EA). Recorded earthquake activity in Yakima County is mostly marked by low magnitude events and thus low seismic risk. One exception is an area along Toppenish Ridge where Holocene faulting may have produced earthquakes of as much as magnitude 7. Zones of surficial fault scarps are shown on High Risk areas (EA3) while areas adjacent to the scarps are assigned Intermediate Risk (EA2). The rest of the county is Low Risk, unlabeled, and combined with other low risk hazards.

(c) Suspected Geologic Hazard Areas (SUS). These are areas for which detailed geologic mapping is lacking but preliminary data indicate a potential hazard. No risk assessment (1-2-3) is given for these areas. Most are probably OS or LS hazards.

(d) Risk Unknown Hazard Areas (UNK). In these areas geologic mapping is lacking or is insufficient to make a determination. All of these areas are associated with other classified geologic hazards, and most are located in remote areas of Yakima County.

(4) Volcanic hazard areas are not mapped but are defined as areas subject to pyroclastic (formed by volcanic explosion) flows, lava flows and inundation by debris flows, mudflows or related flooding

resulting from volcanic activity. Volcanic hazard areas in Yakima County are limited to pyroclastic (ash) deposits. While Yakima County contains a portion of Mt. Adams and is in close proximity to Mt. Rainier and Mt. St. Helens, the threat of volcanic hazards is minimal and limited to ash deposition. The more devastating effects of volcanic activity such as lava flows, and lahars (volcanic landslide or mudflow) are not possible due to intervening ridges. No specific protection requirements are identified for volcanic hazard areas.

(5) This chapter does not imply that land outside mapped geologically hazardous areas or uses permitted within such areas will be without risk. This chapter shall not create liability on the part of Yakima County, any officer, or employee thereof for any damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

Plan 2015 Comprehensive Plan Goals and Policies

As of this writing in 2014, Yakima County was awaiting adoption of a new Subdivision and Zoning ordinance, which will continue to provide landslide mitigation though zoning. Yakima County Comprehensive Plan update (Horizon 2040) will be completed by 2017. This update is expected to highlight geologic hazard mitigation goals and policies, which include:

CRITICAL AREAS PURPOSE STATEMENT 8

Critical Areas are an important part of the natural setting in Yakima County. Their protection is required by the Growth Management Act and important to the quality of life of the residents of this county. Critical Areas include groundwater, fish and wildlife habitat (which includes surface waters), wetlands, frequently flooded areas, and geologic hazards. The protection of critical areas must include certain general approaches, which are provided for in the goals and policies below.

Goal NS 8: Establish critical areas protection measures to protect environmentally sensitive areas, and protect people and property from hazards.

Critical Areas: General

POLICIES

NS 8.1 Use the best available science in a reasonable manner to develop regulations to protect the functions and values of critical areas.

NS 8.2 Ensure proposed subdivisions, other development, and associated infrastructure are designed at a density, level of site coverage, and occupancy to preserve the structure, values and functions of the natural environment or to safeguard the public from hazards to health and safety.

NS 8.3 Use a preference-based system of mitigation sequencing for the County's stream, lake, pond, wetland, floodplain and fish and wildlife habitat critical areas that reduces impacts using approaches ranging from avoidance to replacement.

NS 8.4 In order to encourage Critical Area protection and restoration, the density and lot size limits stipulated in other policies may be adjusted or exceeded to accomplish clustering and bonus provisions adopted under the (Critical Areas Ordinance) CAO. The use of incentive based programs is encouraged

Critical Areas: Geologic Hazards

PURPOSE STATEMENT NS 19

Geologic hazards pose a threat to the health and safety of County citizens when incompatible commercial, residential, or industrial development and associated infrastructure is sited in areas of significant hazard. The following goal and policies address the risk associated with these areas by encouraging engineering designs or modified construction practices that will mitigate problems, and prohibiting building where problems cannot be mitigated.

GOAL NS19: Protect the public from personal injury, loss of life or property damage from geologic hazards.

POLICIES:

NS 19.1: Ensure that land use practices in geologically hazardous areas do not cause or exacerbate natural processes which endanger lives, property, or resources.

NS 19.2 Locate development within the most environmentally suitable and naturally stable portions of the site.

NS 19.3 Classify and designate areas on which development should be prohibited, conditioned, or otherwise controlled because of danger from geological hazards.

NS 19.4 Prevent the subdividing of known or suspected landslide hazard areas, side slopes of stream ravines, or slopes 40 percent or greater for development purposes.

REMOTE RURAL/EXTREMELY LIMITED DEVELOPMENT POTENTIAL AREAS

PURPOSE STATEMENT LU-R 11

Certain areas of the County are remote and/or extremely limited in their development potential. This land use category has generally been applied to Cascade Mountain foothills, ridges and uplands, including the Rattlesnake Hills, Yakima Ridge, unforested portions of Cowiche and Cleman Mountains, the upper Wenas Valley and floodways on the valley floor along the Naches and Yakima Rivers. The cost of extending or maintaining roads and services to these areas is often prohibitive given inaccessibility and challenging geographical features many of these areas possess, such as: natural hazard potential (excessive or unstable slopes, soil constraints, topographic or flooding characteristics, and wildfire potential); or remote location (outside of expected rural fire service area, lack of all-weather access, depth to groundwater). These areas may also include public values covered by Statute (e.g., protection of shorelines, or critical areas features such as sensitive fish and wildlife habitats). These areas are typically not well suited for commercial timber production, and agricultural uses are generally limited to grazing or other dryland farming, although soils and the land may become productive where irrigation water is available.

GOAL LU-R 11: Recognize and maintain Remote Rural/Extremely Limited Development Potential areas, and allow development at a level consistent with environ-mental constraints and service availability in remote areas and other places with extremely limited development potential.

POLICIES:

LU-R 11.1 Minimum parcel size for new development within the Remote Rural /Extremely Limited Development Potential category should be one quarter quarter section (i.e., approximately 40 acres less rights of way).

LU-R 11.2 Require notice of service limitations to future purchasers of lands which are located within the Remote Rural/Extremely Limited Development Potential area through a declarative coven-ant to be recorded as an addendum to any instrument of sale, lease or transfer of ownership of properties in this area. This covenant must also be recorded as an addendum to all land divisions.

LU-R 11.3 Yakima County should not extend County roads into those lands which fall under the Remote Rural/Extremely Limited Development Potential category.
LU-R 11.4 New development within the Re-mote Rural/Extremely Limited Development Potential category should be served by individual wells and septic systems.

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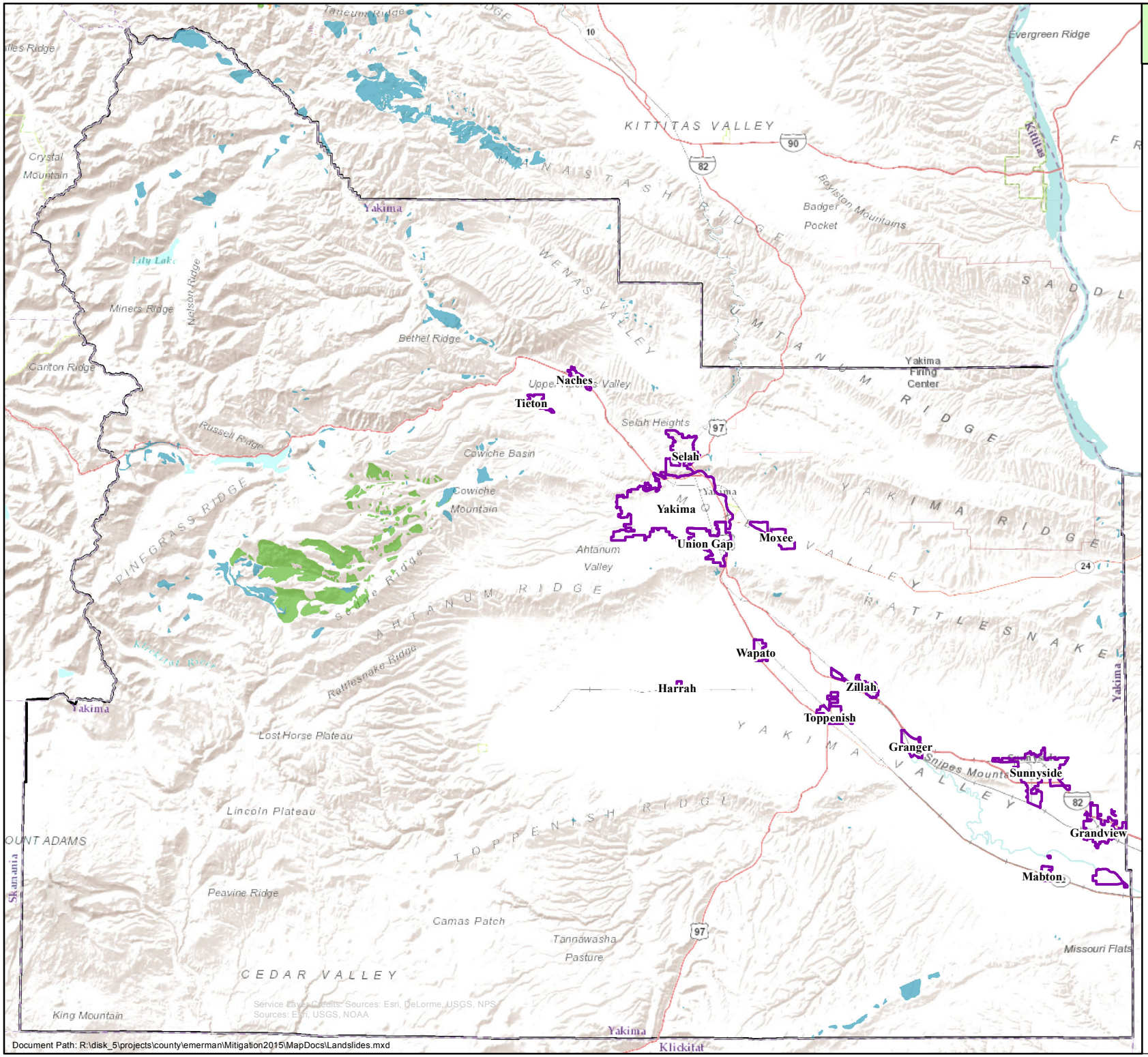

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Potential Landslide Areas

- City Limits

Landslides

- Debris flow
- Debris slide and avalanches
- Deep-seated
- Shallow undifferentiated
- Unknown

Washington State Department of Natural Resources
Division of Geology and Earth Resources
Landslides of Washington State at 1:24,000 Scale
June 2010
Downloaded from website on: Sept 22, 2014

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 18, 2014

Part Two—Hazard-Specific Information
Tab-10

Lightning

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LIGHTNING

Definition

A discharge of electrical energy that results from the buildup of positive and negative charges in a thunderstorm, which creates a "bolt" when the buildup of charges becomes strong enough.

Hazard

Lightning can strike communications equipment (e.g., radio or cell towers, antennae, satellite dishes, etc.) and hamper communication and emergency response. Lightning strikes can also cause significant damage to buildings, critical facilities, and infrastructure, largely by igniting a fire. Lightning can also ignite a wildfire.

Lightning Storm Events Database

Search Results for Yakima County, Washington

3 events were reported between 12/01/2000 and 12/31/2014 (5144 days)

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	3
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	1
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Column Definitions:

'Mag': Magnitude, 'Dth': Deaths, 'Inj': Injuries, 'PrD': Property Damage, 'CrD': Crop Damage

Event Details

Event	**Lightning**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**NEWSPAPER**
NCDC Data Source	**PDS**
Begin Date	**2001-05-27 09:10:00.0 PST**
End Date	**2001-05-27 09:10:00.0 PST**
End Location	**MABTON**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Event Narrative	**Lightning sparked a wildfire near State Highway 22 just south of Mabton that burned around 300 acres. 30 firefighters from surrounding fire districts contained this fire after 6 hours.**

Event Details

Event	**Lightning**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**UTILITY COMPANY**
NCDC Data Source	**PDS**
Begin Date	**2002-06-10 15:00:00.0 PST**
End Date	**2002-06-10 19:00:00.0 PST**
End Location	**YAKIMA**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	
Crop Damage	
Event Narrative	**Lightning knocked out power to 4,000 customers in Yakima. The storms produced hail and flooding on some intersections.**

Event Details

Event	**Lightning**
State	**WASHINGTON**
County/Area	**YAKIMA**
WFO	**PDT**
Report Source	**NEWSPAPER**
NCDC Data Source	**PDS**
Begin Date	**2006-05-18 15:30:00.0 PST**
Begin Location	**2W YAKIMA**
End Date	**2006-05-18 16:30:00.0 PST**
End Location	**2W YAKIMA**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**35K**
Crop Damage	
Event Narrative	**Lightning struck a weather vane on top of a barn and sparked a fire that destroyed the barn roof.**

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated
Lightning					
Action Items	***Lead Responsibility**	****Priority**	****Timeline**	****Funding**	****Estimated Cost**
Conduct outreach activities to increase awareness of tornado risk.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	

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Part Two—Hazard-Specific Information
Tab-11

Severe Wind Storms

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SEVERE WIND STORMS

Hazard

An atmospheric disturbance manifested in strong winds.

All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, heavy snow, large hail, thunderstorms, lightning, tornados, rain, snow or other mixed precipitation. These phenomena are defined by the National Weather Service:

High Winds
Sustained wind speeds of 40 mph or greater lasting 1 hour or longer, or winds of 58 mph or greater for any duration, not caused by thunderstorms

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Yakima County Recent Severe Wind Storm Events: 2010-2014
NOAA National Climatic Data Center
Storm Events Database
Begin Date: 2010
End Date: 2014

Event Details

Event	**High Wind**
Magnitude	**52 kts.**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**Amateur Radio**
NCDC Data Source	**CSV**
Begin Date	**2010-05-03 09:00:00.0 PST-8**
End Date	**2010-05-03 16:00:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**50.00K**
Crop Damage	
Episode Narrative	**A tight pressure gradient combined with a cold frontal passage to produce widespread high winds and damage. Blowing dust reduced visibility to near zero in portions of the Yakima Valley and Lower Columbia Basin and forced road closures. Peak wind gusts in mph included 15 miles west of Basin City (77), 8 miles northwest of Richland (59), 1 mile northwest of Richland (58), Benton City (58), 5 miles south of Eltopia (58), 1 miles north northeast of College Place (58), 8 miles northwest of West Richland (74), and High Bridge RAWS (59). Sustained winds at least 40 mph were reported 8 miles north of Dayton and 2 miles west northwest of College Place. Downed trees, branches, power lines and property damage were reported at West Richland, 7 miles southeast of White Swan, 5 miles north northwest of Grandview, Benton City, Dayton, 1 mile north northeast of College Place, Prosser, 8 miles southeast of Dayton, Walla Walla, 1 mile northeast of Sunnyside, and Bickleton.**

Event Details

Event	**Dust Storm**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**County Official**
NCDC Data Source	**CSV**
Begin Date	**2010-05-03 08:00:00.0 PST-8**
End Date	**2010-05-03 18:00:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**A tight pressure gradient combined with a cold frontal passage to produce widespread high winds and damage. Blowing dust reduced visibility to near zero in portions of the Yakima Valley and Lower Columbia Basin and forced road closures. Peak wind gusts in mph included 15 miles west of Basin City (77), 8 miles northwest of Richland (59), 1 mile northwest of Richland (58), Benton City (58), 5 miles south of Eltopia (58), 1 miles north northeast of College Place (58), 8 miles northwest of West Richland (74), and High Bridge RAWS (59). Sustained winds at least 40 mph were reported 8 miles north of Dayton and 2 miles west northwest of College Place. Downed trees, branches, power lines and property damage were reported at West Richland, 7 miles southeast of White Swan, 5 miles north northwest of Grandview, Benton City, Dayton, 1 mile north northeast of College Place, Prosser, 8 miles southeast of Dayton, Walla Walla, 1 mile northeast of Sunnyside, and Bickleton.**

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Severe Wind Storm

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	M	Ongoing	In-Kind	
Adopt and Enforce Building Codes Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	M	Ongoing	In-Kind	

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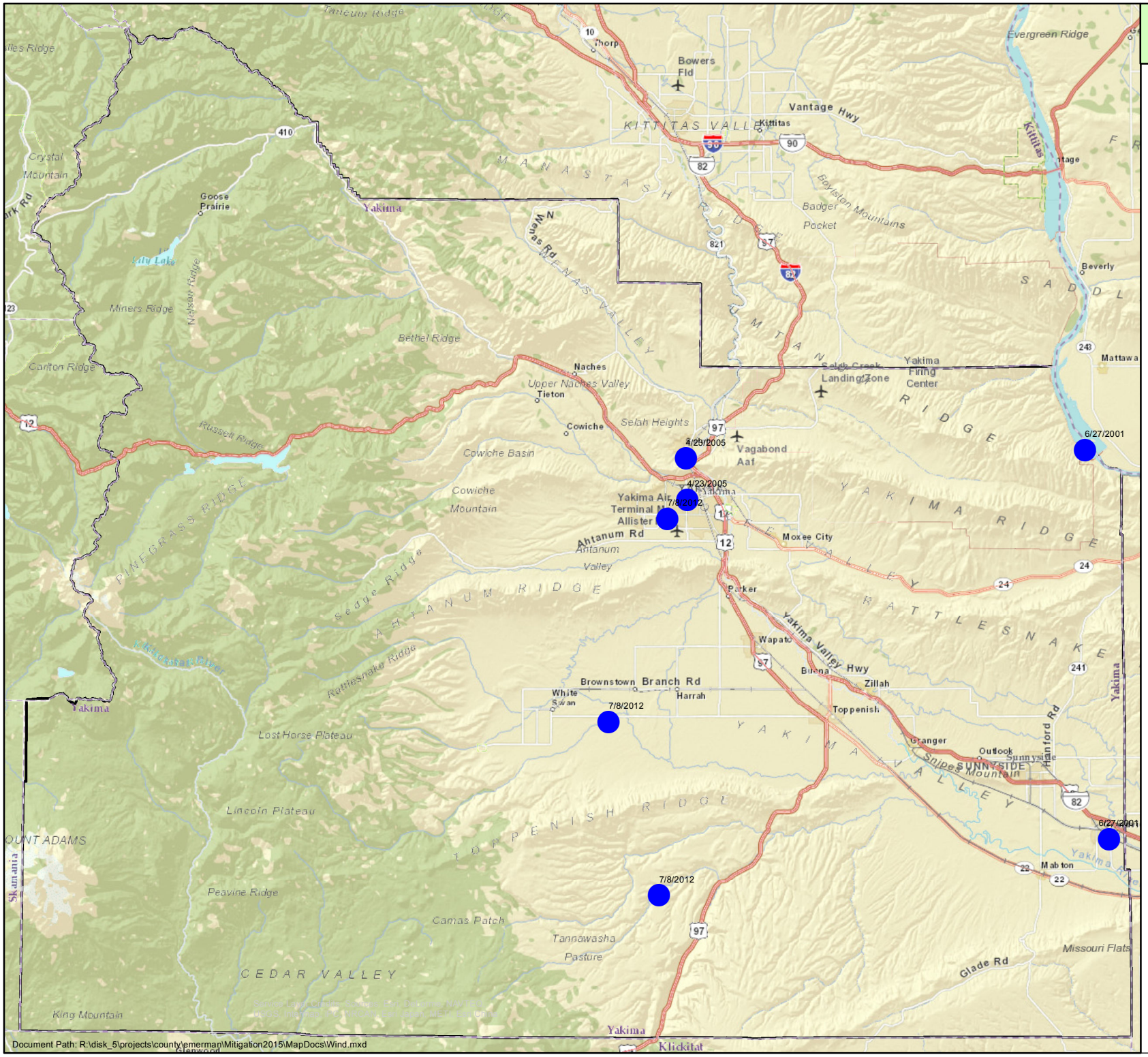

Document Path: R:\disk_5\projects\county\emerman\Mitigation2015\MapDocs\Wind.mxd

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Wind Events Reported 2000 to 2013

Wind Events

NOAA - Severe Weather Database 2013.

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 18, 2014

Part Two—Hazard-Specific Information
Tab-12

Severe Winter Storms

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Severe Winter Storms

Hazard

All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, heavy snow, large hail, thunderstorms, lightning, tornados, rain, snow or other mixed precipitation. These phenomena are defined by the National Weather Service:

Winter Storm

A storm with a significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation. Heavy snowfall is 4 inches or more in a 12-hour period, or 6 or more inches in a 24-hour period in non-mountainous areas; and 12 inches or more in a 12-hour period or 18 inches or more in a 24-hour period in mountainous areas.

Heavy Snow

This generally means: a snowfall accumulating to 4” or more in depth in 12 hours or less or a snowfall accumulating to 6” or more in depth in 24 hours or less.

Yakima County Recent Severe Winter Storm Events: 2010-2014
NOAA National Climatic Data Center
Storm Events Database
Begin Date: 2010
End Date: 2014

Event Details

Event	**Winter Storm**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**COOP Observer**
NCDC Data Source	**CSV**
Begin Date	**2012-01-19 06:00:00.0 PST-8**
End Date	**2012-01-19 17:00:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Modified arctic air moved into the region followed by a series of moderate to strong upper level storm systems riding on a moist subtropical jet stream. The result was widespread heavy snow and local high winds. Freezing rain and sleet accumulated to between 1/4 and 1/2 inch over the lower elevations. On January 17 and 18, snowfall amounts reported in inches included Waitsburg (6), 5 miles north northwest of Wiley City (6), 18 miles west northwest of West Richland (5), 8 miles west northwest of Connell (4), 2 miles west of Yakima (5), Toppenish (6), 1 mile southwest of Yakima (5), 5 miles north northwest of Centerville (15), 9 miles northwest of Roslyn (23), 3 miles north northeast of Ellensburg (4), Yakima (4), 7 miles northeast of Goldendale (14.5), 4 miles east northeast of White Salmon (18), 1 mile south southwest of Yakima (4), Cle Elum (7), Dayton (7.5), Ski Bluewood (18), Goldendale (12), 1 mile west northwest of White Salmon (17), Glenwood (10), 1 mile east of Walla Walla (5), 5 miles north of White Salmon (10.2), Mount Adams Ranger Station (17), Snowden (18), Easton (14), Tampico (11), 2 miles east south of West**

	Valley (5.5), 4 miles east northeast of Yakima (4), Waitsburg (7), Richland (6), 15 miles northeast of Pasco (7.5), 10 miles east of Goldendale (13), 1 mile west of Toppenish (5), Kennewick (7.8), 3 miles northeast of College Place (4), West Richland (7), 5 miles south of Sunnyside (5), 20 miles west of Prescott (7), Selah (5), White Salmon (16), 6 miles east of White Swan (5.5), West Valley (7), Sunnyside 4.5), 10 miles north of Pasco (4), 1 mile southwest of Ellensburg (4), and 2 miles northeast of Husum (10.2). **On January 19-20, another surge of subtropical Pacific moisture moved over the cold air with a widespread mixture of precipitation. The lower elevations received freezing rain mixed at times with sleet and snow. The higher elevations received heavy snowfall. The storm caused numerous vehicle accidents with injuries, downed tree branches, power outages, and closed roads and schools.** **Ice accumulation reported in inches included Kennewick (.5), 1 mile west of Patterson (.25), Dayton (.5), Walla Walla (.5), 3 miles northeast of Dallesport (.38), 1 mile west northwest of White Salmon (.25).** **Snowfall amounts reported in inches included 8 miles southeast of Cliffdell (13), 5 miles west southwest of Yakima (4.5), Yakima (4), Connell (4.5), 2 miles northwest of Ellensburg (5.8), Sunnyside (4.1), Glenwood (8), and 7 miles west of Fruitvale (7).**
Event Narrative	

Event Details

Event	**Winter Storm**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**Trained Spotter**
NCDC Data Source	**CSV**
Begin Date	**2012-12-16 22:00:00.0 PST-8**
End Date	**2012-12-17 00:00:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**A strong weather system moved across the interior Pacific Northwest, producing heavy snow along the Cascade East Slopes and adjacent valleys. Areas that reported heavy snow measured in inches: Trout Lake (9), West Valley (8.5), SE of Cliffdell (9), 5 miles WSW of Yakima (6.2), 4 SSW Kittitas (5), 1 SW Ellensburg (5.5), Ellensburg (4.5), 3 NW Selah (7.5), 6 W Fruitvale (8.5), and 2 WSW Ellensburg (6).**
Event Narrative	

Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Severe Winter Storm

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Adopt and Enforce Building Codes Yakima County will adopt the IBC 2015.	Yakima County Building Official/Code Enforcement	M	Ongoing	In-Kind	
County-wide planning and preparedness activities, response actions, post disaster actions, recovery activities.	Yakima Valley Office of Emergency Management	M	Ongoing	In-Kind	

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Part Two—Hazard-Specific Information
Tab-13

Tornadoes

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TORNADOES

Definition

A violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm.

Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings and particularly manufactured homes. Tornadoes are more likely to occur during the months of March through May and tend to form in the late afternoon and early evening.

Hazard

All areas of Washington State are vulnerable to severe weather. Typically, a severe storm can cause major impacts to transportation, infrastructure and services, and loss of utilities. Most storms move into Washington from the Pacific Ocean. A severe storm is defined as an atmospheric disturbance that results in one or more of the following phenomena: high winds, heavy snow, large hail, thunderstorms, lightning, tornados, rain, snow or other mixed precipitation. These phenomena are defined by the National Weather Service:

- Severe Thunderstorm--A thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or hail at least 1 inch in diameter. A thunderstorm with wind equal to or greater than 40 mph (35 knots) and/or hail at least ½ inches in diameter is defined as approaching severe.
- Tornado – A violently rotating column of air, usually pendant to a cumulonimbus (type of cloud), with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud rotating noise. On a local scale, it is the most destructive of all atmospheric phenomena.

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Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020

Priority: H (High); M (Medium); L (Low	Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Funding Source: Local; State; FEMA; Private; Other	Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Tornado

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Conduct outreach activities to increase awareness of tornado risk.	Yakima Valley Office of Emergency Management	L	Ongoing	In-Kind	

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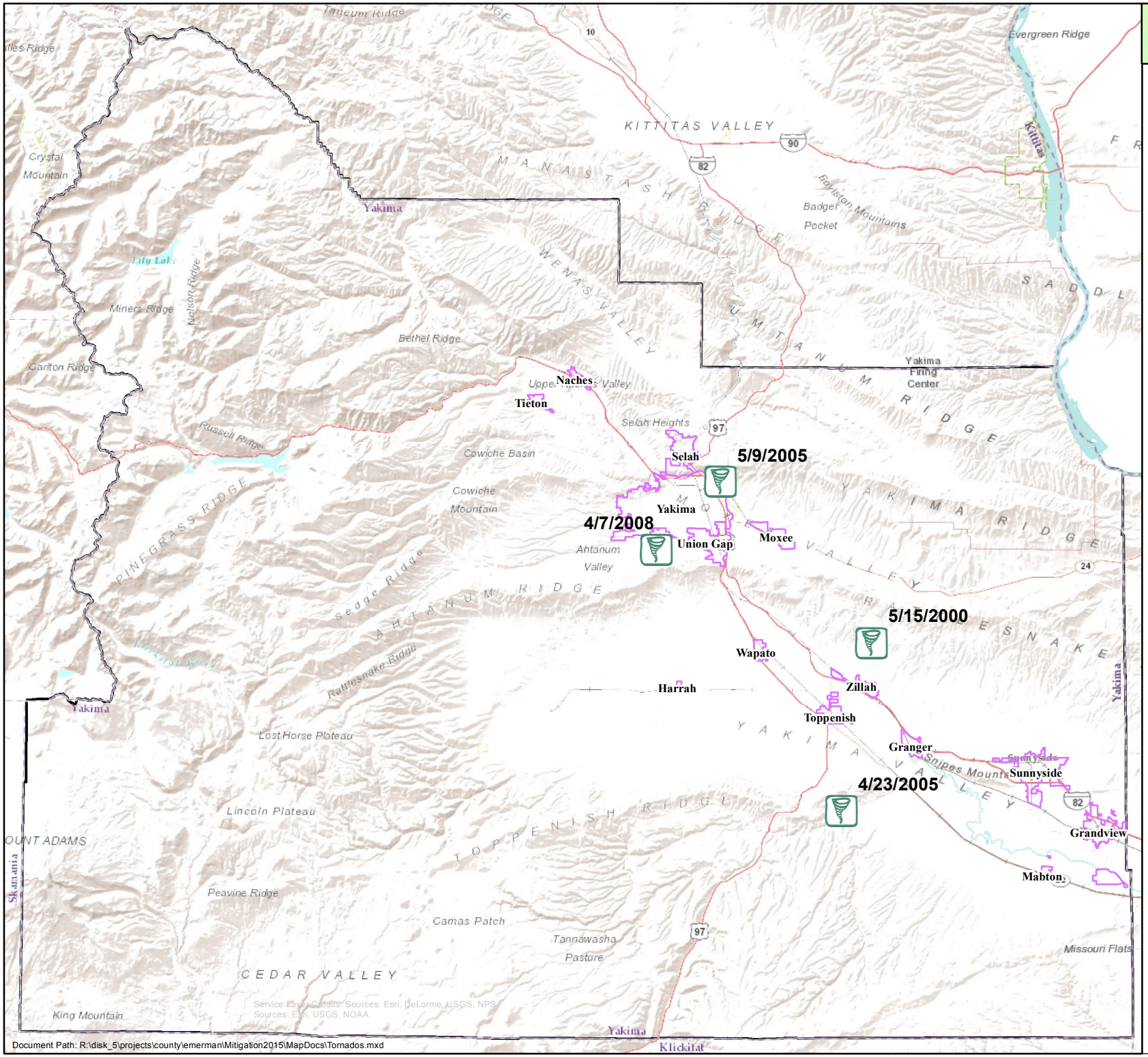

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Tornados Reported 2000 to 2013

Tornado
City Limits

NOAA - Severe Weather Database 2013.

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 18, 2014

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Tab-14

Volcanic Eruption

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VOLCANIC ERUPTION

Definition

A volcano is a vent in the earth's crust through which magma (molten rock), rock fragments, gases, and ashes are ejected from the earth's interior. A volcanic mountain is created over time by the accumulation of these erupted products on the on the earth's surface.

History

On May 18, 1980 at 8:32 a.m., Mount St. Helens erupted killing 57 people. After a 5.1 magnitude earthquake, the volcano's summit slid away in a huge landslide, the largest in earth's recorded history. The landslide depressurized the volcano's magma system, triggering a powerful explosion that ripped through the sliding debris. Rock, ash, volcanic gas, and steam were blasted upwards and outward to the north.

The lateral blast produced a column of ash and gas that rose more than 15 miles into the atmosphere in 15 minutes. From a second eruption, magma erupted explosively from the newly created crater. Then avalanches of hot ash, pumice, gas, and pyroclastic flows poured out of the crater and spread five miles to the north. Over the course of the day, prevailing winds blew 520 million tons of ash eastward across the United States and caused complete darkness in the City of Yakima.

Hazard Identification and Vulnerability Assessment

Scientists define a volcano as active if it has erupted in historic time or is seismically or geothermally active. By this definition Mount Rainier, Mount Baker, and Mount St. Helens are active volcanoes. Mount Adams is also capable of renewed activity.

Volcanoes commonly repeat their past behavior. It is likely that the types, frequencies, and magnitudes of past activity will be repeated in the future. Volcanoes usually exhibit warning signs that can be detected by instruments or observations before erupting. However, explosions caused by heated material coming into contact with ground water can happen without warning. In the future Washington State can expect volcanoes avalanches, lahars (mudflows), lava flows, pyroclastic flows, and tephra falls, and collapse of a sector of a volcano within the Cascade Range. Valleys are vulnerable to lahars, volcanic debris flows, and sedimentation, which can destroy lakes, streams, and structures. Areas downwind of a volcano eruption are vulnerable to reduced visibility, ash fall, and caustic gases. Some of the after effects of a volcanic eruption are:

- ✓ Avalanches of glacial ice, snow, rock, and debris from volcanic mountains cause damage down slope and in valleys. Avalanches can occur without warning, travel rapidly, and carry large amounts of material.
- ✓ Lahars or volcanic mudflow originate from volcanic landslides or from the eruption of melted water. Lahars move faster on the steep slopes nearest their source, and attain speeds of 15 to 60 miles per hour. The highest speed measured on the slopes of Mount St.

Helens was 90 miles per hour. Lahars attain depths of hundreds of feet in the canyons near their origin and spread out over valleys downstream. A large volume lahar may overtop or destroy a dam by suddenly displacing water or creating huge waves.

- ✓ Magma or molten rock or lava originates from the main cone or cinder cone of a mountain. Cascade Range volcanic magma flows have been short and slow moving. The heat of the magma may start forest or grass fires. Flows bury roads and escape routes. Magma flows bury roads and escape routes.
- ✓ Pyroclastic flows are hot avalanches of lava fragments and gas formed by the collapse of thick lava flows and eruption columns.
- ✓ Tephra falls are from explosive eruptions that blast fragments of rock and ash into the air. Large fragments fall to the ground close to the volcano. Small fragments and ash can travel thousands of miles downwind.
- ✓ Steam and gas explosions containing pulverized lava and rock fragments bombard areas as far away as 10 miles. Steam explosions occur any time that hot material comes into contact with water, glacial ice, or snow. No eruptive activity is necessary for this to occur.
- ✓ Clouds of carbon dioxide and toxic gases kill vegetation and animals with chemical poisons, internal or external burns, and asphyxiation.
- ✓ Ash falls are harsh, acidic, gritty, smelly, and causes lung damage to the young, old, or people suffering from respiratory problems. When atmospheric sulfur dioxide combines with water it forms diluted sulfuric acid that causes burns to skin, eyes, mucous membranes, nose, and throat. Acid rains affect water supplies, strip and burn foliage, strip paint, corrode machinery, and dissolve fabric. Heavy ash falls blots out light. Heavy demand for electric light and air conditioning cause a drain on power supplies. Ash clogs waterways and machinery. It causes electrical short circuits, drifts into roadways, railways, and runways. Very fine ash is harmful to mechanical and electronic equipment. The weight of ash causes structural collapse, particularly when it becomes water saturated. Because it is carried by winds it continues as a hazard to machinery and transportation systems for months after the eruption.
- ✓ Volcanic earthquakes occur within a volcano. Earthquakes from local tectonic sources or shallow faults in the earth's crust can also shake a volcano. Examples of such earthquakes include the "St. Helens seismic zone" and "West Rainier zone." All Washington State volcanoes are situated close shallow crustal fault zones.

Conclusion

The local jurisdictions have joined to develop volcanic hazard plans that address issues of emergency response and strategies for expanded public awareness and mitigations.

Volcanic hazard assessments are published by the U.S. Geological Survey for Mount Rainier, Mount Baker, Mount St. Helens, Mount Adams, and Glacier Peak. As part of their comprehensive planning process, Yakima County jurisdictions are encouraged to consider ashfall mitigation

Resources

Washington State Emergency Management Division
Washington Department of Natural Resources, Geology and Earth Resources Division
University of Washington, Geophysics Program
United States Department of Agriculture
United States Forest Service

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Yakima County Unincorporated Hazard-Specific Action Items.

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020			
Priority: H (High); M (Medium); L (Low	**Timeline:** Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	**Funding Source:** Local; State; FEMA; Private; Other	**Estimated Cost:** Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Volcanic Eruption

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Conduct outreach activities to increase awareness of tornado risk.	Yakima Valley Office of Emergency Management	H	Ongoing	In-Kind	

Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Part 2 Section 14 Volcanic Eruption 2015 Planning Updates

Yakima County Planning Division uses policies and ordinances to mitigate for Volcanic Eruptions and other geologic hazards. Yakima County Critical Areas Ordinance (Chapter 16C.08) and Yakima County Shoreline Master Program (Chapter 16D.08) provide guidelines for development in mapped geologically hazardous areas.

16C.08.01 Purpose and Intent.

(1) Geologically hazardous areas include those areas susceptible to erosion, sliding, earthquake or other geological events. They pose a threat to the health and safety of the citizens of Yakima County when incompatible development is sited in areas of significant hazard. Some risks due to geologic hazards might be capable of mitigation through engineering, design, or modified construction standards so the level of risk is reduced to an acceptable level. However, when mitigation is not feasible, development within geologically hazardous areas is best avoided.

(2) The purposes of this chapter are to:

(a) Minimize risks to public health and safety and reduce the risk of property damage by regulating development on or adjacent to geologically hazardous areas;

(b) Maintain natural geological processes while protecting existing and new development;

(c) Establish review procedures for development proposals in geologically hazardous areas.

(Ord. 13-2007 §1 (Exh. A)(16C.08.01), 2007).

16C.08.02 Mapping and Designation.

(1) Geologically hazardous areas are areas that are susceptible to one or more of the following types of hazards, based on WAC 365-190-080(4)(b) through (f):

(a) Erosion hazards;

(b) Landslide hazards, which in the Yakima County inventory includes:

(i) Oversteepened slope hazards;

(ii) Alluvial fan/flash flooding hazards;

(iii) Avalanche hazards; and

(iv) Stream undercutting hazards;

(c) Seismic hazards (referred to below as earthquake hazards);

(d) Volcanic hazards.

(2) The approximate location and extent of erosion hazard areas are shown on the county's critical area map titled "Erosion Hazard Areas of Yakima County." Erosion hazard areas were identified by using the "Soil Survey of Yakima County Area, Washington" and the "Soil Survey of Yakima Indian Reservation Irrigated Area, Washington, Part of Yakima County." The analysis utilized the general soil map unit descriptions of severe and very severe hazard of water erosion.

(3) The approximate location and extent of geologically hazardous areas are shown on the county's critical area map titled "Geologically Hazardous Areas of Yakima County." The following geologically hazardous areas, with the corresponding map code in parentheses, are mapped and classified using the stated criteria based on WAC 365-190-080(4)(b) through (f):

(a) Landslide Hazard Areas (LS). These include places where landslides, debris flows, or slumps have already occurred. Where sliding is presumed to have occurred within ten thousand years or less is shown as High Risk (LS3) on the map. Slides thought to be older than ten thousand years but still capable of movement are shown as Intermediate Risk (LS2). Areas where slides are absent are unlabeled and combined with other Low Risk areas.

(i) Oversteepened Slope Hazard Areas (OS). These include areas with slopes steep enough to create potential problems. High Risk areas (OS3) have a high potential to fail, and include slopes greater than forty percent, and consist of areas of rock fall, creep, and places underlain with unstable materials. Intermediate Risk areas (OS2) are less likely to fail but are still potentially hazardous. This category also includes some slopes between fifteen and forty percent. Low Risk areas, unlikely to fail, are unlabeled and combined with other Low Risk categories.

(ii) Alluvial Fan/Flash Flooding Hazard Areas (AF). These are areas where flash flooding can occur, and are often associated with inundation by debris from flooding. They include alluvial fans, canyons, gullies, and small streams where catastrophic flooding can occur. They do not include all areas where flash flooding may occur with Yakima County. Flooding may also occur in larger streams and rivers, but these are depicted in the "Flood Insurance Study for the Unincorporated Areas of Yakima County," dated March 2, 1998, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps, and any amendments which

may thereafter be made by the Federal Emergency Management Agency, rather than on the geologically hazardous areas map. High Risk areas (AF3) are those most likely to experience flooding. These areas usually involve larger drainage areas, easily eroded sediments, and steeper gradients. Intermediate Risk areas (AF2) have some potential for flash flooding but involve smaller drainages and flatter slopes. Low Risk areas where flash flooding is unlikely are unlabeled and combined with other Low Risk areas on the map.

(iii) Avalanche Risk Hazard Areas (AR). Areas of avalanche hazards are limited (within the mapped boundaries) to areas near the Cascade Crest. High Risk areas (AF3) are those in areas of high snowfall where avalanche scars are visible and slopes are steep to moderately steep. These areas could also be rated OS3. Intermediate Risk areas (AF2) are usually adjacent to AF3 areas but where vegetation is still in place and slopes are moderate. AF2 and AF3 areas are mapped on the basis of aerial photography and observed scars. Climatic data (snowfall, wind direction, etc.) are necessary for more detailed mapping. Low Risk areas, where avalanches are unlikely, are unlabeled and combined with other Low Risk geologic hazards.

(iv) Stream Undercutting Hazard Areas (SU). These areas are confined to banks near main streams and rivers where undercutting of soft materials may result. High Risk areas (SU3) include steep banks of soft material adjacent to present stream courses. Intermediate Risk areas (SU2) are banks along the edge of a floodplain but away from the present river course. Low Risk areas are unlabeled and combined with other Low Risk areas on the maps.

(b) Earthquake Activity Hazard Areas (EA). Recorded earthquake activity in Yakima County is mostly marked by low magnitude events and thus low seismic risk. One exception is an area along Toppenish Ridge where Holocene faulting may have produced earthquakes of as much as magnitude 7. Zones of surficial fault scarps are shown on High Risk areas (EA3) while areas adjacent to the scarps are assigned Intermediate Risk (EA2). The rest of the county is Low Risk, unlabeled, and combined with other low risk hazards.

(c) Suspected Geologic Hazard Areas (SUS). These are areas for which detailed geologic mapping is lacking but preliminary data indicate a potential hazard. No risk assessment (1-2-3) is given for these areas. Most are probably OS or LS hazards.

(d) Risk Unknown Hazard Areas (UNK). In these areas geologic mapping is lacking or is insufficient to make a determination. All of these areas are associated with other classified geologic hazards, and most are located in remote areas of Yakima County.

(4) Volcanic hazard areas are not mapped but are defined as areas subject to pyroclastic (formed by volcanic explosion) flows, lava flows and inundation by debris flows, mudflows or related flooding

resulting from volcanic activity. Volcanic hazard areas in Yakima County are limited to pyroclastic (ash) deposits. While Yakima County contains a portion of Mt. Adams and is in close proximity to Mt. Rainier and Mt. St. Helens, the threat of volcanic hazards is minimal and limited to ash deposition. The more devastating effects of volcanic activity such as lava flows, and lahars (volcanic landslide or mudflow) are not possible due to intervening ridges. No specific protection requirements are identified for volcanic hazard areas.

(5) This chapter does not imply that land outside mapped geologically hazardous areas or uses permitted within such areas will be without risk. This chapter shall not create liability on the part of Yakima County, any officer, or employee thereof for any damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

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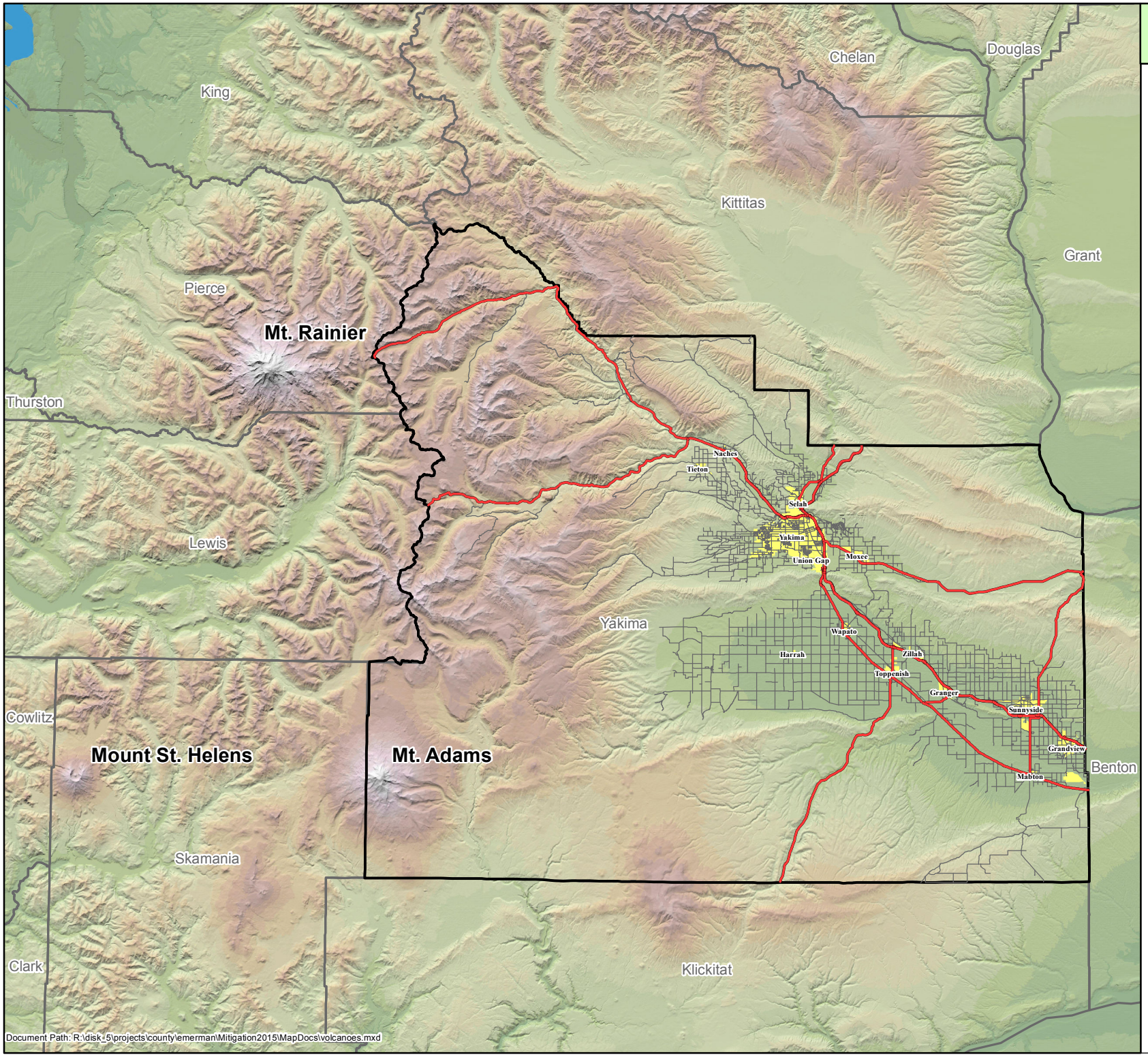

YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Cascade Range Volcanoes

City Limits
Counties
State & Federal Roads
County Roads

Yakima County Hazard Mitigation Plan

Map Inset

0 5 10 20 Miles

1 in = 14.4 miles

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Date: September 26, 2014

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Part Two—Hazard-Specific Information
Tab-15

Wildland Fire

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WILDLAND FIRE

Wildland fires are the uncontrolled destruction of forests, brush, field crops and grasslands caused by nature or humans.

Hazard Identification and Vulnerability Assessment

The fire season runs from mid-May through October. Dry periods can extend the season. The possibility of a wildland fire depends on fuel availability, topography, the time of year, weather, and activities such as debris burning, land clearing, camping, and recreation. In Yakima County, wildland fires start most often in lawns, fields, or open areas, transportation areas, and wooded wildland areas. They are usually extinguished while less than one acre, but can spread to over several thousands of acres and may require hundreds of firefighters several weeks to extinguish. In Yakima County, wildland fire protection is provided by city and fire protection districts.

Wildland fires responded to by city and fire protection districts are largely started by human causes. Included in the list of human causes are cigarettes, fireworks, and outdoor burning. Wildland fires started by heat spark ember or flames caused the largest dollar loss, followed by debris burning and fireworks.

The effects of wildland fires vary with intensity, area, and time of year. Factors affecting the degree of risk include rainfall, type of vegetation, and proximity to firefighting agencies. Short-term loss is the complete destruction of valuable resources, such as timber, wildlife habitat, scenic vistas, and watersheds. Vulnerability to flooding increases due to the destruction of watersheds. Long-term effects are reduced amounts of timber for building and recreational areas. Although crops and orchards are tenth on the list of properties damaged, these had the third highest dollar loss, the highest value, and the greatest potential loss.

Wildland Fire Characteristics

An informed discussion of fire mitigation is not complete until basic concepts that govern fire behavior are understood. In the broadest sense, wildland fire behavior describes how fires burn; the manner in which fuels ignite, how flames develop and how fire spreads across the landscape. The three major physical components that determine fire behavior are the fuels supporting the fire, the topography in which the fire is burning, and the weather and atmospheric conditions during a fire event. At the landscape level, both topography and weather are beyond our control. We are powerless to control winds, temperature, relative humidity, atmospheric instability, slope, aspect, elevation, and landforms. It is beyond our control to alter these conditions, and thus impossible to alter fire behavior through their manipulation. When we attempt to alter how fires burn, we are left with manipulating the third component of the fire environment; fuels which support the fire. By altering fuel loading and fuel continuity across the landscape, we have the best opportunity to control or affect how fires burn.
A brief description of each of the fire environment elements follows in order to illustrate their effect on fire behavior.

- **Weather**

Weather conditions contribute significantly to determining fire behavior. Wind, moisture, temperature, and relative humidity ultimately determine the rates at which fuels dry and vegetation cures, and whether fuel conditions become dry enough to sustain an ignition. Once conditions are capable of sustaining a fire, atmospheric stability and wind speed and direction can have a significant effect on fire behavior. Winds fan fires with oxygen, increasing the rate at which fire spreads across the landscape. Weather is the most unpredictable component governing fire behavior, constantly changing in time and across the landscape.

- **Topography**

Fires burning in similar fuel types, will burn differently under varying topographic conditions. Topography alters heat transfer and localized weather conditions, which in turn influences vegetative growth and resulting fuels. Changes in slope and aspect can have significant influences on how fires burn. Generally speaking, north slopes tend to be cooler, wetter, more productive sites. This can lead to heavy fuel accumulations, with high fuel moistures, later curing of fuels, and lower rates of spread. In contrast, south and west slopes tend to receive more direct sun, and thus have the highest temperatures, lowest soil and fuel moistures, and lightest fuels. The combination of light fuels and dry sites leads to fires that typically display the highest rates of spread. These slopes also tend to be on the windward side of mountains. Thus, these slopes tend to be "available to burn" a greater portion of the year. Slope also plays a significant role in fire spread, by allowing preheating of fuels upslope of the burning fire. As slope increases, rate of spread and flame lengths tend to increase. Therefore, we can expect the fastest rates of spread on steep, warm south and west slopes with fuels that are exposed to the wind.

- **Fuels**

Fuel is any material that can ignite and burn. Fuels describe any organic material, dead or alive, found in the fire environment. Grasses, brush, branches, logs, logging slash, forest floor litter, conifer needles, and buildings are all examples. The physical properties and characteristics of fuels govern how fires burn. Fuel loading, size and shape, moisture content, and continuity and arrangement all have an effect on fire behavior. Generally speaking, the smaller and finer the fuels, the faster the potential rate of fire spread. Small fuels such as grass, needle litter and other fuels less than a quarter inch in diameter are most responsible for fire spread. In fact, "fine" fuels, with high surface to volume ratios, are considered the primary carriers of surface fire. This is apparent to anyone who has ever witnessed the speed at which grass fires burn. As fuel size increases, the rate of spread tends to decrease due to a decrease in the surface to volume ratio. Fires in large fuels generally burn at a slower rate, but release much more energy and burn with much greater intensity. This increased energy release, or intensity, makes these fires more difficult to control. Thus, it is much easier to control a fire burning in grass than to control a fire burning in timber.

When burning under a forest canopy, the increased intensities can lead to torching (single trees becoming completely involved) and potential development of crown fires. That is, they release much more energy. Fuels are found in combinations of types, amounts, sizes, shapes, and arrangements. It is the unique combination of these factors, along with the topography and weather, which determines how fires will burn.

The study of fire behavior recognizes the dramatic and often-unexpected effect small changes in any single component have on how fires burn. It is impossible to speak in specific terms when predicting how a fire will burn under any given set of conditions. However, through countless observations and

repeated research, some of the principles that govern fire behavior have been identified and are recognized.

Historic Fire Regime

Historical variability in fire regime is a conservative indicator of ecosystem sustainability, and thus, understanding the natural role of fire in ecosystems is necessary for proper fire management. Fire is one of the dominant processes in terrestrial systems that constrain vegetation patterns, habitats, and ultimately, species composition. Land managers need to understand historical fire regimes, the fire return interval (frequency) and fire severity prior to settlement by Euro-Americans, to be able to define ecologically appropriate goals and objectives for an area. Moreover, managers need spatially explicit knowledge of how historical fire regimes vary across the landscape.

"Natural" fires in Yakima County would have been disproportionately caused by Native Americans. Aboriginal peoples intentionally set fires throughout the region for the purposes of controlling tree and shrub expansion and for the cultivation of select plants. When we describe "natural" in the Range of Natural Variability we are including indigenous peoples as natural disturbance agents and contributors to perceptions of what is "natural".

A primary goal in ecological restoration is often to return an ecosystem to a previously existing condition that no longer is present at the site, under the assumption that the site's current condition is somehow degraded or less desirable than the previous condition and needs improvement.

Land managers in Yakima County must determine if the past, Native American influenced condition of the County was necessarily healthier, had a higher level of integrity, and was more sustainable than the current condition. In other words, is "restoration" an appropriate course of action? After a prolonged absence, if fire is reintroduced to these ecosystems the result could be damaging. Fuel loads throughout most of the County today are quite high and most of the County is inhabited by people, homes, and infrastructure. The ecosystem was adapted to fire in the past, but is no longer adapted today, especially in light of the human component.

In the absence of intensive Native American burning, a condition has developed where fire could/should not be reintroduced without some significant alteration of the current ecosystem structure. This would also require a significant assessment of social acceptance and financial contribution.

Many ecological assessments are enhanced by the characterization of the historical range of variability which helps managers understand: (1) how the driving ecosystem processes vary from site to site; (2) how these processes affected ecosystems in the past; and (3) how these processes might affect the ecosystems of today and the future. Historical fire regimes are a critical component for characterizing the historical range of variability in fire-adapted ecosystems. Furthermore, understanding ecosystem departures provides the necessary context for managing sustainable ecosystems. Land managers need to understand how ecosystem processes and functions have changed prior to developing strategies to maintain or restore sustainable systems. In addition, the concept of departure is a key factor for assessing risks to ecosystem components. For example, the departure from historical fire regimes may serve as a useful proxy for the potential of severe fire effects from an ecological perspective.

Vegetation Condition Class

A vegetation condition class (VCC) is a classification of the amount of departure from the historic regime. The three classes are based on low (VCC 1), moderate (VCC 2), and high (VCC 3) departure from the central tendency of the natural (historical) regime. The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

An analysis of Vegetation Condition Classes in Yakima County shows that the much of the land in the county that has not been converted to agriculture (16%) is considered moderately (32%) or highly departed (30%) from its historic fire regime and associated vegetation and fuel characteristics. Approximately 18% has a low departure.

A map depicting Vegetation Condition Class as well as a more in-depth explanation of VCC is presented in Appendices 1 and 3 of the *Community Wildfire Protection Plan, 2014.*

Conclusion

Building near wildlands increases loss from fires. Often, structures are built with minimal awareness of the need for fire protection. Wildland fires occur with regularity in Yakima County. There are a number of ways to reduce wildland fires and minimize injury and property loss. Mitigation activities include:

- ✓ Develop ordinances and educate people
- ✓ Develop fire detection programs and emergency communications systems
- ✓ Exercise warning systems and evacuation plans
- ✓ Plan escape routes for personnel living in wildlands
- ✓ Road closures during fires
- ✓ Property owner precautions
- ✓ Maintain appropriate defensible space around homes
- ✓ Provide access routes and turnarounds for emergency equipment
- ✓ Minimize fuel hazards adjacent to homes
- ✓ Use fire-resistant roofing materials
- ✓ Maintain water supplies
- ✓ Ensure that home address is visible to first responders

Resources

Washington State Emergency Management Division
Washington State Patrol, Fire Protection Bureau
Washington State Department of Natural Resources, Resource Protection Division
Bureau of Indian Affairs
National Weather Service
United States Forest Service

Notable Wildland Fires in Yakima County

Date	Name	Area	Acres
June 15, 1996	Konnowac Pass	Yakima County	4,500
August 17, 1996	Cold Creek	Benton and Yakima Counties	57,000
July 1, 1998	Rattlesnake Ridge	Yakima County	18,000
August 24, 2000	Mule Dry	Yakama Indian Reservation and Yakima, Klickitat, and Benton Counties	76,800
August 13, 2001	Spruce-Dome	Yakima County	2,581
July 11, 2003	Middle Fork	Yakima County	

National Climatic Data Center (NCDC)
Wildland Fire Query Results

Event Details

Event	**Wildfire**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**Fire Department/Rescue**
NCDC Data Source	**CSV**
Begin Date	**2011-02-12 13:35:00.0 PST-8**
End Date	**2011-02-12 20:30:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**2/0**
Property Damage	**4.00M**

Crop Damage	
Episode Narrative	**A fast moving cold front brought high winds. Peak wind gusts in miles per hour included Hanford Emergency Ops Center (72), Gable Mountain (71), Yakima Barricade (77), Hanford (61), Rattlesnake Springs (69), Hanford 200 West (71), Hanford Army Loop (69), Vernita Bridge (78), Richland Airport (58). Tree branches up to 1.5 inches in diameter were downed by the winds 8 miles west northwest of Connell. A wildfire in White Swan, fanned by the high winds up to 69 mph, was carried from a house to a logging mill and into the town. The wildfire burned 20 homes. A trailer was blown over west of Ellensburg.**
Event Narrative	

Event Details

Event	**Wildfire**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**Newspaper**
NCDC Data Source	**CSV**
Begin Date	**2011-06-15 09:00:00.0 PST-8**
End Date	**2011-06-15 14:30:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**Winds to 30 mph caused a wildfire to grow rapidly in southeast Yakima County. The fire near Konnowac Pass grew to 1200 acres.**
Event Narrative	

Event Details

Event	**Wildfire**
State	**WASHINGTON**
County/Area	**YAKIMA VALLEY**
WFO	**PDT**
Report Source	**Newspaper**
NCDC Data Source	**CSV**
Begin Date	**2011-11-13 12:30:00.0 PST-8**
End Date	**2011-11-13 16:00:00.0 PST-8**
Deaths Direct/Indirect	**0/0** (fatality details below, when available...)
Injuries Direct/Indirect	**0/0**
Property Damage	**0.00K**
Crop Damage	**0.00K**
Episode Narrative	**High winds caused multiple power failures for 1800 customers in the Tieton area. The first outage was around 11 am due to downed power lines and the second was around 4 pm. The wind also fanned a spontaneous combustion wildfire at the Boise Cascade mill site in Yakima.**
Event Narrative	

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Yakima County Unincorporated Hazard-Specific Action Items

Yakima County Unincorporated
Hazard-Specific Action Items
2015-2020

Priority: H (High); M (Medium); L (Low

Timeline: Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing

Funding Source: Local; State; FEMA; Private; Other

Estimated Cost: Actual; Estimated

*Lead responsibility is the agency, entity, division, etc. that has a primary role in coordinating a hazard action item response.

**Yakima County's priority; timeline, funding source and estimated costs for addressing the potential hazards is highly opportunistic and depends on available revenues from outside sources.

Wildland Fire

Action Items	*Lead Responsibility	**Priority	**Timeline	**Funding	**Estimated Cost
Develop defensible space around homes and encourage residents to participate in community awareness and education events	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Continuous	In-Kind	
Offer hands-on workshops to highlight individual home vulnerabilities and how-to-techniques to reduce ignitability of common structural elements and encourage residents to participate.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Annually	In-Kind	
Encourage residents to assess and improve accessibility to their property.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Continuous	In-Kind	

Yakima County Unincorporated Hazard-Specific Action Items 2015-2020					
Priority: H (High); M (Medium); L (Low	**Timeline:** Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing			**Funding Source:** Local; State; FEMA; Private; Other	**Estimated Cost:** Actual; Estimated
Develop a community-level CWPP for each at-risk community that will identify specific firefighting resource projects, fuels reduction projects, public education and outreach projects, and reduction in structural ignitability projects through collaboration with state, federal, tribal, county, and private entities.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	As needed	In-Kind	
Develop a program to incorporate Firewise and Fire Adaptive Communities into all aspects of the community through education on individual roles and responsibilities for wildland fire prevention and safety.	Lead: Community Wildfire Protection Plan (CWPP) Steering Committee Support: Yakima County Fire Marshal's Office	H	Annually	In-Kind	
Incorporate Wildfire Mitigation in the Comprehensive Plan	Yakima County Planning	H			
Reduce Risk through Land Use Planning	Yakima County Planning	H	Ongoing	In-Kind	
Review and adopt the 2012 edition of the IWUIC (International Wildland Urban Interface Code) in 2015	Yakima County Building and Safety Division	H	Ongoing	In-Kind	

Critical Areas Ordinance (CAO) & Shoreline Master Program (SMP) Critical Areas

Part 2 Section 10 Wildland Fire 2015 Planning Updates

Yakima County Comprehensive Plan (Plan 2015) contains goals and policies that mitigate for fire hazards. Yakima County limits development in wildfire susceptible areas through zoning; many high risk areas are in zoning districts that have minimum lot sizes of at least 40 acres, which prevents dense residential development. The Yakima County Comprehensive Plan Update (Horizon 2040) is expected to include a Hazard Mitigation element which will address Wildland Fire mitigation goals and policies.

FIRE HAZARDS
PURPOSE STATEMENT NS 19
Much of Yakima County receives little natural precipitation and is highly susceptible to fire hazard during much of the year. Meanwhile, more people are moving to previously uninhabited forest and rural areas. As this number increases, the need to provide adequate and efficient fire services to these areas also increases. The following goal and policies address this need by establishing road, bridge and building standards which will ensure better fire protection in forest and rural areas.
GOAL NS 19: Protect life and property in rural Yakima County from fire hazards.
POLICIES:
NS 19.1 Encourage the development of an adequate water supply/storage for new development which is not connected to a community water/hydrant system. A storage facility/fire well should be accessible by standard firefighting equipment and adequate for the needs of the structure(s) and people being protected.
NS 19.2 Roofing used in the construction of residential development shall be of a Class "A" fire retardant material when located outside of 5 road miles of a full service fire station.
NS 19.3 Encourage, where feasible, the undergrounding of electrical utilities to reduce their exposure to fire.
NS 19.4 Require new residential construction to provide for a fuel break around structures.
NS 19.5 Require proposed developments to provide sufficient access for heavy-duty firefighting equipment.
NS 19.6 Bridges, culverts, road drains and other structures shall be constructed and maintained in a manner to accommodate firefighting apparatus on a year around basis.
NS 19.7 Residences and driveways shall be clearly marked and visible with the appropriate address assigned by Yakima County

REMOTE RURAL/EXTREMELY LIMITED DEVELOPMENT POTENTIAL AREAS

PURPOSE STATEMENT LU-R 11
Certain areas of the County are remote and/or extremely limited in their development potential. This land use category has generally been applied to Cascade Mountain foothills, ridges and uplands, including the Rattlesnake Hills, Yakima Ridge, unforested portions of Cowiche and Cleman Mountains, the upper Wenas Valley and floodways on the valley floor along the Naches and Yakima Rivers. The cost

of extending or maintaining roads and services to these areas is often prohibitive given inaccessibility and challenging geographical features many of these areas possess, such as: natural hazard potential (excessive or unstable slopes, soil constraints, topographic or flooding characteristics, and wildfire potential); or remote location (outside of expected rural fire service area, lack of all-weather access, depth to groundwater). These areas may also include public values covered by Statute (e.g., protection of shorelines, or critical areas features such as sensitive fish and wildlife habitats). These areas are typically not well suited for commercial timber production, and agricultural uses are generally limited to grazing or other dryland farming, although soils and the land may become productive where irrigation water is available.

GOAL LU-R 11: Recognize and maintain Remote Rural/Extremely Limited Develop-ment Potential areas, and allow develop-ment at a level consistent with environ-mental constraints and service availability in remote areas and other places with extremely limited development potential.

POLICIES:

LU-R 11.1 Minimum parcel size for new development within the Remote Rural /Extremely Limited Development Potential category should be one quarter quarter section (i.e., approximately 40 acres less rights of way).

LU-R 11.2 Require notice of service limitations to future purchasers of lands which are located within the Remote Rural/Extremely Limited Development Potential area through a declarative coven-ant to be recorded as an addendum to any instrument of sale, lease or transfer of ownership of properties in this area. This covenant must also be recorded as an addendum to all land divisions.

LU-R 11.3 Yakima County should not extend County roads into those lands which fall under the Remote Rural/Extremely Limited Development Potential category.

LU-R 11.4 New development within the Re-mote Rural/Extremely Limited Development Potential category should be served by individual wells and septic systems.

Integration with other Local Planning Documents

During development of this Community Wildfire Protection Plan, several planning and management documents were reviewed in order to avoid conflicting goals and objectives. Existing programs and policies were reviewed in order to identify those that may weaken or enhance the mitigation objectives outlined in this document. The following sections identify and briefly describe some of the existing Yakima County planning documents and ordinances considered during development of this plan.

Yakima County Multi-Jurisdictional Hazards Mitigation Plan
As a requirement to receive certain types of federal non-emergency disaster assistance, including funding for hazard mitigation projects, Yakima County and the cities and towns of Grandview, Granger, Harrah, Mabton, Moxee, Naches, Selah, Sunnyside, Tieton, Toppenish, Union Gap, Wapato, Yakima, and Zillah are required to develop and maintain an up-to-date local hazard mitigation plan. The jointly developed Yakima County Multi-Jurisdictional Hazards Mitigation Plan was approved by FEMA in 2009 and contains multiple short and long term action items that directly or indirectly support the goals and guiding principles of the CWPP.

Plan 2015: A Blueprint for Yakima County Progress
The Plan 2015 is the guiding document that establishes the vision for growth and development in Yakima County. The CWPP will "dove-tail" with the County's Plan 2015 during its development and implementation to ensure that the goals and objectives of each are integrated. This planning effort is intended to be compatible with the goals and objectives of the Plan 2015.

2009 Yakima County Community Wildfire Protection Plan
The 2009 version of the Yakima County CWPP was used as the basis for the 2014 CWPP Update. Much of the background information, risk evaluation, and action items were integrated into the Update. However, the updated CWPP incorporates new data, mapping, and analysis tools and utilizes a more refined framework for the presentation of material. Furthermore, the 2014 CWPP includes a larger cross-section of stakeholders and public input due to the recent efforts of the Yakima Valley Fire Adapted Communities Coalition.

Highways 410 and 12 Community Wildfire Protection Plan
In 2005, the Highways 410 and 12 CWPP was completed by a group of local landowners and fire experts. The Highways 410 and 12 CWPP area covers approximately 284,712 acres and lies west of the city of Yakima and the town of Naches. The goals of the Highways 410 and 12 CWPP are:

- Improve prevention and suppression
- Reduce hazardous fuels
- Restore fire adapted ecosystems
- Promote community assistance
- Recognize and adhere to environmental laws and policies
- Tier to existing and approved emergency response plans within Yakima County

The Highways 410 and 12 CWPP provides a great example to other communities within the County for community-level fire planning. Because of its scale, the plan is more specific and detailed than a county-level plan. The Highways 410 and 12 CWPP will be referenced throughout this document and should be referred to for finer-scale planning in that portion of the County. By recognizing that the Highways 410 and 12 CWPP area occurs within the larger Yakima County CWPP planning area, the YVFACC hopes to help the Highways 410 and 12 CWPP participants leverage available resources to help accomplish their specific goals while also addressing broader or landscape scale issues in the context of coordinated Countywide planning.

Cowychee Mountain Community Wildfire Protection Plan

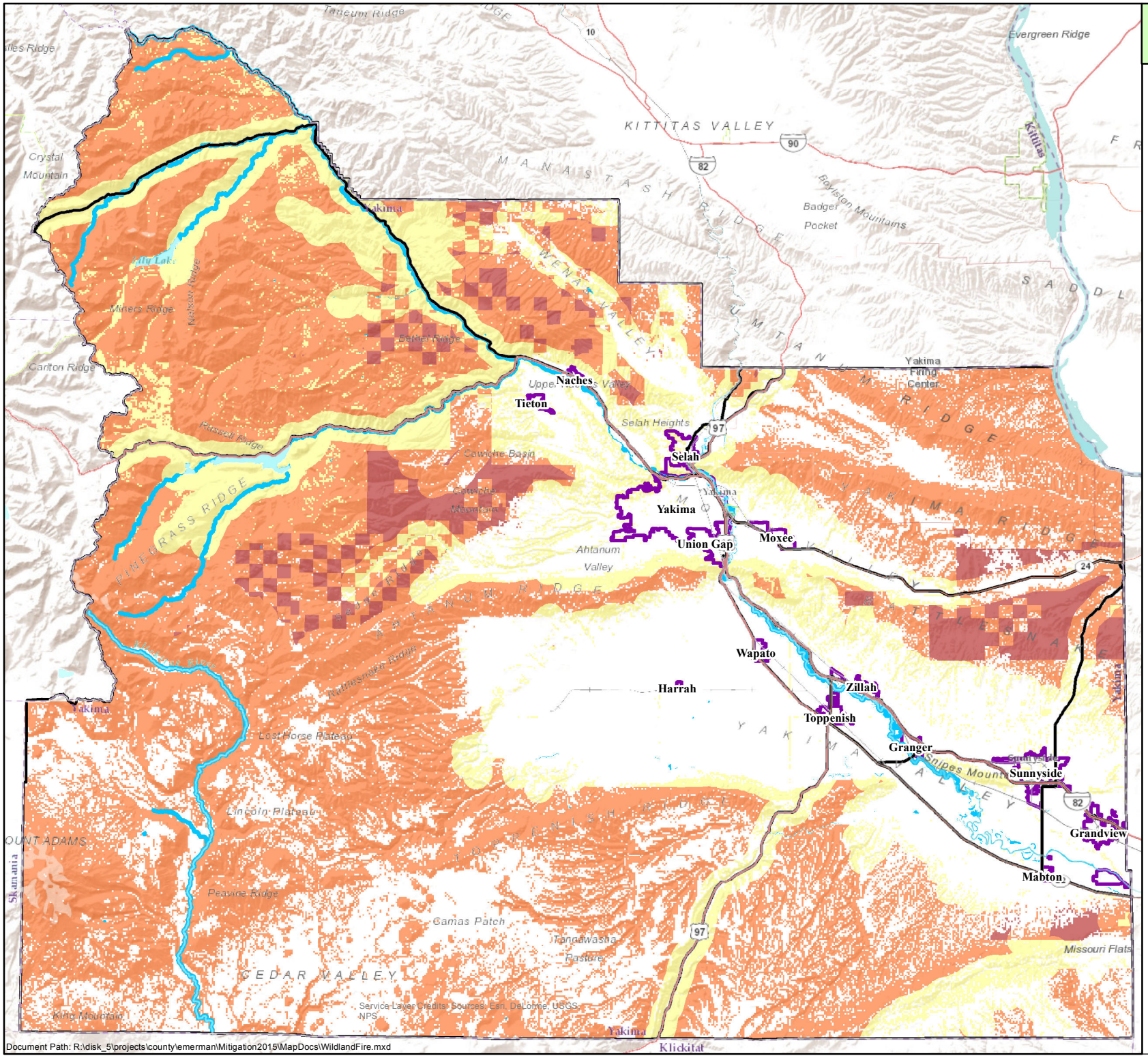
The Cowychee Mountain CWPP was completed in 2012 by a Core Group of stakeholders surrounding the Cowiche Mountain area of Yakima County. While other CWPPs tend to focus on the wildfire threat to communities associated with forested habitats, the Cowychee Mountain CWPP focuses on the shrub-steppe/rangeland zone. The goals of the Core Group include:

- Create a safer environment for the public and firefighting responders
- Recognize that the focus is shrub-steppe vegetation; thus, the CWPP will use shrub-steppe ecological principles to define fuel reduction priorities
- Outreach across boundaries and jurisdiction by sharing land management principles that will include potential fuel reduction through restoration and best management practices
- Create opportunities for training, education, and available resources for fire agencies

As with the Highways 410 and 12 CWPP, the Cowychee Mountain CWPP will be referenced throughout this document and should be referred to for finer-scale planning in that portion of the County. By recognizing that the Cowychee Mountain CWPP area occurs within the larger Yakima County CWPP planning area, the YVFACC hopes to help the Cowychee Mountain Core Group leverage available resources to help accomplish their specific goals while also addressing broader or landscape scale issues in the context of coordinated Countywide planning.

Yakama Wildland Fire Prevention Plan

The Yakama Bureau of Indian Affairs Agency has operated a Fire Management Program for over 20 years through annual preparedness funding. The purpose of the Wildland Fire Prevention Plan is to define the Prevention Strategy contained in the Wildland Fire Management Plan for the Yakama Reservation.
As a large landowner and stakeholder in Yakima County, the Yakama Nation plays an important role in wildfire prevention with its partners, including the Washington Department of Natural Resources (DNR), local fire districts and departments, the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the Washington State Fire Marshal. The objectives of the Tribe's Prevention Plan focus on firefighter safety, fire detection and suppression, and prevention efforts. The Yakima County CWPP will dovetail with the Tribe's efforts and help leverage resources that may be mutually beneficial.



YAKIMA COUNTY
GEOGRAPHIC INFORMATION SERVICES

Yakima County Urban Wildlands Fire Potential

Urban Wildlands - Risk
- Low
- Medium
- High
- Extreme
- City Limits
- Rivers
- State & Federal Roads

Yakima County Hazard Mitigation Plan

Map Inset

0 3.5 7 14 Miles

1 in = 9.4 miles

Date: September 26, 2014

Appendix A
Resource Directory

The Resource Directory provides contact information for local, regional, state, and federal programs that are currently involved in hazard mitigation activities. The Hazard Mitigation Steering Committee may look to the organizations on the following pages for resources and technical assistance. The Resource Directory provides a foundation for potential partners in action item implementation.

This section may also be used by various community members interested in hazard mitigation information and projects.

Government, Federal

Alaska Volcano Observatory
Bureau of Reclamation
Cascades Volcano Observatory - USGS
Census - Population & Housing Unit Estimates
Code of Federal Regulations/Congressional Register
Department of Energy
Environmental Protection Agency
Federal Census Tiger Maps
Federal Communications Commission
Federal Emergency Management Agency (FEMA)
Federal Emergency Management Agency (FEMA) Region X
Urban Search and Rescue (US&R)
Federal Energy Regulatory Commission (FERC)
Federal Government Documents
Federal Government Resources on the Web
Federal Register
GPO Gate at University of California
GSA Region Ten
Library of Congress
Los Alamos National Laboratory
National Aeronautics and Space Administration (NASA) Images
National Archives and Records Administration
National Communications System
National Mental Health Services Knowledge Exchange Network
National Oceanic & Atmospheric Administration (NOAA)
NOAA National Environmental Satellite Data & Information
National Safety Council
Navstar Global Positioning System
Nuclear Regulatory Commission
Oak Ridge National Laboratory
Occupational Safety & Health Administration
OSHA Computerized Information System
THOMAS Legislative Information on the Internet
US Department of Agriculture (USDA)

US Department of Energy (USDOE) Office of Energy Efficiency and Renewable Energy - Center of Sustainable Development, Disaster Planning information
US Fire Administration (USFA)
US Geological Survey (USGS)
US State & Local Gateway
US Treasury

FEMA MITIGATION PLANNING RESOURCES

- **Region 10 Integrating Natural Hazard Mitigation into Comprehensive Planning**: This resource is specific to Region 10 states and provides examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. It expected to be released later this year. You can find it in the FEMA Library at http://www.fema.gov/media-library/assets/documents/89725.

- The **Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible impediments, and presents a series of case studies to demonstrate successful integration in practice. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7130.

- The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=6938.

- The **Local Mitigation Planning Handbook** provides guidance to local governments on developing or updating hazard mitigation plans to meet and go above the requirements. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7209.

- The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update. http://www.fema.gov/library/viewRecord.do?id=4859

- **Tribal Multi-Hazard Mitigation Planning Guidance:** This resource is specific to tribal governments developing or updating tribal mitigation plans. It covers all aspects of tribal planning requirements and the steps to developing tribal mitigation plans. You can find the document in the FEMA Library at http://www.fema.gov/media-library/assets/documents/18355

- The FEMA Region X **Risk Mapping, Analysis, and Planning program (RiskMAP)** releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx. If you would like to receive future newsletters, email rxnewsletter@starr-team.com.

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Appendix B
Definitions and Acronyms

COMPREHENSIVE FLOOD HAZARD MANAGEMENT PLAN - Recommendations on future flood hazard management alternatives for problematic areas. Once the plan is adopted, it serves as a policy document, for the County and Cities that adopt it. The Plan itself is not a regulatory document, but identifies and prioritizes flood control and mitigation projects for the community. Adoption of the plans increases the chances of State and Federal funding of projects and post flood disaster relief.

DISASTER - An event expected or unexpected, in which a community's available, pertinent resources are expended; or the need for resources exceeds availability; and in which a community undergoes severe danger; incurring losses so that the social or economic structure of the community is disrupted; and the fulfillment of some or all of the community's essential functions are prevented.

EARTHQUAKE - The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth, called a fault.

EMERGENCY - An event, expected or unexpected, involving shortages of time and resources; that places life, property, or the environment, in danger; that requires response beyond routine incident response resources.

EMERGENCY MANAGEMENT or COMPREHENSIVE EMERGENCY MANAGEMENT - The preparation for and the carrying out of all emergency functions, other than functions for which the military forces are primarily responsible, to mitigate, prepare for, respond to, and recover from emergencies and disasters, and to aid victims suffering from injury or damage, resulting from disasters caused by all hazards, whether natural or technological, and to provide support for search and rescue operations for persons and property in distress.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) - Agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. Federal Emergency Management Agency manages the President's Disaster Relief Fund and coordinates the disaster assistance activities of all federal agencies in the event of a Presidential Disaster Declaration.

FLOOD - An inundation of dry land with water. Types of floods in Yakima County are primarily river and stream.

HAZARDOUS MATERIALS - Materials, which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, or property when released.

LANDSLIDE - Landslide is the sliding movement of masses of loosened rock and soil down a hillside or slope.

LONG-TERM ACTION ITEMS (LT)- May require new or additional resources or authorities, and may take between one and five years to implement.

MAJOR DISASTER - As defined in federal law, is any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, or other technological or human caused catastrophe in any part of the United States which, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance… in alleviating the damage, loss, hardship, or suffering caused thereby.

MITIGATION - Actions taken to eliminate or reduce the degree of long-term risk to human life, property, and the environment from natural and technological hazards. Mitigation assumes our communities are exposed to risks whether or not an emergency occurs. Mitigation measures include, but are not limited to, building codes, disaster insurance, hazard information systems, land use management, hazard analysis, land acquisition, monitoring and inspection, public education, research, relocation, risk mapping, safety codes, statues and ordinances, tax incentives and disincentives, equipment or computer tie downs, and stocking emergency supplies.

PREPAREDNESS - Actions taken in advance of an emergency to develop operational capabilities and facilitate an effective response in the event an emergency occurs. Preparedness measures include, but are not limited to, continuity of government, emergency alert systems, emergency communications, emergency operations centers, emergency operations plans, emergency public information materials, exercise of plans, mutual aid agreements, resource management, training response personnel, and warning systems.

PRESIDENTIAL DECLARATION - Formal declaration by the President that an Emergency or Major Disaster exists, based upon the request for such a declaration by the Governor and with the verification of Federal Emergency Management Agency preliminary damage assessments.

RECOVERY - Activity to return vital life support systems to minimum operating standards and long-term activity designed to return life to normal or improved levels, including some form of economic viability. Recovery measures include, but are not limited to, crisis counseling, damage assessment, debris clearance, decontamination, disaster application centers, disaster insurance payments, disaster loans and grants, disaster unemployment assistance, public information, reassessment of emergency plans, reconstruction, temporary housing, and full-scale business resumption.

RESPONSE - Actions taken immediately before, during, or directly after an emergency occurs, to save lives, minimize damage to property and the environment, and enhance the effectiveness of recovery. Response measures include, but are not limited to, emergency plan activation, emergency alert system activation, emergency instructions to the public, emergency medical assistance, staffing the emergency operations center, public official alerting, reception and care, shelter and evacuation, search and rescue, resource mobilization, and warning systems activation.

RISK ASSESSMENT TOOL - An Excel spreadsheet, which is designed to measure a jurisdiction's risk from the effects of hazards contained in the HMP.

SEVERE WINTER STORM - An atmospheric disturbance manifested in strong winds, snow, and ice.

SHORT-TERM ACTION ITEMS (ST) - Activities which county and local jurisdiction agencies are capable of implementing with existing resources and authorities within one to two years.

WIND STORM - A localized violently destructive windstorm occurring over land.

VOLCANO - A vent in the earth's crust through which molten rock, rock fragments, gases, and ashes are ejected from the earth's interior.

WILDLAND FIRE - Uncontrolled destruction of forests, brush, field crops and grasslands caused by nature or humans.

ACRONYMS

CAO - Critical Areas Ordinance

CEMP – Comprehensive Emergency Management Program

CHFMP - Comprehensive Flood Hazard Management Plan

FEMA – Federal Emergency Management Agency

FCZD - Flood Control Zone District

GMA - Growth Management Act

HICA – Hazard Identification and Community Assessment

HMGP – Hazard Mitigation Grant Program

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Appendix C
Mitigation Actions and Ideas

(FEMA *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013*)

Introduction

The purpose of this document is to provide a resource that communities can use to identify and evaluate a range of potential mitigation actions for reducing risk to natural hazards and disasters. The focus of this document is mitigation, which is action taken to reduce or eliminate long-term risk to hazards. Mitigation is different from preparedness, which is action taken to improve emergency response or operational preparedness.

This document is intended to be a starting point for gathering ideas and should not be used as the only source for identifying actions. Communities should seek innovative and different ideas for reducing risk that meet their unique needs. The actions listed are not necessarily eligible for Federal assistance programs. Users should review specific program guidance and contact their State Hazard Mitigation Officer (SHMO) or regional FEMA office for more information.

Hazard Descriptions

Risk Codes: D—Drought; EQ—Earthquake; VE—Volcanic Eruption; ER—Erosion; ET--Extreme temperatures; F—Flood; HA—Hail; LS—Landslide; L—Lightning; SW--Severe wind; WW--Severe winter weather; SU—Subsidence; T—Tornado; WF—Wildfire; MU--Multiple Hazards

Drought (D)

A drought is a period of unusually constant dry weather that persists long enough to cause deficiencies in water supply (surface or underground). Droughts are slow onset hazards, but, over time, they can severely affect crops, municipal water supplies, recreational resources, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impacts can be significant. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. In addition, human actions and demands for water resources can accelerate drought-related impacts.

Earthquake (EQ)

An earthquake is a sudden release of energy that creates a movement in the earth's crust. Most earthquake-related property damage and deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the extent and duration of the shaking. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (in mountain regions and along hillsides), and liquefaction.

Volcanic Eruption

A volcano is a vent in the earth's crust through which magma (molten rock), rock fragments, gases, and ashes are ejected from the earth's interior. A volcanic mountain is created over time by the accumulation of these erupted products on the on the earth's surface.

Erosion (ER)
Erosion wearing away of land, such as loss of riverbank, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surge, and windstorms, but may be intensified by human activities. Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure.

Extreme Temperatures (ET)
Extreme heat and extreme cold constitute different conditions in different parts of the country. Extreme cold can range from near freezing temperatures in the southern United States to temperatures well below zero in the northern states. Similarly, extreme heat is typically recognized as the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for an extended period. Fatalities can result from extreme temperatures, as they can push the human body beyond its limits (hyperthermia and hypothermia).

Flood (F)
A flood is the partial or complete inundation of normally dry land. The various types of flooding include riverine flooding, coastal flooding, and shallow flooding. Common impacts of flooding include damage to personal property, buildings, and infrastructure; bridge and road closures; service disruptions; and injuries or even fatalities.

Hail (HA)
Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Hailstorms frequently accompany thunderstorms, so their locations and spatial extents overlap. Hail can cause substantial damage to vehicles, roofs, landscaping, and other areas of the built environment. U.S. agriculture is typically the area most affected by hail storms, which cause severe crop damage even during minor events.

Landslide (LS)
The movement of a mass of rock, debris, or earth down a slope by force of gravity is considered a landslide. Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. Potential impacts include environmental disturbance, property and infrastructure damage, and injuries or fatalities.

Lightning (L)
Lightning is a discharge of electrical energy that results from the buildup of positive and negative charges in a thunderstorm, which creates a "bolt" when the buildup of charges becomes strong enough. Lightning can strike communications equipment (e.g., radio or cell towers, antennae, satellite dishes, etc.) and hamper communication and emergency response. Lightning strikes can also cause significant damage to buildings, critical facilities, and infrastructure, largely by igniting a fire. Lightning can also ignite a wildfire.

Severe Wind (SW)
Severe wind can occur alone, such as during straightline wind events, or it can accompany other natural hazards, including hurricanes and severe thunderstorms. Severe wind poses a threat to lives, property, and vital utilities primarily due to the effects of flying debris or downed trees and power lines. Severe wind will typically cause the greatest damage to structures of light construction, particularly manufactured homes.

Severe Winter Weather (WW)
Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Severe winter weather can down trees, cause widespread power outages, damage property, and cause fatalities and injuries.

Subsidence (SU)
Subsidence is the gradual settling or sudden sinking of the Earth's surface due to subsurface movement of earth materials. The level of subsidence ranges from a broad lowering to collapse of land surface. Most causes of subsidence are human-induced, such as groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost. Areas located above or adjacent to karsts topography have a greater risk of experiencing subsidence. Sudden collapses of surface areas can damage and destroy buildings and infrastructure.

Tornado (T)
A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings and particularly manufactured homes. Tornadoes are more likely to occur during the months of March through May and tend to form in the late afternoon and early evening.

Wildfire (WF)
A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on local weather conditions; outdoor activities such as camping, debris burning, and construction; and the degree of public cooperation with fire prevention measures. Wildfires can result in widespread damage to property and loss of life.

Mitigation Actions

The suggested mitigation actions are summarized into four types: (1) Local Planning and Regulations, (2) Structure and Infrastructure Projects, (3) Natural Systems Protection, and (4) Education and Awareness Programs. Examples of activities that can be used to accomplish each mitigation goal are identified, as well as the relevant FEMA publications or resources, if applicable.

I. Local Planning and Regulations

These include government authorities, policies, or codes that influence the way land and buildings are developed and built.

D-1 AssessVulnerabilityto Drought Risk

To better understand and assess local vulnerability to drought, consider actions such as:

- Gathering and analyzing water and climate data to gain a better understanding of local climate and drought history.
- Identifying factors that affect the severity of a drought.
- Identifying available water supplies.
- Determining how the community and its water sources have been impacted by droughts in the past.

D-2 Monitor Drought Conditions

Monitoring drought conditions can provide early warning for policymakers and planners to make decisions through actions including:

- Identifying local drought indicators, such as precipitation, temperature, surface water levels, soil moisture, etc.
- Establishing a regular schedule to monitor and report conditions on at least a monthly basis.

D-3 Monitor Water Supply

Monitoring the water supply and its functions can save water in the long run through actions such as:

- Regularly checking for leaks to minimize water supply losses.
- Improving water supply monitoring.

D-4 Plan for Drought

Plan for future drought events in your area through actions such as:

- Developing a drought emergency plan.
- Developing criteria or triggers for drought-related actions.
- Developing a drought communication plan and early warning system to facilitate timely communication of relevant information to officials, decision makers, emergency managers, and the general public.
- Developing agreements for secondary water sources that may be used during drought conditions.

- Establishing an irrigation time/scheduling program or process so that all agricultural land gets the required amount of water. Through incremental timing, each area is irrigated at different times so that all water is not consumed at the same time. Spacing usage may also help with recharge of groundwater.

D-5 Require Water Conservation during Drought Conditions

Require mandatory water conservation measures during drought emergencies, including:

- Developing an ordinance to restrict the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc.
- Adopting ordinances to prioritize or control water use, particularly for emergency situations like firefighting.

D-6 Prevent Overgrazing

Prevent overgrazing, which has been linked to drought vulnerability, through actions such as:

- Establishing a grazing policy or permitting program to prevent overgrazing.
- Reducing the number of animals and improving range management.

EQ-1 Adopt and Enforce Building Codes

Building codes reduce earthquake damage to structures. Consider actions such as:

- Adopting and enforcing updated building code provisions to reduce earthquake damage risk.
- Adopting the International Building Code (IBC) and International Residential Code (IRC).

EQ-2 Incorporate Earthquake Mitigation into Local Planning

Earthquake risk can be reduced through local planning, codes, and ordinances, including:

- Creating 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.
- Developing and distributing guidelines or passing ordinances that require developers and building owners to locate lifelines, buildings, critical facilities, and hazardous materials out of areas subject to significant seismic hazards.
- Incorporating structural and non-structural seismic strengthening actions into ongoing building plans and activities in the capital improvement plan to ensure that facilities remain operational for years to come.
- Supporting financial incentives, such as low interest loans or tax breaks, for home and business owners who seismically retrofit their structures.

EQ-3 Map and Assess Community Vulnerability to Seismic Hazards

To better understand and assess local vulnerability to earthquakes, consider actions such as:

- Developing an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including pre-1940s homes and homes with cripple wall foundations.
- Collecting geologic information on seismic sources, soil conditions, and related potential hazards.
- Creating an earthquake scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community to develop earthquake mitigation priorities.
- Using HAZUS to quantitatively estimate potential losses from an earthquake.
- Maintaining a database to track community vulnerability to earthquake risk.
- Using GIS to map hazard areas, at-risk structures, and associated hazards (e.g., liquefaction and landslides) to assess high-risk areas.

EQ-4 Conduct Inspections of Building Safety

Inspections can be used to assess earthquake risk, such as:

- Establishing a school survey procedure and guidance document to inventory structural and non-structural hazards in and around school buildings.
- Using 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.
- Consulting industry standard publications such as American Society of Civil Engineers (ASCE) 31 - *Seismic Evaluation of Existing Buildings*, ASCE 41 - *Seismic Rehabilitation of Existing Buildings, and Applied Technology Council (ATC) 20 - Procedures for Post-earthquake Safety Evaluation of Buildings*.

ER-1 Map and Assess Vulnerability to Erosion

Erosion risk can be better assessed and monitored with mapping techniques, including the following:

- Using GIS to identify and map erosion hazard areas.
- Developing and maintaining a database to track community vulnerability to erosion.
- Using GIS to identify concentrations of at-risk structures.
- Improving mapping of hazard areas to educate residents about unexpected risks.

ER-2 Manage Development in Erosion Hazard Areas

Erosion damage can be mitigated by regulating how development occurs in hazard areas, such as the following:

- Adopting sediment and erosion control regulations.
- Adopting zoning and erosion overlay districts.
- Developing an erosion protection program for high hazard areas.

- Employing erosion control easements.
- Prohibiting development in high-hazard areas.
- Developing and implementing an erosion management plan.
- Requiring mandatory erosion surcharges on homes.
- Locating utilities and critical facilities outside of areas susceptible to erosion to decrease the risk of service disruption.

ER-3 Promote or Require Site and Building Design Standards to Minimize Erosion Risk

Development can be designed to minimize damage due to erosion using the following techniques:

- Constructing open foundation systems on buildings to minimize scour.
- Constructing deep foundations in erosion hazard areas.
- Clustering buildings during building and site design.
- Designing and orienting infrastructure to deter erosion and accretion.

ET-1 Reduce Urban Heat Island Effect

As urban areas develop and buildings and roads replace open land and vegetation, urban regions become warmer than their rural surroundings, forming an "island" of heat. Several methods for reducing heat island effects include:

- Increasing tree plantings around buildings to shade parking lots and along public rights-of-way.
- Encouraging installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air.
- Using cool roofing products that reflect sunlight and heat away from a building.

F-1 Incorporate Flood Mitigation in Local Planning

Comprehensive planning and floodplain management can mitigate flooding by influencing development. Strategies include:

- Determining and enforcing acceptable land uses to alleviate the risk of damage by limiting exposure in flood hazard areas. Floodplain and coastal zone management can be included in comprehensive planning.
- Developing a floodplain management plan and updating it regularly.
- Mitigating hazards during infrastructure planning. For example, decisions to extend roads or utilities to an area may increase exposure to flood hazards.
- Adopting a post-disaster recovery ordinance based on a plan to regulate repair activity, generally depending on property location.
- Passing and enforcing an ordinance that regulates dumping in streams and ditches.
- Establishing a "green infrastructure" program to link, manage, and expand existing parks, preserves, greenways, etc.
- Obtaining easements for planned and regulated public use of privately-owned land for temporary water retention and drainage.

F-2 Form Partnerships to Support Floodplain Management

Partnerships between local, state, and regional entities help expand resources and improve coordination. Consider the following actions:

- Developing a storm water committee that meets regularly to discuss issues and recommend projects.
- Forming a regional watershed council to help bring together resources for comprehensive analysis, planning, decision-making, and cooperation.
- Establishing watershed-based planning initiatives to address the flood hazard with neighboring jurisdictions.
- Forming a citizen plan implementation steering committee to monitor progress on local mitigation actions. Include a mix of representatives from neighborhoods, local businesses, and local government.

F-3 Limit or Restrict Development in Floodplain Areas

Flooding can be mitigated by limiting or restricting how development occurs in floodplain areas through actions such as:

- Prohibiting or limiting floodplain development through regulatory and/or incentive-based measures.
- Limiting the density of developments in the floodplain.
- Requiring that floodplains be kept as open space.
- Limiting the percentage of allowable impervious surface within developed parcels.
- Developing a stream buffer ordinance to protect water resources and limit flood impacts.
- Prohibiting any fill in floodplain areas.

F-4 Adopt and Enforce Building Codes and Development Standards

The use of building codes and development standards can ensure structures are able to withstand flooding. Potential actions include:

- Adopting the International Building Code (IBC) and International Residential Code (IRC).
- Adopting ASCE 24-05 *Flood Resistant Design and Construction*. ASCE 24 is a referenced standard in the IBC that specifies minimum requirements and expected performance for the design and construction of buildings and structures in the flood hazard areas to make them more resistant to flood loads and flood damage.
- Adding or increasing "freeboard" requirements (feet above base flood elevation) in the flood damage ordinance.
- Prohibiting all first floor enclosures below base flood elevation for all structures in flood hazard areas.
- Considering orientation of new development during design (e.g., subdivisions, buildings, infrastructure, etc.).
- Setting the design flood elevation at or above the historical high water mark if it is above the mapped base flood elevation.
- Using subdivision design standards to require elevation data collection during platting and to have buildable space on lots above the base flood elevation.

- Requiring standard tie-downs of propane tanks.

F-5 Improve Storm Water Management Planning

Rainwater and snowmelt can cause flooding and erosion in developed areas. Storm Water management practices to prevent this include:

- Completing a storm water drainage study for known problem areas.
- Preparing and adopting a storm water drainage plan and ordinance.
- Preparing and adopting a community-wide storm water management master plan.
- Regulating development in upland areas in order to reduce storm water run-off through a storm water ordinance.
- Linking flood hazard mitigation objectives with EPA Storm water Phase II initiatives.
- Developing engineering guidelines for drainage from new development.
- Requiring a drainage study with new development.
- Encouraging the use of Low Impact Development techniques

F-6 Adopt Polices to Reduce Storm Water Runoff

In addition to storm water management, techniques to reduce rain runoff can prevent flooding and erosion, such as:

- Designing a "natural runoff" or "zero discharge" policy for storm water in subdivision design.
- Requiring more trees be preserved and planted in landscape designs to reduce the amount of storm water runoff.
- Requiring developers to plan for on-site sediment retention.
- Requiring developers to construct on-site retention basins for excessive storm water and as a firefighting water source.
- Encouraging the use of porous pavement, vegetative buffers, and islands in large parking areas.
- Conforming pavement to land contours so as not to provide easier avenues for storm water.
- Encouraging the use of permeable driveways and surfaces to reduce runoff and increase groundwater recharge.
- Adopting erosion and sedimentation control regulations for construction and farming.

F-7 ImproveFlood Risk Assessment

Heighten awareness of flood risk with the following:

- Incorporating the procedures for tracking high water marks following a flood into emergency response plans.
- Conducting cumulative impact analyses for multiple development projects within the same watershed.
- Conducting a verification study of FEMA's repetitive loss inventory and developing an associated tracking database.
- Regularly calculating and documenting the amount of flood-prone property

preserved as open space.
- Requiring a thorough watershed analysis for all proposed dam or reservoir projects.
- Developing a dam failure study and emergency action plan.
- Using GIS to map areas that are at risk of flooding.
- Obtaining depth grid data and using it to illustrate flood risk to citizens.
- Incorporating digital floodplain and topographic data into GIS systems, in conjunction with HAZUS, to assess risk.
- Developing and maintaining a database to track community exposure to flood risk.
- Revising and updating regulatory floodplain maps.

F-8 Join or Improve Compliance with NFIP

The National Flood Insurance Program (NFIP) enables property owners in participating communities to purchase insurance protection against flood losses. Actions to achieve eligibility and maintain compliance include:
- Participating in NFIP.
- Adopting ordinances that meet minimum Federal and state requirements to comply with NFIP.
- Conducting NFIP community workshops to provide information and incentives for property owners to acquire flood insurance.
- Designating a local floodplain manager and/or CRS coordinator who achieves CFM certification.
- Completing and maintaining FEMA elevation certificates for pre-FIRM and/or post-FIRM buildings.
- Requiring and maintaining FEMA elevation certificates for all new and improved buildings located in floodplains.

F-9 Manage the Floodplain Beyond Minimum Requirements

In addition to participation in NFIP, implementing good floodplain management techniques that exceed minimum requirements can help minimize flood losses. Examples include:
- Incorporating the ASFPM's "No Adverse Impact" policy into local floodplain management programs.
- Revising the floodplain ordinance to incorporate cumulative substantial damage requirements.
- Adopting a "no-rise" in base flood elevation clause for the flood damage prevention ordinance.
- Extending the freeboard requirement past the mapped floodplain to include an equivalent land elevation.
- Including requirements in the local floodplain ordinance for homeowners to sign non-conversion agreements for areas below base flood elevation.
- Establishing and publicizing a user-friendly, publicly-accessible repository for inquirers to obtain Flood Insurance Rate Maps.
- Developing an educational flyer targeting NFIP policyholders on increased cost of compliance during post-flood damage assessments.
- Annually notifying the owners of repetitive loss properties of Flood Mitigation

Assistance funding.
- Offering incentives for building above the required freeboard minimum (code plus).

F-10 Participate in the CRS

The Community Rating System (CRS) rewards communities that exceed the minimum NFIP requirements. Depending upon the level of participation, flood insurance premium rates are discounted for policyholders. Potential activities that are eligible to receive credit include:
- Advising the public about the local flood hazard, flood insurance, and flood protection measures.
- Enacting and enforcing regulations that exceed NFIP minimum standards so that more flood protection is provided for new development.
- Implementing damage reduction measures for existing buildings such as acquisition, relocation, retrofitting, and maintenance of drainage ways and retention basins.
- Taking action to minimize the effects of flooding on people, property, and building contents through measures including flood warning, emergency response, and evacuation planning.

F-11 Establish Local Funding Mechanisms for Flood Mitigation

Potential methods to develop local funding sources for flood mitigation include:
- Using taxes to support a regulatory system.
- Using impact fees to help fund public projects to mitigate impacts of land development (e.g., increased runoff).
- Levying taxes to fix maintenance of drainage systems and capital improvements.

LS-1 Map and Assess Vulnerability to Landslides

Improve data and mapping on specific landslide risks in the community by:
- Studying areas where riparian landslides may occur.
- Completing an inventory of locations where critical facilities, other buildings, and infrastructure are vulnerable to landslides.
- Using GIS to identify and map landslide hazard areas.
- Developing and maintaining a database to track community vulnerability to landslides.
- Assessing vegetation in wildfire-prone areas to prevent landslides after fires (e.g., encourage plants with strong root systems).

LS-2 Manage Development in Landslide Hazard Areas

Landslide risk can be mitigated by regulating development in landslide hazard areas through actions such as:
- Creating a plan to implement reinforcement measures in high-risk areas.
- Defining steep slope/high-risk areas in land use and comprehensive plans and creating guidelines or restricting new development in those areas.

- Creating or increasing setback limits on parcels near high-risk areas.
- Locating utilities outside of landslide areas to decrease the risk of service disruption.
- Restricting or limiting industrial activity that would strip slopes of essential top soil.
- Incorporating economic development activity restrictions in high-risk areas.

SW-1 Adopt and Enforce Building Codes

Adopt regulations governing residential construction to prevent wind damage. Examples of appropriate regulations are:

- Adopting the International Building Code (IBC) and International Residential Code (IRC).
- Adopting standards from International Code Council (ICC)-600 *Standard for Residential Construction in High-Wind Regions*.
- Reviewing building codes and structural policies to ensure they are adequate to protect older structures from wind damage.
- Requiring or encouraging wind engineering measures and construction techniques that may include structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles.
- Requiring tie-downs with anchors and ground anchors appropriate for the soil type for manufactured homes.
- Prohibiting the use of carports and open coverings attached to manufactured homes.
- Requiring the use of special interlocking shingles designed to interlock and resist uplift forces in extreme wind conditions to reduce damage to a roof or other structures.
- Improving nailing patterns.
- Requiring building foundation design, braced elevated platforms, and protections against the lateral forces of winds and waves.
- Requiring new masonry chimneys greater than 6 feet above a roof to have continuous reinforced steel bracing.
- Requiring structures on temporary foundations to be securely anchored to permanent foundations.

SW-2 Promote or Require Site and Building Design Standards to Minimize Wind Damage

Damage associated with severe wind events can be reduced or prevented if considered during building and site design. Examples include the following:

- Using natural environmental features as wind buffers in site design.
- Incorporating passive ventilation in the building design.
- Incorporating passive ventilation in the site design. Passive ventilation systems use a series of vents in exterior walls or at exterior windows to allow outdoor air to enter the home in a controlled way.
- Encouraging architectural designs that limit potential for wind-borne debris.
- Improving architectural design standards for optimal wind conveyance.

- Encouraging wind-resistant roof shapes (e.g., hip over gable).

SW-3 Assess Vulnerability to Severe Wind

In order to better understand and assess local vulnerability to severe wind, consider actions such as:

- Developing and maintaining a database to track community vulnerability to severe wind.
- Using GIS to map areas that are at risk to the wind hazard associated with different hurricane conditions (e.g., Category 1, 2, 3, etc.) and to identify concentrations of at-risk structures.
- Creating a severe wind scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community to develop severe wind mitigation priorities.
- Using HAZUS to quantitatively estimate potential losses from hurricane wind.

SW-4 Protect Power Lines and Infrastructure

The regular maintenance and upkeep of utilities can help prevent wind damage. Possible strategies are:

- Establishing standards for all utilities regarding tree pruning around lines.
- Incorporating inspection and management of hazardous trees into the drainage system maintenance process.
- Preemptively testing power line holes to determine if they are rotting.
- Inspecting utility poles to ensure they meet specifications and are wind resistant.
- Burying power lines to provide uninterrupted power after severe winds, considering both maintenance and repair issues.
- Upgrading overhead utility lines (e.g., adjust utility pole sizes, utility pole span widths, and/or line strength).
- Avoiding use of aerial extensions to water, sewer, and gas lines.
- Using 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.
- Installing redundancies and loop feeds.

WW-1 Adopt and Enforce Building Codes

Buildings and infrastructure can be protected from the impacts of winter storms with the following regulations:

- Adopting the International Building Code (IBC) and International Residential Code (IRC).
- Ensuring the development and enforcement of building codes for roof snow loads.
- Discouraging flat roofs in areas that experience heavy snows.

SU-1 Map and Assess Vulnerability to Subsidence

Some areas with subsidence risk may not be fully identified in your community. Consider actions such as:

- Using GIS to map areas that are susceptible to subsidence.
- Identifying and mapping old mining areas or geologically unstable terrain so that development can be prevented or eliminated.
- Using ground-penetrating radar to detect lava tubes and map their location.
- Supporting mapping efforts to identify areas of existing permafrost.
- Improving accuracy of hazard area maps to educate residents about unanticipated risks. Upgrading maps provides a truer measure of risks to a community.

SU-2 Manage Development in High-Risk Areas

Development regulations should consider areas with poor soil conditions, including the following:

- Prohibiting development in areas that have been identified as at-risk to subsidence.
- Restricting development in areas with soil that is considered poor or unsuitable for development.

SU-3 Consider Subsidence in Building Design

If subsidence is considered during building design, future damage may be prevented. Potential actions include:

- Educating design professionals about where to locate information on subsidence rates and maps.
- Incorporating structural designs that can resist loading associated with subsidence.
- Adopting an ordinance promoting permafrost sensitive construction practices.
- Including potential subsidence in freeboard calculations for buildings in flood-prone areas.

SU-4 Monitor Subsidence Risk Factors

Several risk factors can be monitored to help predict subsidence, such as the following:

- Monitoring areas at risk to subsidence by remaining aware of changes in groundwater levels.
- Monitoring areas where natural resources are removed from underground.
- Filling or buttressing subterranean open spaces, as with abandoned mines, to prevent or alleviate collapse.

WF-1 Map and Assess Vulnerability to Wildfire

The first step in local planning is to identify wildfire hazard areas and assess overall community vulnerability. Potential actions include:

- Using GIS mapping of wildfire hazard areas to facilitate analysis and planning decisions through comparison with zoning, development, infrastructure, etc.
- Developing and maintaining a database to track community vulnerability to wildfire.
- Creating a wildfire scenario to estimate potential loss of life and injuries, the types

of potential damage, and existing vulnerabilities within a community to develop wildfire mitigation priorities.

WF-2 Incorporate Wildfire Mitigation in the Comprehensive Plan

Communities can review comprehensive plans to ensure wildfire mitigation has been addressed. The comprehensive plan may include the following:

- Recognizing the existence of wildfire hazards and identifying areas of risk based on a wildfire vulnerability assessment.
- Describing policies and recommendation for addressing wildfire risk and discouraging expansion in the wildland-urban interface.
- Including considerations of wildfire hazards in land use, public safety, and other elements of the comprehensive plan.

WF-3 Reduce Risk through Land Use Planning

Local governments can mitigate future losses by regulating development in wildfire hazard areas through land use planning, including:

- Using zoning and/or a special wildfire overlay district to designate high-risk areas and specify the conditions for the use and development of specific areas.
- Addressing density and quantity of development, as well emergency access, landscaping and water supply.
- Promoting conservation of open space or wildland-urban boundary zones to separate developed areas from high-hazard areas.
- Setting guidelines for annexation and service extensions in high-risk areas.

WF-4 Develop a Wildland- Urban Interface Code

Communities can develop regulations for safer construction and incorporate mitigation considerations into the permitting process. Potential actions include:

- Developing specific design guidelines and development review procedures for new construction, replacement, relocation, and substantial improvement in wildfire hazard areas.
- Addressing fire mitigation through access, signage, fire hydrants, water availability, vegetation management, and special building construction standards.
- Involving fire protection agencies in determining guidelines and standards and in development and site plan review procedures.
- Establishing wildfire mitigation planning requirements for large scale developments or planned unit developments.

WF-5 Require or Encourage Fire-Resistant Construction Techniques

A local government can encourage fire-resistant construction or may choose to require it through local regulations. Examples include:

- Encouraging the use of non-combustible materials (i.e., stone, brick, and stucco) for

new construction in wildfire hazard areas.

- Using fire resistant roofing and building materials in remodels, upgrades, and new construction.
- Enclosing 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.
- Prohibiting wooden shingles/wood shake roofs on any new development in areas prone to wildfires.
- Encouraging the use of functional shutters on windows.

MU-1 Assess Community Risk

Understanding community vulnerability and level of risk is important to identify and prioritize mitigation alternatives. Improve risk assessment through the following:

- Obtaining local data including tax parcels, building footprints, critical facility locations, and other information for use in risk analysis.
- Developing and maintaining a database to track community vulnerability (i.e., exposure in known hazard areas).
- Establishing a process to coordinate with state and Federal agencies to maintain up-to-date hazard data, maps, and assessments.
- Keeping aerial photography current, especially in rapidly developing areas.
- Identifying the most at-risk critical facilities and evaluating potential mitigation techniques.

MU-2 Map Community Risk

Maps are an important tool for communicating risk. Consider the following for developing GIS capabilities:

- Developing a coordinated GIS Department. Find out who uses GIS, determine how it is used, and identify other potential uses.
- Incorporating a GIS system/management plan for tracking permitting, land use patterns, etc.
- Obtaining hazard data and using GIS to map risk for various hazards.

MU-3 Prevent Development in Hazard Areas

Limit or prohibit development in high-hazard areas through the following types of actions:

- Encouraging clustering of residential lots outside of hazard areas in subdivision design/review.
- Prohibiting or limiting public expenditures for capital improvements in known hazard areas.
- Organizing a managed retreat from very high-risk areas.

- Purchasing the "right of first refusal" for hazard-prone parcels targeted for public acquisition.
- Purchasing land and title in the name of a local governing body to remove structures and enforce permanent restrictions on development.
- Acquiring and using easements (e.g., conservation) to prevent development in known hazard areas.
- Using conservation easements to protect environmentally significant portions of parcels from development.
- Acquiring hazardous areas for conservation or restoring as functional public parks.
- Acquiring safe sites for public facilities (e.g., schools, police/fire stations, etc.).
- Prohibiting new facilities for persons with special needs/mobility concerns in hazard areas.
- Prohibiting animal shelters in known hazard areas.

MU-4 Adopt Development Regulations in Hazard Areas

Regulate development in hazard areas. Examples include:

- Using subdivision and development regulations to regulate development in hazard-prone areas.
- Evaluating the use of performance/impact zoning to set risk-based standards for land development.
- Requiring setbacks from delineated hazard areas (e.g., shorelines, wetlands, steep slopes, etc.).
- Requiring conditional/special use permits for the development of known hazard areas.
- Offering expanded development rights to developers/businesses for performing mitigation retrofits.
- Incorporating restrictive covenants on properties located in known hazard areas.
- Designating high-risk zones as special assessment districts (to fund necessary hazard mitigation projects).

MU-5 Limit Density in Hazard Areas

Limit the density of development in the hazard areas through the following techniques:

- Increasing minimum lot size for development in known hazard areas.
- Designating "agricultural use districts" in the zoning ordinance to limit densities in known hazard areas.
- Ensuring the zoning ordinance encourages higher densities only outside of known hazards areas.
- Requiring clustering for planned unit developments (PUD) in the zoning ordinance to reduce densities in known hazard areas.
- Establishing a local transfer of development rights (TDR) program for risk in known hazard areas.
- Establishing a process to use floating zones to reduce densities in damaged areas following a disaster event.

MU-6 Integrate Mitigation into Local Planning

Hazard mitigation can be integrated into local planning efforts through the following:

- Incorporating risk assessment and hazard mitigation principles into comprehensive planning efforts.
- Incorporating a stand-alone element for hazard mitigation into the local comprehensive (land use) plan.
- Incorporating hazard mitigation into broader growth management (i.e., Smart Growth) initiatives.
- Incorporating a hazard risk assessment into the local development and subdivision review process.
- Adding hazard mitigation measures to existing adequate public facilities (APF) tests and programs.
- Ensuring natural hazards are considered in all land suitability analyses (LSA).
- Determining and enforcing acceptable land uses to alleviate the risk of damage by limiting exposure in such hazard areas.
- Developing a post-disaster reconstruction plan to facilitate decision making following a hazard event.
- Involving citizens in comprehensive planning activities that identify and mitigate hazards.

MU-7 Strengthen Land Use Regulations

Land use regulations can reduce hazard risk through the following:

- Using bonus/incentive zoning to encourage mitigation measures for private land development.
- Using conditional use zoning to require or exact mitigation measures for private land development.
- Establishing a process to use overlay zones to require mitigation techniques in high-hazard districts.
- Adopting a post-disaster recovery ordinance based on a plan to regulate repair activity, generally depending on property location.
- Adopting environmental review standards.
- Incorporating proper species selection, planting, and maintenance practices into landscape ordinances.

MU-8 Adopt and Enforce Building Codes

Building codes and inspections help ensure buildings can adequately withstand damage during hazard events. Effective actions include:

- Adopting the International Building Code (IBC) and International Residential Code (IRC).
- Increasing the local Building Code Effectiveness Grading Schedule (BCEGS) classification through higher building code standards and enforcement practices.

- Incorporating higher standards for hazard resistance in local application of the building code.
- Providing advanced training to local building inspectors.
- Considering orientation of new development during design (e.g., subdivisions, buildings, infrastructure, etc.)
- Requiring standard tie-downs of propane tanks.
- Requiring tie-downs for all manufactured housing.
- Establishing moratorium procedures to guide the suspension of post-disaster reconstruction permits.
- Revising fire codes to limit hotel room occupancy to ensure timely evacuation of high-use and multi-floor structures.
- Establishing "value-added" incentives for hazard-resistant construction practices beyond code requirements.

MU-9 Create Local Funding Mechanisms for Hazard Mitigation

Local funding resources can be developed through the following measures:

- Establishing a local reserve fund for public mitigation measures.
- Using impact fees to help fund public hazard mitigation projects related to land development (i.e., increased runoff).
- Requiring a development impact tax on new construction to mitigate the impacts of that development.
- Recruiting local financial institutions to participate in "good neighbor" lending for private mitigation practices.
- Providing local match to Federal funds that can fund private mitigation practices.

MU-10 Incentivize Hazard Mitigation

Incentives and disincentives can be used to promote hazard mitigation through the following measures:

- Using special tax assessments to discourage builders from constructing in hazardous areas.
- Using insurance incentives and disincentives (i.e., incentives for best practices).
- Providing tax incentives for development of low-risk hazard parcels.
- Waiving permitting fees for home construction projects related to mitigation.
- Using tax abatements, public subsidies, and other incentives to encourage private mitigation practices.
- Reducing or deferring the tax burden for undeveloped hazard areas facing development pressure.
- Encouraging infill development through tax incentives, streamlined approval processes, etc.

MU-11 Monitor Mitigation Plan Implementation

Monitoring the implementation of the local mitigation plan can ensure that mitigation actions are being completed through:

- Forming a plan implementation steering committee to monitor progress on local mitigation actions. Include a mix of representatives from neighborhoods, local businesses, and local government.
- Preparing a plan implementation monitoring schedule and outlining roles for those responsible for monitoring (i.e., local departments, agencies, and committees).
- Preparing and submitting an annual plan implementation progress report to the local elected body.

II. Structure and Infrastructure Projects

These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves construction of manmade structures that reduce the impact of hazards, such as floodwalls, retaining walls, detention and retention structures, culverts, and safe rooms.

D-7 Retrofit Water Supply Systems

Improve water supply and delivery systems to save water through actions such as:

- Designing water delivery systems to accommodate drought events.
- Developing new or upgrading existing water delivery systems to eliminate breaks and leaks.

EQ-5 Protect Critical Facilities and Infrastructure

Reduce potential damage to critical facilities and infrastructure from future seismic events through actions such as:

- Conducting seismic retrofitting for critical public facilities most at risk to earthquakes.
- Requiring bracing of generators, elevators, and other vital equipment in hospitals.
- Identifying and hardening critical lifeline systems (i.e., critical public services such as utilities and roads) to meet "Seismic Design Guidelines and Standards for Lifelines" or equivalent standards such as American Lifelines Alliance (ALA) guidance. This may distinguish a manageable earthquake from a social and economic catastrophe.
- Reviewing construction plans for all bridges to determine their susceptibility to collapse and retrofitting problem bridges.
- Using flexible piping when extending water, sewer, or natural gas service.
- Installing shutoff valves and emergency connector hoses where water mains cross fault lines.

EQ-6 Implement Structural Mitigation Techniques

Use structural mitigation measures to reduce damage from future seismic events, such as:

- Strengthening and retrofitting non-reinforced masonry buildings and non-ductile concrete facilities that are particularly vulnerable to ground shaking.
- Retrofitting building veneers to prevent failure.
- Building a safe room to provide protection during an earthquake.

- Installing window film to prevent injuries from shattered glass.
- Anchoring rooftop-mounted equipment (i.e., HVAC units, satellite dishes, etc).
- Constructing masonry chimneys greater than 6 feet above a roof with continuous reinforced steel bracing.

ER-4 Remove Existing Buildings and Infrastructure from Erosion Hazard Areas

To prevent damage to buildings and infrastructure from erosion, consider acquiring and demolishing or relocating at-risk buildings and infrastructure and enforcing permanent restrictions on development after land and structure acquisition.

F-12 Remove Existing Structures from Flood Hazard Areas

Communities may remove structures from flood-prone areas to minimize future flood losses by acquiring and demolishing or relocating structures from voluntary property owners and preserving lands subject to repetitive flooding.

F-13 Improve Storm Water Drainage System Capacity

Rainwater and snowmelt can cause flooding and erosion in developed areas. Structural storm water management projects that prevent this include:

- Installing, re-routing, or increasing the capacity of a storm drainage system.
- Increasing 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, flood gates and pumps, or channel redirection.
- Increasing capacity of storm water detention and retention basins.
- Increasing dimensions of drainage culverts in flood-prone areas.
- Using stream restoration to ensure adequate drainage and diversion of storm water.
- Requiring developers to construct on-site retention basins for excessive storm water and as a firefighting water source.
- Providing grassy swales along roadsides.

F-14 Conduct Regular Maintenance for Drainage Systems and Flood Control Structures

Regular maintenance will help drainage systems and flood control structures continue to function properly. Potential activities include:

- Performing regular drainage system maintenance, such as sediment and debris clearance, as well as detection and prevention of discharges into storm water and sewer systems from home footing drains, downspouts, or sewer pumps.
- Implementing an inspection, maintenance, and enforcement program to help ensure continued structural integrity of dams and levees.
- Routinely cleaning debris from support bracing underneath low-lying bridges.
- Routinely cleaning and repairing storm water drains.
- Regularly clearing sediment build-up on riverbanks near aerial lines.
- Inspecting bridges and identifying if any repairs or retrofits are needed to prevent

scour.
- Incorporating ice jam prevention techniques as appropriate.

F-15 Elevate or Retrofit Structures and Utilities

Structures and utilities can be elevated to reduce flood damage, including:
- Elevating structures so that the lowest floor, including the basement, is raised above the base flood elevation.
- Raising utilities or other mechanical devices above expected flood levels.
- Elevating and anchoring manufactured homes or, preferably, keeping manufactured homes out of the floodplain.
- Relocating utilities and water heaters above base flood elevation and using tankless water heaters in limited spaces.

F-16 Flood Proof Residential and Non-Residential Structures

Flood proofing techniques may protect certain structures from flood damage, including:
- Wet flood proofing in a basement, which may be preferable to attempting to keep water out completely because it allows for controlled flooding to balance exterior and interior wall forces and discourages structural collapse.
- Encouraging wet flood proofing of areas above base flood elevation.
- Using water resistant paints or other materials to allow for easy cleanup after floodwater exposure in accessory structures or in a garage area below an elevated residential structure.
- Dry flood proofing non-residential structures by strengthening walls, sealing openings, or using waterproof compounds or plastic sheeting on walls to keep water out.

F-17 Protect Infrastructure

Mitigation techniques can be implemented to help minimize losses to infrastructure from flood events, such as:
- Elevating roads and bridges above the base flood elevation to maintain dry access. In situations where flood waters tend to wash roads out, construction, reconstruction, or repair can include not only attention to drainage, but also stabilization or armoring of vulnerable shoulders or embankments.
- Raising low-lying bridges.
- Flood proofing wastewater treatment facilities located in flood hazard areas.
- Flood proofing water treatment facilities located in flood hazard areas.
- Depending on its infrastructure capabilities, using check valves, sump pumps, and backflow prevention devices in homes and buildings.
- Using bioengineered bank stabilization techniques.

F-18 Protect Critical Facilities

Techniques to protect critical facilities from flood events include:

- Requiring that all critical facilities including emergency operations centers (EOC), police stations, and fire department facilities be located outside of flood-prone areas.
- Requiring all critical facilities to meet requirements of Executive Order 11988 and be built 1 foot above the 500-year flood elevation.
- Installing/upgrading storm water pumping stations.
- Raising electrical components of sewage lift stations above base flood elevation.
- Raising manhole openings using concrete pillars.
- Installing watertight covers or inflow guards on sewer manholes.
- Installing flood telemetry systems in sewage lift stations.
- Installing back-up generators for pumping and lift stations in sanitary sewer systems along with other measures (e.g., alarms, meters, remote controls, and switchgear upgrades).
- Building earthen dikes around flood-threatened critical facilities.
- Using bioengineered bank stabilization techniques.

F-19 Construct Flood Control Measures

Small flood control structures can be built to prevent flood damage. Examples include:

- Using minor structural projects that are smaller and more localized (e.g., floodwalls or small berms) in areas that cannot be mitigated through non-structural activities or where structural activities are not feasible due to low densities.
- Using revetments (hardened materials placed atop existing riverbanks or slopes) to protect against floods.
- Using bioengineered bank stabilization techniques.

HA-1 Locate Safe Rooms to Minimize Damage

Locate tornado safe rooms inside or directly adjacent to houses to prevent hail-induced injuries that may occur when taking shelter during a severe thunderstorm.

HA-2 Protect Buildings from Hail Damage

For new construction as well as retrofitting existing buildings, techniques to minimize hail damage include:

- Including measures such as structural bracing, shutters, laminated glass in window panes, and hail-resistant roof coverings or flashing in building design to minimize damage.
- Improving roof sheathing to prevent hail penetration.
- Installing hail resistant roofing and siding.
- Contacting the Insurance Institute for Business and Home Safety (IBHS) to learn more about the most appropriate type of roof covering for your geographic region.

LS-3 Prevent Impacts to Roadways

To prevent roadway damage and traffic disruptions from landslides, consider options such as:

- Implementing monitoring mechanisms/procedures (i.e., visual inspection or electronic monitoring systems).
- Applying soil stabilization measures, such as planting soil- stabilizing vegetation on steep, publicly-owned slopes.
- Using debris-flow measures that may reduce damage in sloping areas, such as stabilization, energy dissipation, and flow control measures.
- Establishing setback requirements and using large setbacks when building roads near slopes of marginal stability.
- Installing catch-fall nets for rocks at steep slopes near roadways.

LS-4 Remove Existing Buildings and Infrastructure from Landslide Hazard Areas

To help mitigate landslide hazards, communities can acquire and demolish or relocate at-risk buildings and infrastructure and enforce permanent restrictions on development after land and structure acquisition.

L-1 Protect Critical Facilities and Equipment

Protect critical facilities and infrastructure from lighting damage with the following measures:

- Installing lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
- Installing and maintaining surge protection on critical electronic equipment.

SW-5 Retrofit Residential Buildings

The following types of modifications or retrofits to existing residential buildings can reduce future wind damage:

- Improving the building envelope.
- Installing hurricane shutters or other protective measures.
- Retrofitting gable end walls to eliminate wall failures in high winds.
- Replacing existing non-ductile infrastructure with ductile infrastructure to reduce their exposure to hazardous events.
- Retrofitting buildings with load-path connectors to strengthen the structural frames.
- Installing safe rooms.
- Reinforcing garage doors.
- Inspecting and retrofitting roofs to adequate standards to provide wind resistance.

SW-6 Retrofit Public Buildings and Critical Facilities

Public buildings and critical facilities can be retrofitted to reduce future wind damage with the following actions:

- Improving roof coverings (e.g., no pebbles, remove ballast roof systems).
- Anchoring roof-mounted heating, ventilation, and air conditioning units.
- Retrofitting buildings with load-path connectors to strengthen the structural frames.
- Retrofitting or constructing the emergency operations center to FEMA 361 standards.
- Avoiding placing flag poles or antennas near buildings.
- Upgrading and maintaining existing lightning protection systems to prevent roof cover damage.
- Requiring upgrading of reused buildings that will house critical facilities.
- Protecting traffic lights and other traffic controls from high winds.
- Converting traffic lights to mast arms.

WW-2 Protect Buildings and Infrastructure

Buildings and infrastructure can be protected from the impacts of winter storms with the following techniques:

- Adding building insulation to walls and attics.
- As buildings are modified, using new technology to create or increase structural stability.
- Retrofitting public buildings to withstand snow loads and prevent roof collapse.

WW-3 Protect Power Lines

Power lines can be protected from the impacts of winter storms with the following techniques:

- Establishing standards for all utilities regarding tree pruning around lines.
- Burying overhead power lines.
- Using 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.
- Installing redundancies and loop feeds.

WW-4 Reduce Impacts to Roadways

The leading cause of death during winter storms is from automobile or other transportation accidents, so it is important to consider ways to lessen roadway impacts. Potential strategies include:

- Planning for and maintaining adequate road and debris clearing capabilities.
- Using snow fences or "living snow fences" (e.g., rows of trees or other vegetation) to limit blowing and drifting of snow over critical roadway segments.
- Installing roadway heating technology to prevent ice/snow buildup.

SU-5 Remove Existing Structures from Subsidence Hazard Areas

To prevent property loss, acquire and demolish or relocate buildings and infrastructure in high-risk areas.

WF-6 Retrofit At-Risk Structures with Ignition-Resistant Materials

Existing structures in wildfire hazard areas can be protected through the use of non-combustible materials and technologies, including:

- Installing roof coverings, sheathing, flashing, skylights, roof and attic vents, eaves, and gutters that conform to ignition-resistant construction standards.
- Installing wall components that conform to ignition-resistant construction standards.
- Protecting propane tanks or other external fuel sources.
- Purchasing and installing external, structure-specific water hydration systems (sprinklers); dedicated power sources; and dedicated cisterns if no water source (e.g., lake, river, or swimming pool) is available.

WF-7 Create Defensible Space around Structures and Infrastructure

Local governments can implement defensible space programs to reduce risk to structures and infrastructure, including:

- Creating buffers around residential and non-residential structures through the removal or reduction of flammable vegetation, including vertical clearance of tree branches.
- Replacing flammable vegetation with less flammable species.
- Creating defensible zones around power lines, oil and gas lines, and other infrastructure systems.

WF-8 Conduct Maintenance to Reduce Risk

Local governments can implement maintenance procedures to reduce wildfire risk, including:

- Performing arson prevention cleanup activities in areas of abandoned or collapsed structures, accumulated trash or debris, and with a history of storing flammable materials where spills or dumping may have occurred.
- Preventing or alleviating wildfires by proper maintenance and separation of power lines as well as efficient response to fallen power lines.
- Routinely inspecting the functionality of fire hydrants.
- Requiring and maintaining safe access for fire apparatus to wildland-urban interface neighborhoods and properties.

MU-12 Protect Structures

Damage to structures can be prevented through the following actions:

- Acquiring or relocating structures located in hazard areas.
- Moving vulnerable structures to a less hazardous location.
- Relocating or retrofitting public buildings located in high-hazard areas.
- Relocating or retrofitting endangered public housing units in high- hazard areas.
- Retrofitting fire and police stations to become hazard resistant.
- Identifying and strengthening facilities to function as public shelters.

MU-13 Protect Infrastructure and Critical Facilities

Infrastructure and critical facilities can be protected from damage by the following:

- Incorporating hazard mitigation principles into all aspects of public-funded building.
- Incorporating mitigation retrofits for public facilities into the annual capital improvements program.
- Engineering or retrofitting roads and bridges to withstand hazards.
- Relocating or undergrounding electrical infrastructure.
- Designing and building water tanks or wells for use in times of water outage.
- Installing quick-connect emergency generator hook-ups for critical facilities

III. Natural Systems Protection

These are actions that minimize damage and losses and preserve or restore the functions of natural systems. Examples include sediment and erosion control, stream corridor restoration, forest management, conservation easements, and wetland restoration and preservation.

D-8 Enhance Landscaping and Design Measures

Encourage drought-tolerant landscape design through measures such as:

- Incorporating drought tolerant or xeriscaping practices into landscape ordinances to reduce dependence on irrigation.
- Providing incentives for xeriscaping.
- Using permeable driveways and surfaces to reduce runoff and promote groundwater recharge.

EQ-7 Increase Earthquake Risk Awareness

There are many ways to increase awareness of earthquake risk, including:

- Working with insurance industry representatives to increase public awareness of the importance of earthquake insurance. Residential structural improvements can be factored into the process of obtaining insurance coverage or reduced deductibles.
- Developing an outreach program about earthquake risk and mitigation activities in homes, schools, and businesses.
- Educating homeowners on safety techniques to follow during and after an earthquake.
- Offering GIS hazard mapping online for residents and design professionals.

EQ-8 Conduct Outreach to Builders, Architects, Engineers, and Inspectors

Building susceptibility to earthquake damage can be improved if design professionals are made aware of proper design and building requirements. Outreach activities include:

- Conducting information sessions or other forms of outreach on seismic code provisions for new and existing buildings to enhance code use and enforcement by

local architects, engineers, contractors, and code enforcement personnel.

- Training building department staff and officials on Form ATC-20 for post-earthquake building evaluation. The ATC-20 report and addendum, prepared by the Applied Technology Council, provide procedures and guidelines for making on-the-spot evaluations and decisions regarding continued use and occupancy of earthquake-damaged buildings.

EQ-9 Provide Information on Structural and Non-Structural Retrofitting

Property owners can retrofit existing structures to reduce damage from seismic events. Potential actions include the following:

- Educating homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit.
- Developing a technical assistance information program for homeowners. Teaching them how to seismically strengthen their houses can be an effective mitigation activity. The program can include providing local government building departments with copies of existing strengthening and repair information for distribution.
- Developing an outreach program to encourage homeowners to secure furnishings, storage cabinets, and utilities to prevent injuries and damage. Examples include anchoring tall bookcases and file cabinets, installing latches on drawers and cabinet doors, restraining desktop computers and appliances, using flexible connections on gas and water lines, mounting framed pictures and mirrors securely, and anchoring and bracing propane tanks and gas cylinders.
- Establishing a library of technical documents on structural and non-structural mitigation options as well as model ordinances and procedures that have been used by other jurisdictions to reduce earthquake risk.

ER-5 Stabilize Erosion Hazard Areas

To stabilize slopes susceptible to erosion, consider options such as:

- Preventing erosion with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric.
- Stabilizing cliffs with terracing or plantings of grasses or other plants to hold soil together.
- Prohibiting removal of natural vegetation from dunes and slopes.
- Planting mature trees in the coastal riparian zone to assist in dissipation of the wind force in the breaking wave zone.
- Using a hybrid of hard/soft engineering techniques (i.e., combine low-profile rock, rubble, oyster reefs, or wood structures with vegetative planting or other soft stabilization techniques).
- Implementing marine riparian habitat reinstatement or re-vegetation.
- Using a rock splash pad to direct runoff and minimize the potential for erosion.
- Using bioengineered bank stabilization techniques.

F-20 Protect and Restore Natural Flood Mitigation Features

Natural resources provide floodplain protection, riparian buffers, and other ecosystem services that mitigate flooding. It is important to preserve such functionality with the following:

- Protecting and enhancing landforms that serves as natural mitigation features (i.e., riverbanks, wetlands, dunes, etc.).
- Using vegetative management, such as vegetative buffers, around streams and water sources.
- Protecting and preserving wetlands to help prevent flooding in other areas.
- Establishing and managing riparian buffers along rivers and streams.
- Retaining natural vegetative beds in storm water channels.
- Retaining thick vegetative cover on public lands flanking rivers.

F-21 Preserve Floodplains as Open Space

Preserving natural areas and vegetation benefits natural resources while also mitigating potential flood losses. Techniques include:

- Developing an open space acquisition, reuse, and preservation plan targeting hazard areas.
- Developing a land banking program for the preservation of the natural and beneficial functions of flood hazard areas.
- Using transfer of development rights to allow a developer to increase densities on another parcel that is not at risk in return for keeping floodplain areas vacant.
- Compensating an owner for partial rights, such as easement or development rights, to prevent a property from being developed.

F-22 Increase Awareness of Flood Risk and Safety

Ideas for increasing flood risk awareness include the following:

- Encouraging homeowners to purchase flood insurance.
- Annually distributing flood protection safety pamphlets or brochures to the owners of flood-prone property.
- Educating citizens about safety during flood conditions, including the dangers of driving on flooded roads.
- Using outreach programs to advise homeowners of risks to life, health, and safety.
- Offering GIS hazard mapping online for residents and design professionals.
- Establishing a Program for Public Information (PPI) with a PPI committee (as suggested by Activity 332 of the CRS Coordinator's Manual).

WF-9 Implement a Fuels Management Program

A fuels management program may be implemented to reduce hazardous vegetative fuels on public lands, near essential infrastructure, or on private lands by working with landowners. The program can include the following:

- Performing maintenance including fuel management techniques such as pruning

and clearing dead vegetation, selective logging, cutting high grass, planting fire-resistant vegetation, and creating fuel/fire breaks (i.e., areas where the spread of wildfires will be slowed or stopped by the removal of fuels).

- Using prescribed burning to reduce fuel loads that threaten public safety and property.
- Identifying and clearing fuel loads created by downed trees.
- Cutting firebreaks into public wooded areas in the wildland-urban interface.
- Sponsoring local "slash and clean-up days" to reduce fuel loads along the wildland-urban interface.
- Linking wildfire safety with environmental protection strategies (i.e., improving forest ecology, wildlife habitat, etc.).
- Developing a vegetation management plan.

IV. Education and Awareness Programs

These are actions that inform and educate citizens, elected officials, and property owners about hazards and ways to mitigate them. Such actions include radio or television spots, websites with maps and information, real estate disclosure, presentations to school groups or neighborhood organizations, and mailings to residents in hazard-prone areas. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation is more indirect than structural projects that directly reduce risk, it is an important foundation. A greater understanding and awareness of hazards and risk is more likely to lead to direct action.

D-9 Educate Residents on Water Saving Techniques

Encourage citizens to take water-saving measures, such as the following:

- Installing low-flow water saving showerheads and toilets.
- Turning water flow off while brushing teeth or during other cleaning activities.
- Adjusting sprinklers to water the lawn and not the sidewalk or street.
- Running the dishwasher and washing machine only when they are full.
- Checking for leaks in plumping or dripping faucets.
- Installing rain-capturing devices for irrigation.
- Encouraging the installation of gray water systems in homes to encourage water reuse.

D-10 Educate Farmers on Soil and Water Conservation Practices

Encourage farmers to implement soil and water conservation practices that foster soil health and improve soil quality to help increase resiliency and mitigate the impacts of droughts. Potential conservation practices include the following:

- Rotating crops by growing a series of different types of crops on the same fields every season to reduce soil erosion.
- Practicing contour farming by farming along elevation contour lines to slow water runoff during rainstorms and prevent soil erosion, allowing the water time to absorb into the soil.
- Using terracing on hilly or mountainous terrain to decrease soil erosion and surface

runoff.

- Planting "cover crops," such as oats, wheat, and buckwheat, to prevent soil erosion.
- Using zero and reduced tillage to minimize soil disturbance and leave crop residue on the ground to prevent soil erosion.
- Constructing windbreaks to prevent evaporation from reclaiming salt-affected soil.
- Collecting rainwater and using natural runoff to water plants.

D-11 Purchase Crop Insurance

Preserve economic stability during a drought by encouraging agricultural interests to obtain crop insurance to cover potential losses due to drought.

ER-6 Increase Awareness of Erosion Hazards

Consider ways to help citizens become more aware of specific erosion risks in your area, such as:

- Notifying property owners located in high-risk areas.
- Disclosing the location of high-risk areas to buyers.
- Developing a brochure describing risk and potential mitigation techniques.
- Offering GIS hazard mapping online for residents and design professionals.

ET-2 Increase Awareness of Extreme Temperature Risk and Safety

The impacts of extreme temperatures on public health can be lessened if citizens know how to prepare and protect themselves. Ideas for increasing awareness include the following:

- Educating citizens regarding the dangers of extreme heat and cold and the steps they can take to protect themselves when extreme temperatures occur.

ET-3 Assist Vulnerable Populations

Measures should be taken to ensure vulnerable populations are adequately protected from the impacts of extreme temperatures, such as:

- Organizing outreach to vulnerable populations, including establishing and promoting accessible heating or cooling centers in the community.
- Requiring minimum temperatures in housing/landlord codes.
- Encouraging utility companies to offer special arrangements for paying heating bills, if not already required by state law.
- Creating a database to track those individuals at high risk of death, such as the elderly, homeless, etc.

ET-4 Educate Property Owners about Freezing Pipes

Extreme cold may cause water pipes to freeze and burst, which can cause flooding inside a building. Ideas for educating property owners include the following:

- Educating homeowners and builders on how to protect their pipes, including

locating water pipes on the inside of building insulation or keeping them out of attics, crawl spaces, and vulnerable outside walls.
- Informing homeowners that letting a faucet drip during extreme cold weather can prevent the buildup of excessive pressure in the pipeline and avoid bursting.

F-23 Educate Property Owners about Flood Mitigation Techniques

Educate property owners regarding options for mitigating their properties from flooding through outreach activities such as:
- Using outreach activities to facilitate technical assistance programs that address measures that citizens can take or facilitate funding for mitigation measures.
- Encouraging homeowners to install backflow valves to prevent reverse-flow flood damages.
- Encouraging residents in flood-prone areas to elevate homes.
- Educating the public about securing debris, propane tanks, yard items, or stored objects that may otherwise be swept away, damaged, or pose a hazard if picked up and washed away by floodwaters.
- Asking residents to help keep storm drains clear of debris during storms (not to rely solely on Public Works).

HA-3 Increase Hail Risk Awareness

Conduct outreach activities to increase public awareness of hail dangers, including:
- Mailing safety brochures with monthly water bills.
- Posting warning signage at local parks, county fairs, and other outdoor venues.
- Teaching school children about the dangers of hail and how to take safety precautions.

L-2 ConductLightning Awareness Programs

Use outreach programs to promote awareness of lightning dangers. This could include ideas such as:
- Developing a lightning brochure for distribution by recreation equipment retailers or outfitters in mountainous areas.
- Mailing safety brochures with monthly water bills.
- Posting warning signage at local parks.
- Teaching school children about the dangers of lightning and how to take safety precautions.

SW-7 Increase Severe Wind Risk Awareness

Improve public awareness of severe wind through outreach activities such as:
- Informing residents of shelter locations and evacuation routes.
- Educating homeowners on the benefits of wind retrofits such as shutters, hurricane clips, etc.
- Ensuring that school officials are aware of the best area of refuge in school

buildings.
- Instructing property owners on how to properly install temporary window coverings before a storm.
- Educating design professionals to include wind mitigation during building design.

WW-5 Conduct Winter Weather Risk Awareness Activities

Public awareness of severe winter storms can be improved through the following efforts:
- Informing the public about severe winter weather impacts.
- Producing and distributing family and traveler emergency preparedness information about severe winter weather hazards.
- Including safety strategies for severe weather in driver education classes and materials.
- Encouraging homeowners to install carbon monoxide monitors and alarms.
- Educating citizens that all fuel-burning equipment should be vented to the outside.

WW-6 Assist Vulnerable Populations

Protect vulnerable populations from the impacts of severe winter storms through the following efforts:
- Identifying specific at-risk populations that may be exceptionally vulnerable in the event of long-term power outages.
- Organizing outreach to vulnerable populations, including establishing and promoting accessible heating centers in the community.

SU-6 Educate Residents about Subsidence

Increase residents' knowledge of subsidence through the following:
- Promoting community awareness of subsidence risks and impacts.
- Offering GIS hazard mapping online for residents and design professionals.

T-3 Conduct Tornado Awareness Activities

Conduct outreach activities to increase awareness of tornado risk. Activities could include the following:
- Educating citizens through media outlets.
- Conducting tornado drills in schools and public buildings.
- Teaching school children about the dangers of tornadoes and how to take safety precautions.
- Distributing tornado shelter location information.
- Supporting severe weather awareness week.
- Promoting use of National Oceanic and Atmospheric Administration (NOAA) weather radios

WF-10 Participate in Firewise Program

The Firewise program provides a series of steps that individual residents and their neighbors can take to keep their homes and neighborhoods safer from fire. Consider actions such as:

- Joining the "Firewise Communities/USA" recognition program sponsored by the National Wildlife Coordinating Group (firewise.org).
- Sponsoring Firewise workshops for local officials, developers, civic groups, and neighborhood/homeowners' associations.
- Consulting Firewise guidance and encouraging or requiring best practices in your community.

WF-11 Increase Wildfire Risk Awareness

Education and outreach programs can target citizens, businesses, developers, landscapers, and insurers among others to increase awareness of wildfire risk and strategies for protecting homes and infrastructure. Consider actions such as:

- Offering GIS hazard mapping online for residents, developers, and design professionals.
- Organizing a local fire department tour to show local elected officials and planners the most vulnerable areas of the community's wildland-urban interface and increase their understanding of risks.
- Working with insurance companies, utility providers, and others to include wildfire safety information in materials provided to area residents.
- Developing partnerships with neighborhood groups, homeowners' associations, and others to conduct outreach activities.
- Using local fire departments to conduct education programs in schools.
- Informing the public about proper evacuation procedures.
- Forming 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.

WF-12 Educate Property Owners about Wildfire Mitigation Techniques

Educate property owners on actions that they can take to reduce risk to property, such as the following:

- Installing fire mitigation systems such as interior and exterior sprinkler systems.
- Performing safe disposal of yard and household waste rather than open burning.
- Removing dead or dry leaves, needles, twigs, and combustibles from roofs, decks, eaves, porches, and yards.
- Creating a defensible space or buffer zone cleared of combustible materials around property.
- Installing and maintaining smoke detectors and fire extinguishers on each floor of their homes or other buildings.
- Safely using and storing necessary flammable materials, including machine fuels. Approved safety cans should be used for storing gasoline, oily rags, and other flammable materials. Firewood should be stacked at least 100 feet away and uphill from homes.

- Keeping flammables, such as curtains, secured away from windows or using heavy fire-resistant drapes.

MU-14 Increase Hazard Education and Risk Awareness

Hazard education and awareness activities that address multiple hazards include:

- Developing and implementing a multi-hazard public awareness program.
- Providing information on all types of hazards, preparedness and mitigation measures, and responses during hazard events.
- Establishing a "hazard awareness week" in coordination with the media to promote hazard awareness (seasonal).
- Establishing an interactive website for educating the public on hazard mitigation and preparedness measures.
- Annually hosting a public hazards workshop or exposition for all residents.
- Establishing hazard information centers.
- Creating a speakers bureau for disaster-related topics that focus on mitigation and preparedness measures.
- Enhancing hazard awareness of the private sector, particularly lenders, insurance agents, and realtors.
- Scheduling an annual "what's new in mitigation" briefing for the local governing body (possibly with SHMO, etc.).

MU-15 Improve Household Disaster Preparedness

Educate the public on how to prepare for hazards and disasters, including the following:

- Encouraging property owners to purchase hazard insurance not as an alternative to mitigation, but rather to add financial protection if damage does occur.
- Encouraging residents to prepare by stocking up the necessary items and planning for how family members should respond during a disaster. Publicized information about household preparedness can be found at www.ready.gov.
- Providing hazard vulnerability checklists for homeowners to conduct their own inspections.
- Promoting the purchase and use of NOAA weather radios by residents.
- Encouraging citizens to secure loose items (i.e., patio furniture).
- Participating in Nation Weather Service StormReady Program.
- Purchasing and installing NOAA weather radios in schools, government buildings, parks, etc.
- Storing digital or hard copies of public records in low-risk, offsite locations.

MU-16 Promote Private Mitigation Efforts

Encourage private mitigation efforts that address multiple hazards through the following:

- Using outreach programs to: 1) advise homeowners of risks to life, health, and safety; 2) facilitate technical assistance programs that address measures that citizens

can take; or 3) facilitate funding for mitigation measures.

- Establishing, maintaining, and publicizing a library section on hazard mitigation techniques for local residents.
- Identifying and recruiting civic groups and volunteer agencies for community mitigation projects.
- Establishing a network for a business-to-business mitigation mentoring program.
- Offering hazard susceptibility audits of local small businesses.
- Completing a "demonstration model" showing use of hazard mitigation techniques for public display.
- Establishing a technical assistance program for residents to access data or resources for mitigation purposes.
- Educating the public on tradeoffs associated with multi-hazard design.

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Attachment One

Yakima County
Comprehensive Emergency Management Program Update 2014

Section Two
Mitigation

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Preface

Mitigation efforts include activities that will prevent or reduce the impact of emergency/ disaster results on people, property and environment.

I. General

A. Mitigation efforts include activities that will prevent or reduce the impact of emergency/ disaster results on people, property and environment. Efforts include building codes, land use planning, training and education, structural and non-structural safety measures. Federal policies require a formal mitigation program implementation plan any time an area is subject of a Presidential Disaster Declaration and federal disaster monies are received. This program requires:

1. Working knowledge of related federal regulations, guidelines, reports.
2. Significant follow through for the duration of the recovery phase.
3. Ability to implement this structure during emergencies.
4. Ability to effectively manage the system during the response and recovery phases.

B. Philosophically, there are three things we can do to mitigate. We can:

1. Act on the hazard (the cause of the emergency).
2. Act on the people (the population effected by the emergency).
3. Act on the interaction between the hazard and the people.

C. Mitigation activities may be undertaken before a hazard event or afterwards. Pre-event mitigation activities are highly desirable, since the period immediately following a hazard event is often a difficult one in which to make mitigation decisions. If put in place soon enough, these activities can sometimes reduce the damage caused by the next event. Also worth noting is mitigation can break the cycle of repeated destruction resulting from hazard events. Mitigation typically is a difficult, long-term task, but is well worth the effort.

II. Policy

A. It is the policy of Yakima County jurisdictions to support mitigation activities **to** eliminate or reduce disaster damages and to coordinate recovery efforts with long term development and hazard mitigation plans. This is done a number of ways, including, but not limited to, the land use planning process and the enforcement of existing codes, enhancement of codes, and mitigation requirements in the permit

process. Since mitigation efforts will not eliminate all disasters, the jurisdiction shall endeavor to be as prepared as possible for a disaster.

B. Yakima County jurisdictions are encouraged to support mitigation efforts that fall within their responsibilities. Local jurisdictions have a system of Boards and Commissions that have the ability to effectively address many mitigation issues.

C. It is the policy of Yakima County that jurisdictions will enforce public safety mandates to include land use management and building codes, and recommend to the appropriate leadership improvements to the emergency readiness of the community.

III. Mitigation Plan Goals

A. Protect Life, Property and Public Welfare

1. Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural and technological hazards.

2. Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.

3. Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural and technological hazards

B. Public Awareness

1. Develop and implement education and outreach programs to increase public awareness of the risks associated with natural and technological hazards.

2. Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

C. Natural Systems

1. Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.

2. Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

D. Partnerships and Implementation

1. Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.

2. Encourage leadership within the public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

E. Emergency Services

1. Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.

2. Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

3. Coordinate and integrate natural and technological hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

IV. Mitigation Programs and Jurisdiction Responsibilities

Note: Details and further information is contained in the *Yakima County Multi-Jurisdictional Hazards Mitigation Plan*, *2015*

A. Emergency Services Measures

1. Information Technology managers are responsible for protection of important digital records, computer network, and data base systems during a disaster event. Additionally, the GIS unit will be involved in tracking damage and providing geographic analysis.

2. Yakima County Permit Services provides damage assessment and permit processing of reconstruction.

3. The Office of Emergency Management prepares and updates the *Yakima County Comprehensive Emergency Management Program (CEMP)*. Emergency management is the function that coordinates the activities of jurisdictions within Yakima County during an emergency or disaster, serving as a conduit of information and ensuring the most efficient use of resources. Department

directors and other staff are assigned specific roles in the Operational Area Emergency Operations Center. The Emergency Management Director, or designee, serves as the Operational Area Emergency Operations Center (OA EOC) Manager.

4. Law enforcement is responsible for providing communications, coordinating military support, law enforcement, and other duties as outlined in the Yakima County CEMP. They provide an integral role of providing traffic control at key locations to facilitate an efficient evacuation.

5. The Office of Emergency Management establishes, equips, and maintains the Operational Area EOC; identifies required EOC staffing; prepares and maintains maps, displays, databases, reference materials, and other information needed to support EOC operations; identifies and stocks supplies needed for EOC operations; develops and maintains procedures for activating, operating, and deactivating the EOC.

6. Health Department supports community health and disease prevention programs and air quality and water quality programs.

7. Fire Services provide rapid, effective, and efficient response to all residents and visitors requests for emergency assistance, including fire, pre-hospital emergency medical, and rescue services.

8. School Districts develop district and building emergency plans in accordance with state and district guidance and policy. Additionally, they provide school facilities for use as shelters.

B. Public Information

1. Public information bulletins and broadcasts released from jurisdictions are cleared by the designated official.

2. Flood Control Zone District administers the National Flood Insurance Program/Community Rating System program and provides numerous public information activities that includes: provision of Flood Insurance Rate Map (FIRM) map information; an annual outreach project published in the community newsletter regarding mitigation of flood hazards; encourages real estate agents to disclose flood hazard information; ensures that the library contains reference materials on hazard mitigation; and offers presentations on environmental and flood hazard issues to community groups.

3. Fire services provide numerous public outreach projects, including fire safety to encourage the citizens to prepare for a disaster. Many other outreach projects are provided to various groups, including school children. Fire Departments and Building Inspectors review all commercial building permit applications, and provides technical assistance with incorporation of health and safety measures into development plans.

4. Law enforcement agencies provide public safety information and numerous public safety and crime prevention projects.

5. The Office of Emergency Management provides numerous public outreach projects, including presentations to community groups and seminars to encourage the citizens to prepare for a disaster.

6. Public Works provides informational signs on designated evacuation routes.

C. Preventative/Property Protection

1. The Planning Department is responsible for the preparation and administration of the *Yakima County Comprehensive Plan 2015* that contains goals, objectives, and policies relating to growth management.

2. Yakima County participates in the National Flood Insurance Program/Community Rating System program and has committed to address building attributes such as elevations and substantial improvements.

3. Planning, Zoning and Building Department applies the Building Codes and Life Safety Code to building permit applications.

4. The EOC Manager is responsible for coordination and dissemination of emergency/disaster related information to the public.

D. Environmental Protection

1. *Yakima County Comprehensive Plan 2015* has numerous policies restricting activities that would degrade the natural environment.

2. Fire Services and private contractors provide emergency response to and cleanup of hazardous material incidents.

E. Pre- and Post-Disaster Mitigation Measures

1. The Yakima Valley Office of Emergency Management is responsible for developing the *Yakima County Multi-Jurisdictional Hazards Mitigation Plan.*

2. The Plan describes the efforts of this county in developing mitigation strategies for natural and technological hazards.

3. The Plan is consistent with the Disaster Mitigation Act 2000.

F. Preventative

1. Public Works is responsible public drainage system maintenance.

2. Private groups and homeowners associations assist with cleanup and maintenance drainage systems, creeks, etc.

3. Another preventative function performed is by creating wildland fire building codes.

4. The Yakima Area Chapter of the American Red Cross assists public schools in developing emergency plans.

5. Yakima County's Local Emergency Planning Committee (LEPC) is active with the EPCRA (SARA Title III) hazardous materials prevention program to include: identification of hazardous material sites, plotting plumes (GIS), encouraging facility emergency plans, warning, etc.

V. State and/or Federal

State and federal government mitigation programs are numerous, varied, and are often hazard specific. Funding to local government varies. A Presidential Declaration will require mitigation planning as a requirement of receiving federal assistance.

VI. Post Disaster

A. Hazard Mitigation Reports

1. When the President makes a Disaster Declaration, the Disaster Relief Act of 1974, Section 408, as amended, sets forth certain conditions for receiving any federal disaster loans or grants, specifically that mitigation measures will be taken to prevent such damages from reoccurring. The ability of Yakima County jurisdictions to comply with these requirements will depend on staffing requirements and funding availability.

2. Yakima County will use the Disaster Declaration to highlight geographic and subject areas (infrastructure, human services, mitigation) that need further addressing.

B. Interagency Hazard Mitigation Team

1. An Interagency Hazard Mitigation Team is established consisting of representatives from federal, state, and local government. The Washington State Emergency Management Division will assist the Yakima Valley Office Emergency Management in coordinating efforts and selecting jurisdiction mitigation team members during Presidential declared disasters.

2. The role of the Yakima Valley Office of Emergency Management is to provide local coordination and to identify geographic areas for survey tours.

3. The Interagency Hazard Mitigation Team prepares three reports at different time intervals after the disaster to document mitigation needs, recommendations for actions, and progress on mitigation activities to reduce future impacts in the disaster area. The Federal Emergency Management Agency (FEMA) provides guidance for these reports through the Washington State Emergency Management Division after a Presidential Declaration of Disaster.

C. Long-Term Redevelopment

1. A local task force will be established to guide long-term redevelopment.

2. Yakima County will establish new procedures and policies as required to ensure compliance with state and federal requirements.

3. Yakima County will work closely with the Washington State Emergency Management Division in preparing a post-disaster redevelopment plan.

VII References

A. *Yakima County Multi-Jurisdictional Hazards Mitigation Plan 2015*
B. *Yakima County Hazard Identification and Community Assessment, 2009*
C. *Yakima County Comprehensive Emergency Management Program, 2014*

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