2016 Lewis County Multi-Jurisdictional Hazard Mitigation Plan

ADOPTED by LEWIS COUNTY: 1.25.2016

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Acknowledgements

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The cost of developing this Plan has been graciously provided by Lewis County government for the protection of all Lewis County residents.

The following municipal elected officials were critical stakeholders in developing this plan.

Centralia
Mayor Bonnie Canaday, Mayor Pro-tem John Elmore, Gabe Anzelini, Lee Coumbs, Patrick Gallagher, Ron Greenwood, Bart Ricks

Chehalis
Mayor Dennis Dawes, Mayor Pro-tem Terry Harris, Tony Ketchum, Daryl Lund, Dr. Isaac Pope, Robert Spahr, Chad Taylor

Morton
Mayor James Gerwig, Salina Smathers, Peppy Elizaga, Richard Vanderlip, Christina Ladson

Mossyrock
Mayor Thomas Meade, Darrell Peoples, Debra Olson, Randall Sasser, Coral Smith, Teresa Quinlan

Napavine
Mayor John Sayers, Mayor Pro-tem Lionel Pinn, Jenifer Slemp, LaVerne Haslett, Scott Hamilton, Robert A. Wheeler

Toledo
Mayor Jerry Pratt, Jim Fluckinger, Steve Dobosh, Carol Hill, Nathan Cook, Mike Thomas

Vader
Mayor Kenneth D. Smith, Mayor Pro-tem Kevin Flynn, Andrew Wilson, Mark Fenison, Joe Schey, Justin Olson

Winlock
Mayor Lonnie Dowell, Barbara Pedersen, Sarah Gifford, Jerry Rader, Sam Patrick, Aaron Mummert

Town of Pe Ell
Mayor Lonnie Willey, Joseph Dunn, Kristi Milanowski, Bonnie Montgomery, Chris Phelps, Aaron Porter

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1.0 Introduction

Disasters can cause loss of life, damage buildings and other facilities, infrastructure, and have devastating consequences for a jurisdiction's economic and social well-being. According to the Stafford Act (44 CFR 206:401) hazard mitigation is defined as "any action taken to reduce or eliminate the long-term risk to human life and property from natural disasters". Local jurisdictions have the responsibility to protect the health, safety, and welfare of their citizens. Proactive mitigation strategies and actions can reduce risk and provide for safer and more disaster-resilient jurisdictions. Mitigation can be viewed as an investment in the future of our community's safety and sustainability.

A multi-jurisdictional hazard mitigation plan is a plan jointly prepared by more than one jurisdiction. The term "jurisdiction" in this guide means "local government." Code of Federal Regulations (CFR) Title 44 Part 201 Mitigation Planning defines a "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; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity."

Hazard mitigation planning is a process for state, local, and other governments to identify policies, activities, and tools to implement mitigation actions. Mitigation refers to any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. The hazard mitigation planning process has four general steps, which include organizing resources, assessing risks, developing a mitigation plan, and implementing the plan and monitoring progress.

The Disaster Mitigation Act of 2000 (DMA 2000) was passed as a result of escalating disaster costs that were occurring throughout the United States. DMA 2000 challenges local governments to identify methods and implementation procedures they can use to prevent damage from a disaster before the disaster hits. The intent of DMA 2000 is to facilitate cooperation between state and local authorities across a broad spectrum of mitigation activities. The focus of DMA 2000 is on emphasizing the importance of pre-disaster mitigation planning and promoting sustainability as a strategy for disaster resistance. The outline for plan development and authorization to complete the plan is based upon requirements in Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5156, enacted under Section 104 of DMA 2000.

DMA 2000 requires local governments that wish to seek federal disaster mitigation funds to adopt a mitigation plan that describes their process of identifying hazards, risks, and vulnerabilities. Based upon the requirements of DMA 2000, this Plan establishes specific goals and objectives based on the hazards with a potential to impact Lewis County and identifies mitigation activities that are appropriate and specific to each participating jurisdiction.

According to the FEMA Local Mitigation Planning Handbook (March, 2013) multi-jurisdictional planning processes can provide the following benefits:

- Improves communication and coordination among jurisdictions and other regional entities

- Enables comprehensive mitigation approaches to reduce risks that affect multiple jurisdictions
- Maximizes economies of scale by leveraging individual capabilities and sharing costs and resources
- Avoids duplication of efforts
- Provides an organizational structure that local jurisdictions may find supportive.

The purpose of this Lewis County Multi-Jurisdiction Hazard Mitigation Plan is to identify hazards, assess the potential for loss associated with the hazards, assess the vulnerability of each planning participant to different hazards, and develop sound mitigation strategies to reduce these vulnerabilities. The potential for substantial damage as a result of a disaster presents a large potential for impacts to the health, safety, and welfare of all citizens residing within the county. Consistent with the Federal Emergency Management Agency (FEMA) planning process guidelines, the purpose of this Plan is to accomplish the following objectives:

- Minimize the disruption to each community following a disaster;
- Establish actions to reduce or eliminate future damages in order to efficiently recover from disasters;
- Investigate, review and implement activities or actions to ensure disaster related hazards are addressed by the most efficient and appropriate solution;
- Educate citizens about potential hazards;
- Fulfill planning requirements for future hazard mitigation project grants; and
- Facilitate development and implementation of hazard mitigation management activities to ensure a sustainable community.

1.1 Plan Comparison from 2010 to the 2015 Update

The following subjects were reviewed, added, or updated as part of the 2015 updated plan:

1. The plan identifies agencies involved in 2005, 2010, and 2015, and as well as agencies that opted out of the 2015 hazard mitigation plan update.
2. The plan allowed the participating agencies identify and/or update their critical facilities.
3. The update allowed stakeholders and the general public to review the goals and objectives of the updated plan.
4. The 2015 update allow the public to participate in a survey and follow the process online at www.cityofcentralia.com.
5. The 2015 updated plan allowed the public the opportunity to review and participate in updating the identified hazards as well as reviewing the old mitigation strategies and identifying new mitigation strategies.
6. The 2015 updated plan provided for adjacent communities, agencies, businesses, academia, non-profits and other interested parties to participate in the updating process.
7. The 2015 update provided stakeholders an opportunity to identify and update all existing plans. Studies, reports and technical information have been updated and new tools were utilized as part of the hazard identification process.
8. The plan allowed stakeholders to update their inventories of vulnerable buildings and structures by specific, identified hazard (i.e. flood).
9. The updated plan provided stakeholders with a vehicle to estimate potential loss – by individual hazard.

10. The updated plan provided stakeholders with the opportunity to estimate potential losses by utilizing the HAZUS-MH program for flood and earthquake events.
11. The plan updated the land uses and development trends based on each participating community and the county.
12. The plan allowed for the evaluation of the existing mitigation strategies as well as the development of new mitigation strategies based on the STAPLEE criteria.
13. The updated plan includes a section on the NFIP which develops new mitigation strategies that relate directly to the RLP.
14. The updated plan defines the method and schedule for ongoing updating and reevaluation. It includes providing for additional public input.
15. The updated plan provides greater detail about identified hazards, risk assessment and mitigation strategies than the original plan.
16. The 2015 updated plan includes updated GIS maps that identify:
    a. critical facilities,
    b. hazards, and
    c. land uses.

1.2 Planning Participants/Partners

Municipal Planning Partners			
Agency	**2005 Plan**	**2010 Plan**	**2015 Plan**
Lewis County	Yes	Yes	Yes
Centralia	Yes	Yes	Yes
Chehalis	Yes	Yes	Yes
Morton	Yes	Yes	Yes
Mossyrock	Yes	Yes	Yes
Napavine	Yes	Yes	Yes
Toledo	Yes	Yes	Yes
Vader	Yes	Yes	Yes
Winlock	Yes	Yes	Yes
Town of Pe Ell	Yes	Yes	Yes
Special Purpose District Planning Partners			
Lewis County Fire District 1 – Onalaska	Yes	Yes	Yes
Lewis County Fire District 2 – Toledo	No	Yes	Yes
Lewis County Fire District 3 – Mossyrock	Yes	Yes	Yes
Lewis County Fire District 5-Napavine	No	No	Yes
Lewis County Fire District 8 – Salkum	No	Yes	Yes
Lewis County Fire District 9 – Mineral	Yes	Yes	Yes
Lewis County Fire District 10 – Packwood	Yes	Yes	Yes
Lewis County Fire District 11 – Pe Ell	No	Yes	Yes
Lewis County Fire District 13 – Curtis	No	Yes	Yes
Lewis County Fire District 14 – Randle	No	Yes	Yes
Lewis County Fire District 15 – Winlock	No	Yes	Yes
Lewis County Fire District 16 – Doty	Yes	Yes	Yes
Lewis County Fire District 17 – Ashford	Yes	Yes	Yes

Lewis County Fire District 18 – Glenoma	No	No	Yes
Cowlitz-Lewis Fire District 20 – Formerly LCFD 7	No	Yes	Yes
Riverside Fire Authority	No	Yes	Yes
Providence Hospital – Centralia	Yes	Yes	Yes
Morton General Hospital	Yes	Yes	Yes
Cemetery District 4 – Evergreen/Packwood, Silvercreek/Randle, Rainey Valley/Glenoma	No	Yes	Yes
Cemetery District 5 – Lone Hill Cemetery	No	No	Yes
Cemetery District 7 – Toledo Cemetery	No	Yes	Yes
Energy Northwest	No	Yes	Yes
Lewis County PUD	Yes	Yes	Yes
Centralia College	Yes	Yes	Yes
Centralia School District	Yes	Yes	Yes
Chehalis School District	Yes	Yes	Yes
Pe Ell School District	Yes	Yes	Yes
Winlock School District	Yes	Yes	Yes
Chehalis/Centralia Airport (see City of Chehalis)	Yes	Yes	Yes
Morton Airport (see City of Morton)	Yes	Yes	Yes
Packwood Airport (see Lewis County)	No	Yes	Yes
Toledo Airport (see Lewis County)	No	Yes	Yes
Twin Transit	No	No	Yes
Cowlitz Indian Tribe	No	Yes	Yes
Port of Chehalis	No	Yes	Yes

2.0 Plan Adoption

Based upon the FEMA requirements, the multi-jurisdictional hazard mitigation plan must be formally adopted by each participant through approval of a resolution. This approval will legitimize the plan and create 'individual ownership' by each participant. Formal adoption provides evidence of a participant's full commitment to implement the plan's goals, objectives, and action items, and authorizes the appropriate responsible agencies to perform their responsibilities.

Adoption by the Local Governing Body Requirement §201.6(c)(5): For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Element

- Does the new or updated plan indicate the specific jurisdictions represented in the plan?
- For each jurisdiction, has the local governing body adopted the new or updated plan?
- Is supporting documentation, such as a resolution, included for each participating jurisdiction?

Once adopted, participants are responsible to implement and update the plan every five years. In addition, the plan will need to be reviewed and updated as appropriate when a hazard event occurs that significantly affects the area or individual participant. Copies of resolutions approved by each participant are located in the Appendix. Also included in the Appendix is information on public participation and implementation materials.

2.1 Multi-Jurisdictional Plan Adoption

All entities within Lewis County that are included in the CFR definition of "local government" are participating in this multi-jurisdictional plan. The table below summarizes the participants and the Plan adoption dates for each participant.

Municipal Planning Partners		
Participant	**Public Hearing Date**	**Plan Adoption Date**
Lewis County	1/25/2016	1/25/2016
City of Centralia	1/26/2016	1/26/2016
City of Chehalis		
City of Morton	5/23/2016	5/23/2016
City of Mossyrock	1/14/2016	1/14/2016
City of Napavine	3/22/2016	3/22/2016
City of Toledo	2/16/2016	2/16/2016
City of Vader	2/28/2016	2/28/2016
City of Winlock	1/25/2016	1/25/2016
Town of Pe Ell	3/1/2016	3/1/2016
Special Purpose District Planning Partners		
Lewis County Fire District 1 – Onalaska		1/21/2016
Lewis County Fire District 2 – Toledo		2/11/2016
Lewis County Fire District 3 – Mossyrock		2/10/2016
Lewis County Fire District 5 - Napavine		5/12/2016
Lewis County Fire District 8 – Salkum		4/11/2016
Lewis County Fire District 9 – Mineral		4/10/2016
Lewis County Fire District 10 – Packwood		4/14/2016

Lewis County Fire District 11 – Pe Ell		2/8/2016
Lewis County Fire District 13 – Curtis		4/11/2016
Lewis County Fire District 14 – Randle		2/11/2016
Lewis County Fire District 15 – Winlock		2/9/2016
Lewis County Fire District 16 – Doty		2/15/2016
Lewis County Fire District 17 – Ashford		4/11/2016
Lewis County Fire District 18 – Glenoma		4/12/2016
Cowlitz-Lewis Fire District 20 – Formerly LCFD 7		4/14/2016
Riverside Fire Authority		2/10/2016
Providence Hospital – Centralia		4/22/2016
Morton General Hospital		4/27/2016
Centralia College		2/18/2016
Centralia School District		2/17/2016
Chehalis School District		4/19/2016
Pe Ell School District		4/20/2016
Winlock School District		4/20/2016
Energy Northwest		2/24/2016
Lewis County PUD		2/9/2016
Cowlitz Indian Tribe		
Port of Chehalis		2/25/2016
Twin Transit		4/21/2016
Cemetery District 4 – Evergreen/Packwood, Silvercreek/Randle, Rainey Valley/Glenoma		3/14/2016
Cemetery District 5 – Lone Hill Cemetery		5/2/2016
Cemetery District 7 – Toledo Cemetery		4/27/2016
Other Agencies		

2.2 Multi-Jurisdictional Planning Participation

Meeting Attendance

All plan participants (stakeholders) had at least one representative attend a minimum of one hazard identification meeting and one mitigation alternative meeting. All plan participants were also required to complete hazard identification and mitigation strategy worksheets related to their own individual agency.

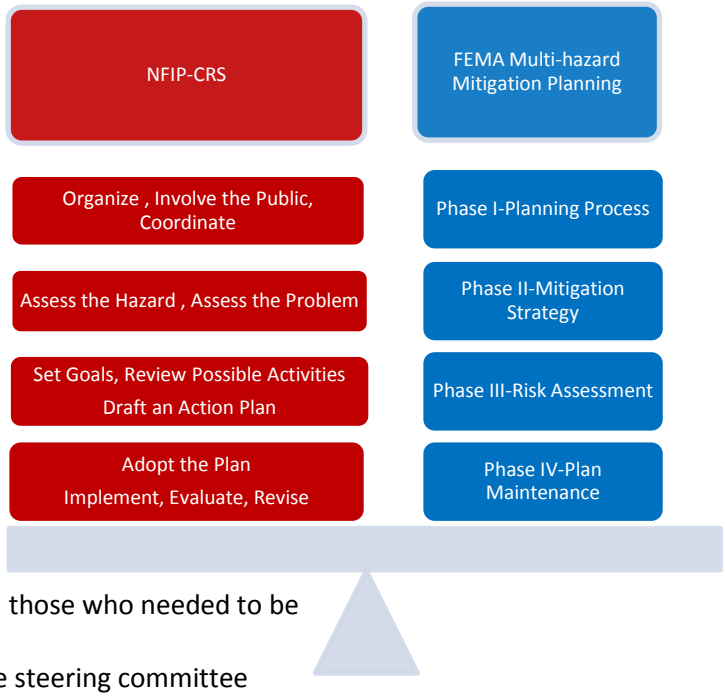
Nature of Participation	Lewis County	Centralia	Chehalis	Morton	Mossy-rock	Napavine	Toledo	Vader	Winlock	Town of Pe Ell
Steering Committee	Yes	Yes	No	No	No	No	No	No	No	No
Two representatives on Planning Team	Yes	Yes	Yes	No	No	No	No	No	No	No
Attended PT Meeting #1: Assessing the Hazard	2	2	2	0	0	0	1	1	1	1
Attended PT Meeting #2: Assessing the Problem	2	2	1	0	0	0	1	1	1	1
Attended PT meeting #3: Setting & Reviewing Goals	2	2	3	0	0	0	1	1	1	1
Attended PT Meeting #4: Reviewing Strategies	2	2	1	0	0	0	0	1	0	1
Attended PT Meeting #5: Drafting an Action Plan	2	2	0	0	0	0	0	0	0	0
Attended Stakeholders meeting #1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Submitted inventory, summary of report, and plans relevant to hazard mitigation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Submitted list of hazards that affect jurisdiction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Submitted description of what is at risk (facilities and infrastructure)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Submitted of land use patterns	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Attended Stakeholders meeting #2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reviewed plan goals	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Developed mitigation actions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Completed STAPLEE Worksheet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Evaluated mitigation actions based on cost effectiveness	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Completed implementation strategies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reviewed and commented on draft plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3.0 Planning Process

FEMA's Multi-Hazard Mitigation Plan & NFIP/CRS

As a pro-active planning document this plan blends two mitigation planning processes together. FEMA's regulations pursuant to the Disaster Mitigation Act of 2000 and its four step process with the CRS 10-step planning process. The 10 CRS step are aligned with the four phases of mitigation planning requirements. The following illustrates demonstrates the two processes and how they work together.



3.05 2015 Plan Update Process

Updating the plan consists of the following seven stages:

- Stage 1: Organize and Review - A steering committee was assembled consisting of individuals from Lewis County and Centralia to discuss updating the multi-jurisdictional hazard mitigation plan. The committee conducted outreach to establish the planning team and determine who to contact to determine the stakeholders and those who needed to be a part of the updating process.
- Stage 2: Engaging the Public – The steering committee and the planning team develop a public involvement strategy that included public meetings, creating surveys and website, and using multiple media outlets to generate interest.
- Stage 3: Update the Risk Assessment – Risk assessment is the process of determining the potential loss of life, personal injury, and property damage from the natural hazards. Each stakeholder identified hazards that affected their agencies, gauge the potential impacts of those hazards. The assessment including the following steps:
    - Hazard identification
    - Identification of critical facilities
    - Asset inventory and vulnerability identification
    - Estimating the potential damage to facilities
- Stage 4: Evaluated the 2010 Goals and Objectives – The Goals and Objectives guided the development of priorities for the mitigation strategies. The planning team and stakeholders were asked to review the goals and objectives.
- Stage 5: Evaluated the 2010 Mitigation Strategies and developed new strategies - Stakeholders were asked to review their 2010 mitigation strategies to determine if they were completed, not economical feasible, or if it should continue in the plan. Then stakeholders used the risk assessment worksheets to develop new mitigation actions to reduce the impact of hazards to facilities.
- Stage 6: Updating the Plan – The planning team and steering committee assembled a document to meet federal hazard mitigation planning requirements for all of stakeholders.

- Stage 7: Plan Adoption and Implementation – Once Washington State's Emergency Management Division and FEMA Region X, the final adoption process will begin. Each stakeholder agency will individually adopt the updated plan. The plan maintenance process includes monitoring and evaluating the plan periodically and revision every five years.

3.1 Introduction

This section provides an overview of the planning process; identifies the Planning Team members and stakeholders (participating agencies); discusses public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this plan.

3.2 Summary of Planning Process and Participants

3.2.05 Steering Committee

In the fall of 2014, the Lewis County Emergency Management Division approached the City of Centralia about serving as the "plan author" for updating the Lewis County Multi-jurisdiction Hazard Mitigation Plan. The City of Centralia agreed to the terms set forth and began to work with the county to assemble the Planning Team. A steering committee was formed to organize the process and develop the process of how the Plan would be updated. The following individuals make up the steering committee:

Background/Specialist	Organization	Individual
Emer. Mgmt./Public Safety	LC Emergency Management	Steve Mansfield, DEM
Emergency Management	LC Emergency Management	Jill Kangas, DEM Planner
Development/Airport	LC Community Development	Lee Napier, CDD
Plan Author	City of Centralia	Emil Pierson, CDD/Parks Director

Plan Coordination

3.2.1 Planning Team

The Planning Team is composed of a lead representative from each municipality as well as applicable local, county, state and federal agencies. These key personnel were assigned the responsibility of being a part of a team that would monitor and direct the process of developing and preparing the plan. The Planning Team worked directly with the plan author (City of Centralia) and technical support personnel to guide the planning process, review the plan, and will continue to serve as a liaison to participants throughout the planning area in plan implementation. The planning team members are listed below:

Background/Specialist	Organization	Individual
County Commission	Lewis County Commission	Edna Fund, LC Commissioner
Emer. Mgmt./Public Safety	LC Emergency Management	Steve Mansfield, DEM
Emergency Management	LC Emergency Management	Jill Kangas, DEM Planner
Development/Airport	LC Community Development	Lee Napier, CDD
Building/Floodplains	LC Building Department	Doyle Sanford, Floodplain Manager

Planning/Environmental	LC Community Development	Karen Witherspoon, LC Planner/CRS Coordinator
GIS Mapping/Public Works	LC Public Works	Matt Hyatt, LC GIS
Public Health/Environmental	LC Public Health & Social Services	William Teitzel, Supervisor
Environmental	LC Public Works	Ann Weckback
Planning/Parks & Recreation	City of Centralia	Emil Pierson, CDD/CRS Coor.
Building/Development	City of Centralia	LG Nelson, Chief Building Official
Planning/Airport	City of Chehalis	Dennis Osborn, Community Development Director
Public Works	City of Chehalis	Rick Sahlin, Public Works Director
Public Safety	Town of Pe Ell	Mike Hartnett, Marshal
City Clerk	City of Vader	Jill Nielson, City Clerk
Mayor	City of Winlock	Lonnie Dowell, Mayor
Public Safety	City of Winlock	Terry Williams, Police Chief
State-DOE	Dept. of Ecology-SW	Jeff Stewart
State-WA EMD	WA State EMD	Morgan Mak, Mitigation Strategist
State-WA EMD	WA State EMD Committee Rep./ President of the LC Farm Bureau	Ron Averill
Non-Government Agencies	United Way of Lewis County	Linda Raschke
Non-Government-Insurance	Bowman Insurance Agency	Pete Bowman
KELA-KMNT Radio & LC PUD Commissioner	KELA-KMNT Radio	Dean Dahlin
Non-Government-Realtor	John L. Scott	Mark Althauser

The Planning team is comprised of private citizens and business, government representatives and specialists from the seven different backgrounds and government departments:

1. Preventive measures (e.g., codes)
2. Property protection (e.g., elevation)
3. Natural resource protection
4. Emergency services
5. Structural flood control projects
6. Public Information

3.2.2 Stakeholders

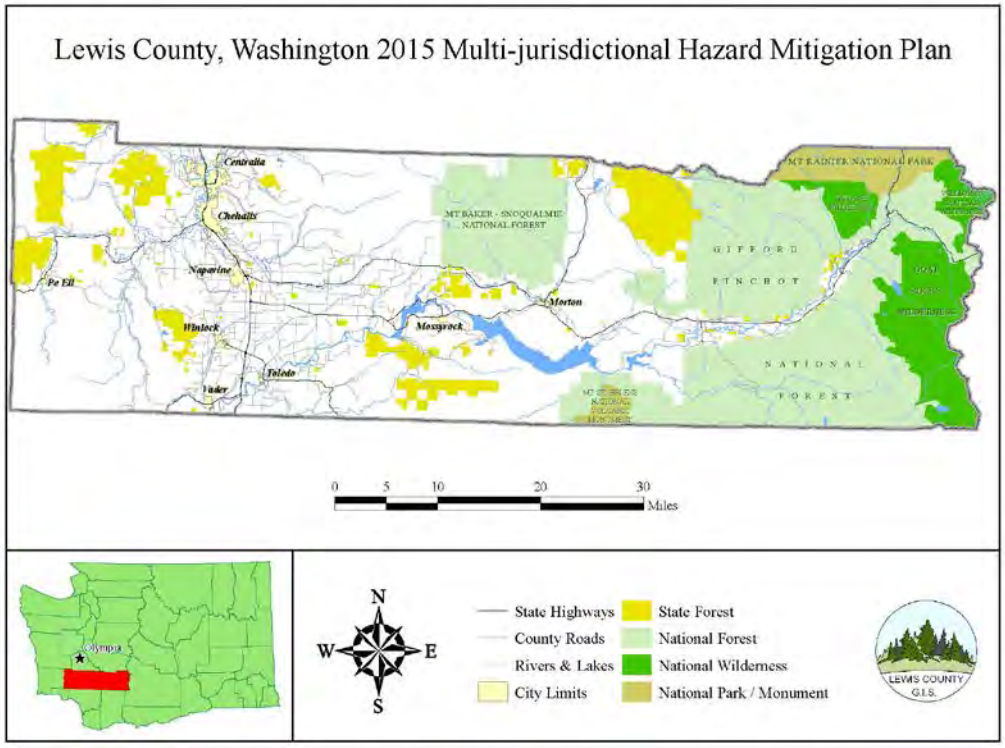
In addition to the Planning Team, all plan participants are part of the Stakeholders Committee. This committee had at least one representative from all of the participating agencies and from throughout the county and outside of the county. The committee members provided information about their respective agencies as well as mitigation strategies and invaluable information throughout the process including reviewing the draft plans and encouraging member of the general public to participate in the planning process. Stakeholders were required to participate in hazard identification and mitigation alternative meetings. In the 2015 update, all jurisdictions that participated in the 2005 & 2010 plans were invited to participate in this update. The following is a list of all of the agencies that comprised the committee: Stakeholder Committee

Organization	**Individual**	**Organization**	**Individual**
Lewis County	Lee Napier	LC Fire District 16 – Doty	Greg Feuchter, Chief
City of Centralia	Emil Pierson	LC Fire District 17 – Ashford	Gary Olson, Chief
City of Chehalis	Dennis Osborn	LC Fire District 18 – Glenoma	Edward Lowe, Chief Phil Congden , Comm.
City of Morton	Keith Cournyer, P.W.	Cowlitz-Lewis Fire District 20	Rich Underdahl, Chief
City of Mossyrock	Doneias Santiago, City Clerk	Riverside Fire Authority	Mike Kytta, Chief
City of Napavine	Penny Jo Haney, City Clerk	Providence Hospital – Centralia	Ken Mitchell
City of Toledo	Michelle Whitten, City Clerk	Morton General Hospital	Jeff Robbins, Maint. Super.

City of Vader	Jill Nielson, City Clerk/Treas.	**Education**	
City of Winlock	Lonnie Dowell, Mayor	Centralia College	Gil Elder
Town of Pe Ell	Mike Hartnett, Marshal	Centralia School District	Phil Iverson
Public Safety		Chehalis School District	Heather Pinkerton
LC Fire District 1 – Onalaska	Andrew Martin	Pe Ell School District	Keith Shepherd
LC Fire District 2 – Toledo	Diane Wallace, Sec.	Winlock School District	Shannon Criss, Super.
LC Fire District 3 – Mossyrock	Doug Fosburg , Chief	**Other Agencies**	
LC Fire District 5 - Napavine	Gregg Peterson, Chief	Cemetery District 4	DaRell Rammell, Comm.
LC Fire District 8 – Salkum	Duran McDaniel, Chief	Cemetery District 5	Dolly Brinson
LC Fire District 9 – Mineral	Lisa Libby, Comm. 1	Cemetery District 7	Ken Norberg
LC Fire District 10 – Packwood	Lonnie Goble, Chief	Cowlitz Indian Tribe	Mike Iyall
LC Fire District 11 – Pe Ell	Michael Krafczyk, Chief	Energy Northwest	Audrey Desserault
LC Fire District 13 – Curtis	Gregg Peterson	Lewis County PUD	Steve Young, Fac. Manager
LC Fire District 14 – Randle	Jeff Jaques, Chief	Port of Chehalis	Rick Rouse, Oper. Director
LC Fire District 15 – Winlock	Kevin Anderson, Chief	Twin Transit	Aaron Rollies

3.2.3 Planning Area/Map

The Planning area that was utilized for this 2015 Plan update encompassed all of Lewis County as shown on the map below.



3.3 Public Involvement

Public involvement is a vital component to the development of a multi-jurisdictional hazard mitigation plan. Local officials and citizens residing in the County served an invaluable role as the local experts during the planning process. These are the individuals who experience local hazards first-hand. They were responsible for providing much of the information necessary to complete the plan, such as the identification of potential hazard types, examples of historical occurrences, and the establishment and selection of preferred goals, objectives, and action items.

The Planning Team, working with the plan author, established a public involvement strategy outlining requirements and guidelines, including the number and location of meetings, minimal participation rules, and general project timeline.

The 2015 update of the 2010 Plan provided a base document including the public participation that was completed in 2010. This update included providing a survey that was much more extensive than in 2010 and providing more information on the website including all handouts, forms, and draft versions of the 2015 Plan update.

Lewis County residents were invited to come to all public meetings, open houses, and presentations. Presentations were also provided on the public access TV channels.

Multi-Jurisdictional Planning Participation
Requirement §201.6(a)(3): Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process. Statewide plans will not be accepted as multijurisdictional plans.

- Does the plan describe how each jurisdiction participated in the plan's development?

Planning Process
Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan.
Documentation of the Planning Process
Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
Element

- An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and nonprofit interests to be involved in the planning process; and
- Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.
Element

- Does the plan provide a narrative description of the process followed to prepare the plan?
- Does the plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)
- Does the plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)
- Was there an opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?

3.3.05 Survey - 2015

The Steering Committee along with the Planning Team developed a public participation survey that was sent out to the entire planning region. It was advertised in the newspaper, on Facebook sites, on the project website, and emailed out to organizations, boards, and committees

throughout the County. There were over 600 responses which were integrated in to the plan through the development of identification of the hazards and mitigation strategies.

A one page survey was utilized at special events allowing for more people to participate and comment on the plan update. The surveys can be found in Appendix A.

3.3.1 Public Meetings

The Planning Team working on this plan update agreed that the consistent, meaningful involvement of the public was the high priority for the long-term success of this planning effort and future mitigation activities. In order to ensure this happened, meeting attendance requirements were established at the beginning of the process. In order to participate in the plan, at least one representative from each participating agency needed to attend one of the two hazard identification public meetings *and* one of three mitigation alternative public meetings. Each meeting was described in a letter sent to all participants in order to distinguish the differences in intent of the two meeting types. A master database identifying each participant was established and carefully maintained to ensure each participant was notified in writing or emailed prior to each meeting and was represented at the meetings.

3.3.2 Hazard Identification Meetings – April 6 & 8, 2015, June 24 & 25, 2009

The two hazard identification meetings were held in Centralia and Randle on April 6th and 8th. The focus of the hazard identification meetings was to gain insight on the types of hazards perceived by the participating agencies. At these public meetings, those in attendance were provided with worksheets designed to gather information about the potential types of hazards, identification of assets and critical facilities, and determination of the value of the facilities.

The methods used to inform participants and the public about the hazard identification meeting included:

- **Project Kick-Off Letter** – announcing the intent of the plan
- **Hazard Identification Meeting Letter** – gave the meeting agenda, date, location, and time
- **Follow-up email -** potential participants were emailed to remind them of the upcoming meeting
- **Word-of-Mouth –** Participating agencies took opportunities to discuss the plan with communities throughout the planning process

For those participants unable to attend a public meeting, an optional packet of information was made available to be sent to them. The packet included the same information which was delivered to plan participants at the Hazard Identification meeting. This effort allowed all participants to have an opportunity to provide input and take part in the development of this plan. Agendas, minutes, and additional documentation related to the Hazard Identification meetings are included in the Appendix.

3.3.3 Mitigation Strategies Meetings – May 4 & 7, 2015, July 29 & 30, 2009

The three mitigation strategies meetings were held two in Centralia and one in Randle during May 2015. One meeting was held during the day in Centralia and the others in the evening this provided the opportunity for maximum participation. The intent of these meetings was to provide an opportunity for the participants to review the hazard mitigation goals and objectives and mitigation strategies.

Participants were asked to evaluate and prioritize mitigation alternatives using the STAPLEE process. Mitigation strategy worksheets were distributed to be reviewed by the participating agencies and to update or add new strategies.

A list of potential mitigation alternatives was also distributed with the worksheets to gain input from each jurisdiction as to what projects or actions they would like to do relative to the goals and objectives.

The techniques used to announce and promote the mitigation alternative meetings included:

- **Mitigation Strategies Meeting Letter** – provided the meeting agenda, date, location, and time
- **Follow-up email -** potential participants were emailed to remind them of the upcoming meeting
- **Word-of-Mouth** – participating agencies took opportunities to discuss the meeting with residents of the communities throughout the planning process

For those participants unable to attend a public meeting, an optional packet of information was made available to be sent to them. The packet included the same information which was delivered to plan participants at the Mitigation Alternative meetings. This effort allowed all participants to have an opportunity to provide input and take part in the development of this plan. Agendas, minutes, and additional documentation related to Mitigation Alternative meetings are included in the Appendix.

3.3.4 Community Meetings and Presentations

Presentations on the plan were made in the months of July and August. At this time, the local governments were formally invited to participate in open houses and other aspects of the development of the Plan. These public presentations also provided an opportunity for individuals to comment they were advertised in the local newspapers. The plan author distributed a flyer with information about the upcoming open houses and a link the Lewis County Emergency Management website where interested individuals could fill out a questionnaire assessing the hazards within the County. All agencies will hold a public meeting/hearing prior to the adoption of the 2015 Plan.

Community and Public Meetings	2010 Plan	2015 Update
Lewis County Commissioners Commission meeting	July 20, 2009	July 29, 2015
City of Centralia City Council meeting	July 28, 2009	July 28, 2015
City of Chehalis City Council meeting	August 24, 2009	
City of Morton City Council meeting	July 27, 2009	
City of Mossyrock City Council meeting	August 13, 2009	
City of Napavine City Council meeting	August 11, 2009	
Town of Pe Ell Council meeting	August 4, 2009	
City of Toledo City Council meeting	August 3, 2009	
City of Vader City Council meeting	July 21, 2009	
City of Winlock City Council meeting	August 10, 2009	

Agendas and additional documentation related to the individual community meetings are included in the Appendix.

3.3.5 Public Events/TV

Steering committee members attended public events to discuss the Plan update with individuals and collect data. People were asked to take the small survey and were provided information on natural hazards that affect them. Insurance brochures, home elevation, and other materials were provided. A few of these events included: 2015 Centralia Summerfest Celebration on the 4th of July and the Southwest Washington Fair August 18-19, 2015. The presentations were also made on Public Access TV at the Centralia City Council and Lewis County Board of County Commissioners meetings on July 28th and 29th. This information is distributed throughout the County encouraging people to review the Plan on the Plan website.

3.3.6 Website and Facebook

To maximize the opportunity for distributing materials and provide public participation by the general public, a webpage was created that included information about the plan update. Items for the Planning Team and Stakeholder meetings were posted online include all presentations, agendas, minutes, and other materials. The survey, planning worksheets (Word and PDF formats), letters, maps, and draft copies of the individual sections and the updated plan were posted online for the public's review, comments, and recommendations. The draft plan was posted on the project website on July 2nd to allow further public review and comment.

Additional documentation related to the website is included in the Appendix.

The City of Centralia and Lewis County also utilized their Facebook pages to inform Lewis County residents of the survey and Plan and the opportunity to participate in updating the Plan.

3.3.7 Open Houses/Plan Review Meetings – July 27 and 30, 2015, August 25, 26, 27 & November 10 & 12, 2009

Two plan review meetings were held the first in Centralia on July 27th and the other in Randle on July 30th. The intent of these meetings was to provide an opportunity for the participants to review the draft plan and participate in the planning process. The meetings enabled the public to comment on the draft plan, specifically the individual participant sections. Finally, participants were asked to identify and assist with collecting any additional information necessary to finish the plan.

3.3.8 Public Hearings prior to Plan Adoption

All participating governmental agencies are required to hold public hearings prior to adoption of the plan inviting public comment. Copies of the resolutions adopted by each governmental agency are included in their individual section.

3.4 Multi-Jurisdictional Approach

The multi-jurisdictional approach of the plan allowed the opportunity for other people to participate and provide input on the development of the Plan. Specifically, representatives from Washington State Department of Ecology and a WA State EMD Committee Representative participated on the Planning Team. Individuals from non-profit agencies were also participated on the Planning Team (United Way of Lewis County, Providence Hospital, and Lewis County PUD). Also on the Planning Team included representatives from the real estate and insurance industries and from a local radio station. Draft copies of the Plan were sent to adjacent counties and state and federal agencies inviting them to comment on the Plan prior to adoption.

3.5 Incorporation of Existing Plans, Studies, Reports, and Technical Information

During the research process of the plan development, many reliable sources of information were referenced. Existing plans, studies, reports and other technical data supplied by the jurisdictions were evaluated and referenced. Various internet databases, local publications, and scholarly journals were also consulted.

Information used in the general development of this plan is listed below. Each of these plans was reviewed for relevant information. Specific information about historical occurrences, community background, future development, hazard risks and locations, potential losses, and valuations were incorporated into the plan. Specific citations to hazard resources can be found in the hazard profiles section of this plan. Community specific information used during the planning process can also be found in the individual participant sections.

General Plans, Documents, and Information Used as a Resource in Developing this Plan

Document of Resource	Source	Description
State of Washington Hazard Mitigation Plan, Approved October 1, 2013	Washington State Emergency Management, a Division of the Washington Military Department www.emd.wa.gov/about/about_index.shtml	The State of Washington Hazard Mitigation Plan identified all hazards that are common to the state and discusses the locations, losses and vulnerability to these hazards.
National Climatic Data Center	www.ncdc.noaa.gov	World's largest active archive of weather data.
The Weather Channel	www.weather.com	Provides current weather reports and related news. Some of the information comes from the National Weather Service
Western Regional Climate Center	wrcc@dri.edu	Provides current and historic weather reports and related news.
Flood Insurance Study	www.fema.gov	Information regarding flooding in a community and is developed in conjunction with the Flood insurance Rate Map
Office of Washington State Climatologist (OWSC)	www.climate.washington.edu/	The function of the State Climatologist is to collect, disseminate, and interpret climate data. This web site provides links to sources of climate data and seasonal forecasts for the state of Washington

National Flood Insurance Program	www.floodsmart.gov/floodsmart/	There are three components that work to reduce cost of flood damages: Flood Insurance, Floodplain Management and Flood Hazard Mapping
Federal Emergency Management Agency	www.fema.gov	Part of the U.S. Department of Homeland Security. Their primary mission is to reduce risks by using mitigation
Quick City Info	www.quickcityinfo.com	Data is compiled from free data sources on the world wide web i.e. USGS and the Census Bureau
City-Data.com	www.city-data.com	Provides information about geographical date, weather, state profiles, maps, and satellite photos
Wikipedia	http://en.wikipedia.org/wiki	Demographic and background information about Lewis County communities
Parcel data	Lewis County PATS at http://parcels.lewiscountywa.gov/home	The Assessor office is responsible for the valuation of parcels of real estate and personal property
American Red Cross	Reported in LEOPs	Disaster information and historical occurrences
Chehalis River Basin Flood Authority	http://lewiscountywa.gov/chehalis-river-basin-flood-authority & https://www.ezview.wa.gov/site/alias__home/34166/default.aspx	Projects and modeling

Land Use Comprehensive Plans	
Lewis County Land Use Comprehensive Plan	Amended 2009
City of Centralia Land Use Comprehensive Plan	2007/Amended 2015
City of Chehalis Land Use Comprehensive Plan	2009
City of Morton Land Use Comprehensive Plan	1992/ Amended 2005
City of Mossyrock Growth Management Directory	December 2008
City of Napavine Land Use Comprehensive Plan	1997/Amended 2006
Town of Pe Ell Land Use Comprehensive Plan	June 1997/Amended 2005
City of Toledo Land Use Comprehensive Plan	Adopted 2005
City of Vader Land Use Comprehensive Plan	Adopted 2005
City of Winlock Land Use Comprehensive Plan	1998/Amended
Documents/Plans	
Optional Comprehensive Plan Element for Natural Hazard Reduction, June 1999	Washington State Community, Trade and Economic Development
Skookumchuck Dam Emergency Action Plan	The latest revision was in December 2007
Lewis County Comprehensive Flood Hazard Management Plan	The current plan was adopted by Lewis County in September 2008
Lewis County Emergency Alert System (EAS)	The revised plan was adopted by Lewis County in 2004
Centralia Comprehensive Flood Management and Natural Hazards Mitigation Plan	Adopted December 2008
Chehalis Basin Flood Mitigation Alternatives Report	July 2012
Studies	
Centralia Flood Damage Reduction Project by USACE	July 2002
Evaluating Losses Avoided Through Hazard Mitigation - Centralia, WA	February 2008
1993 Flood Phase Guidelines Manual and Map – USACE: Seattle District	
Flood Hazard Analyses Salzer-Coal Creeks	May 1975
Flood Hazard Analyses China Creek	March 1977
Inventory of Dams in the State of Washington, Department of Ecology, Revised Edition June 2013	

4.0 Risk Assessment

The risk assessment was established through input and information provided by surveys, steering committee, planning team, participating jurisdictions (stakeholders), and by researching each hazard identified in the Washington State Emergency Management Hazard Mitigation Plan.

4.1 Methodology

For each hazard identified in the State of Washington's Emergency Hazard Mitigation Plan, each jurisdiction within the planning area was required to complete the "Hazard Identification Worksheet." Responses were compiled to create the "Composite Hazard Identification Table." The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. These tables and rankings were compiled after receiving responses from the participants, discussions with the public and their responses, and conducting research on each hazard's presence and risk.

Listed below is the definition of probability of occurrence and the extent of damage as used during the planning process. These terms were applied consistently throughout the plan.

Probability of occurrence is defined as follows:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

4.2 Identifying and Profiling Hazards

The following hazards have been identified as those that have the potential to impact the multi-jurisdictional area:

4.2.1 Avalanche
4.2.2 Dam Failure
4.2.3 Debris Flows
4.2.4 Earthquake
4.2.5 Extreme Heat
4.2.6 Flooding
4.2.7 Landslide
4.2.8 Levee Failure
4.2.9 Severe Wind Storm
4.2.10 Severe Winter Storm
4.2.11 Volcano
4.2.12 Wildfire

Identifying Hazards
Requirement §201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses form identified hazards.
Element

- Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?

These hazards were identified through an extensive process that utilized input from the Planning Team, public input, researching past disaster declarations in the County, and a review of each hazard identified in the Washington State Emergency Management Hazard Mitigation Plan.

Ranking of Identified Hazards											
Natural Hazards	**Lewis County**	**Centralia**	**Chehalis**	**Morton**	**Mossyrock**	**Napavine**	**Toledo**	**Vader**	**Winlock**	**Town of Pe Ell**	**County RANK (Top 15)**
Avalanche	0	0	4	16	0	0	0	4	0	0	
Coastal Erosion	0	0	0	0	0	0	0	0	0	0	
Coastal Storm	0	0	0	0	0	0	0	0	0	0	
Dam Failure	46	26	4	0	10	0	0	20	40	0	8
Debris Flow	46	0	10	40	14	40	0	50	44	0	7
Drought	0	6	10	4	4	0	0	10	0	0	
Earthquake	60	50	60	50	44	40	40	50	60	44	2
Expansive Soils	0	6	10	0	0	0	0	16	0	0	
Extreme Heat	0	0	10	0	50	0	0	36	0	0	
Flooding	70	54	60	50	44	54	40	54	50	40	1
Hailstorm	6	0	10	20	10	0	0	44	0	0	
Hurricane	0	0	16	0	0	0	0	10	0	0	
Land Subsidence	0	0	10	0	0	0	0	4	0	0	
Landslide	60	10	30	44	16	0	40	10	50	44	6
Levee Failure	50	30	30	0	0	0	0	0	0	0	
Thunder Storm	30	0	10	20	4	0	44	10	0	0	
Tornado	0	0	16	30	0	0	44	10	0	44	
Tsunami	0	0	0	60	0	0	40	0	0	44	
Volcano	60	44	36	4	44	40	0	36	46	0	5
Wildfire	30	0	10	0	4	0	0	30	0	0	
Wind Storm	50	44	30	60	14	40	46	54	50	44	3
Winter Storm	50	44	10	30	50	40	40	54	50	40	4

The following hazards have the best chance of occurring again in Lewis County. The order was determined by Lewis County and the participating municipalities and the answers filled out on their Hazard Identification worksheets:

1. Flooding
2. Earthquake
3. Wind Storm
4. Winter Storm
5. Volcanic Eruption
6. Landslide
7. Debris Flow
8. Dam Failure

The following sections provide hazard profiles, vulnerability assessments, and multi-jurisdictional risk assessment. Only the hazard types which have a significant likelihood of occurring or have reason to potentially occur are discussed. Refer to Participant Sections for discussion of unique risk assessments specific to the jurisdictions (i.e. flooding).

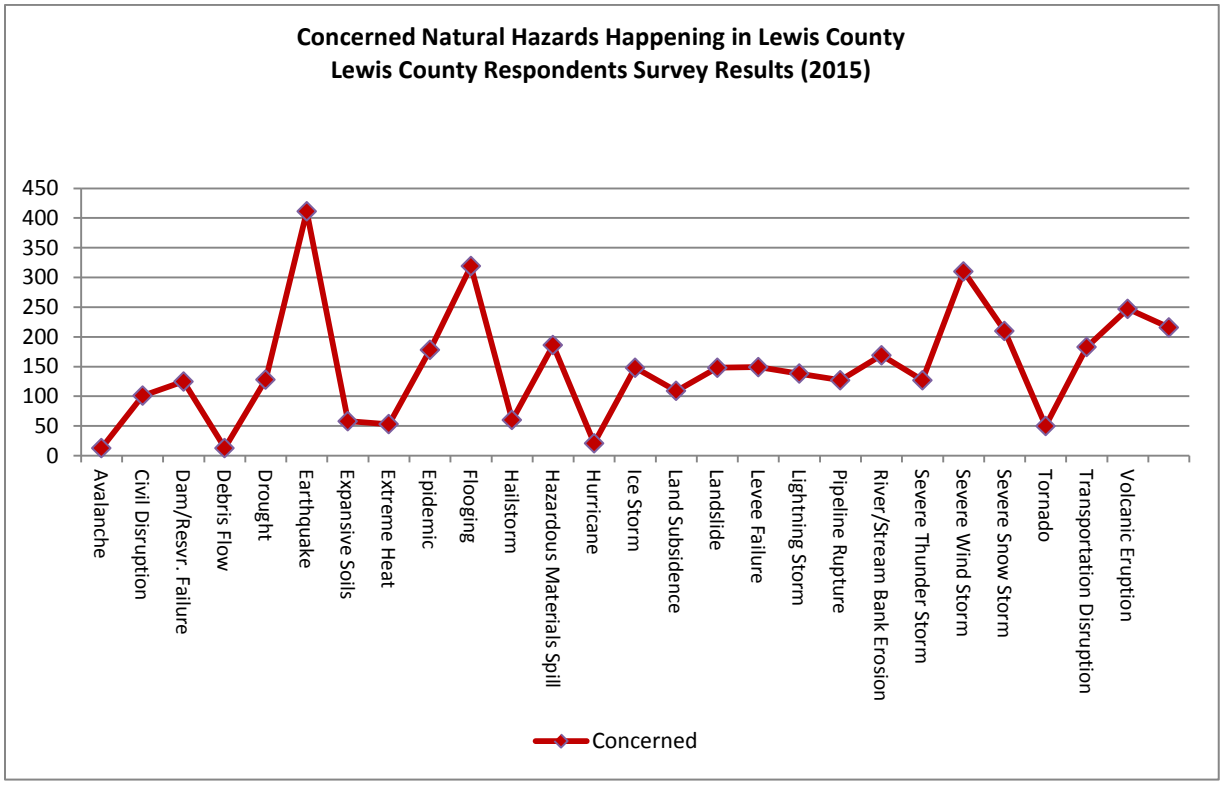
Comparing the Stakeholders results with the survey results from Lewis County respondents showed the similar results as shown on the graph with an earthquake, flooding, severe wind storm, and volcanic followed by a severe winter storm.

Profiling Hazards

Requirement §201.6(c)(2)(i): The risk assessment shall include a description of the …location and extend of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Element

- Does the risk assessment identify the location of each natural hazard addressed in the new or update plan?
- Does the risk assessment identify the extent of each hazard addressed in the new or updated plan?
- Does the plan provide information on previous occurrences of each hazard addressed in the new or updated plan?
- Does the plan include the probability of future events for each hazard addressed in the new or updated plan?

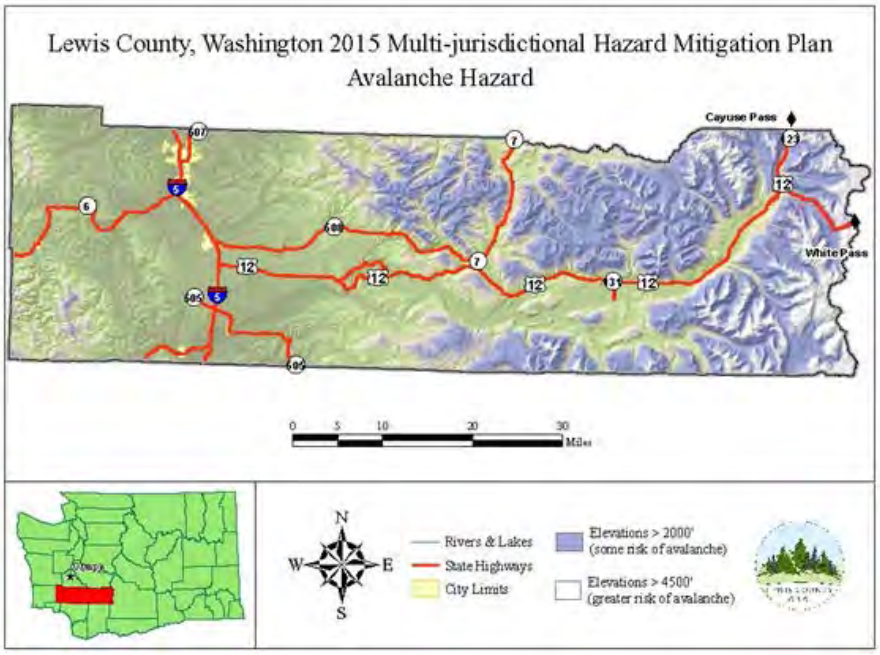


4.2.1 Avalanche

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. (Source: Washington State Emergency Management Division Hazard Mitigation Plan, October 2013). 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. Most current avalanche victims are participating in recreational activities in the backcountry where there is no avalanche control. Only one-tenth of one percent of avalanche fatalities occurs on open runs at ski areas or on highways.

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.



There are two types of avalanches, loose and slab, and two types of slab avalanches, dry and wet. Although the most dangerous avalanche is the slab avalanche, loose slides can and do produce injury and death.

Loose avalanches occur when grains of snow cannot hold onto a slope and begin sliding downhill, picking up more snow and fanning out in an inverted V. Slab avalanches occur when a cohesive mass of snow breaks away from the slope all at once.

Dry slab avalanches occur when the stresses on a slab overcome the internal strength of the slab and its attachment to surrounding snow. A decrease in strength produced through warming, melting snow, or rain, or an increase in stress produced by the weight of additional snowfall, a skier or a snowmobile cause this type of avalanche. Dry slab avalanches can travel 60 to 80 miles per hour, reaching these speeds within five seconds after the fracture. They account for most avalanche fatalities. Wet slab avalanches occur when water percolating through the top slab weakens it and dissolves its bond with a lower layer, decreasing the ability of the weaker, lower layer to hold on to the top slab, as well as decreasing the slab's strength.

A number of weather and terrain factors determine avalanche danger:

1. Storms – A large percentage of all snow avalanches occur during and shortly after storms.
2. Rate of snowfall – Snow falling at a rate of one inch or more per hour rapidly increases avalanche danger.
3. 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.
4. 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.
5. Ground cover – Large rocks, trees and heavy shrubs help anchor snow.
6. Slope profile – Dangerous slab avalanches are more likely to occur on convex slopes.
7. Slope aspect – Leeward slopes are dangerous because windblown snow adds depth and creates dense slabs. South facing slopes are more dangerous in the springtime.
8. Slope steepness – Snow avalanches are most common on slopes of 30 to 45 degrees.

Profiling Hazard

No instances of avalanche have been recorded within the Planning Area. The Washington State Emergency Management Division did identify avalanches as a hazard for Lewis County along the mountain passes of White Pass US Highway 12 and State Routes 410 and 123 (see Areas Vulnerable to Avalanche Map). The probability of future events for this hazard is discussed below in the assessing vulnerability section.

Assessing Vulnerability: Overview

Below are the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan for avalanches. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections found in their individual sections.

Avalanche Composite Hazard Identification Table

Participant	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	No	No	Unlikely	None
City of Centralia	No	No	Unlikely	None
City of Chehalis	No	No	Unlikely	None
City of Morton	No	No	Unlikely	None
City of Mossyrock	No	No	Unlikely	None
City of Napavine	No	No	Unlikely	None
City of Toledo	No	No	Unlikely	None
City of Vader	No	No	Unlikely	None
City of Winlock	No	No	Unlikely	None
Town of Pe Ell	No	No	Unlikely	None

Probability:

- **Highly Likely**: Near 100% probability in the next year.

- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

There are no specific structures identified as being vulnerable to avalanche because none of the participating jurisdictions identified avalanche as a potential hazard. There is a potential for infrastructure damage to the at-risk highways. However, these highways have been designed and built to withstand extreme weather conditions, so the likelihood of destruction is minimized.

Assessing Vulnerability: Estimating Potential Losses

This profile will not attempt to quantify potential losses to facilities due to an avalanche. No municipalities identified this as a hazard that would affect them. However, this hazard does affect White Pass US 12 and State Route 410 and 123. Both can experience closure due to avalanches during the winter months. Losses to highway infrastructure, personal property (cars, recreation equipment), and human life are possible in the unlikely event of an avalanche.

Assessing Vulnerability: Analyzing Development Trends

Because the at-risk areas within the multi-jurisdictional area are in rural mountainous areas, no significant future development is anticipated.

Multi-Jurisdictional Risk Assessment

While the municipalities and other specific plan participants do not anticipate any foreseeable risk of avalanche, the previously identified highway areas of White Pass US 12, SR 410, and SR 123 have been determined to be at risk. An avalanche in one of the at-risk areas could have an impact on the multi-jurisdictional area if there was a resultant disruption in transportation in the region.

The overall risk of loss of infrastructure, property, or human life is extremely low. However, with the increased interest in the pursuit of backcountry recreational activities such as skiing, snowshoeing, and snowmobiling, the risk of loss may increase.

Resources

- *Washington State Enhanced Hazard Mitigation Plan*, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Avalanche.pdf Accessed May 12, 2015.
- Washington State Department of Transportation: Avalanche Control available at http://www.wsdot.wa.gov
- National Avalanche Center. Available at http://www.fsavalanche.org/encyclopedia/ Accessed May 12, 2015
- Bruce Tremper, *Common Questions about Avalanches*, USDA Forest Service Utah Avalanche Center, http://www.avalanche.org/~uac/Common-questions.html, (November 4, 2002).

4.2.2 Dam Failure

Dam failure is described as the structural failure of a water impounding structure. Structural failure can occur during extreme conditions, which can include:

- Reservoir inflows in excess of design flows;
- Flood pools higher than previously attained;
- Unexpected drop in pool level;
- Pool near maximum level and rising;
- Excessive rainfall or snowmelt;
- Large discharge through spillway;
- Erosion, landslide, seepage, settlement, and cracks in the dam or area; and
- Earthquakes

Reasons for dam failures include:

- Overtopping - 34% of all failures (nationally)
    - Inadequate Spillway Design
    - Debris Blockage of Spillway
    - Settlement of Dam Crest
- Foundation Defects - 30% of all failures (nationally)
    - Differential Settlement
    - Sliding and Slope Instability
    - High Uplift Pressures
    - Uncontrolled Foundation Seepage
- Piping and Seepage - 20% of all failures (nationally)
    - Internal Erosion Through Dam Caused by Seepage-"Piping"
    - Seepage and Erosion Along Hydraulic Structures Such as Outlet
    - Conduits or Spillways, or Leakage Through Animal Burrows
    - Cracks in Dam
- Conduits and Valves - 10% of all failures (nationally)
    - Piping of Embankment Material Into Conduit Through Joints or Cracks
- Other - 6% of all failures (nationally)

According to the Department of Ecology's Dam Safety Office there are 51 dams in Lewis County. These dams are defined as structures that can impound 10 acre-feet or more of watery material at the dam crest elevation as per the Inventory of Dam in the State of Washington, Lewis County, Revised Edition June 2013.

Under state law, the Department of Ecology is responsible for regulating dams that capture and store at least 10 acre-feet (about 3.2 million gallons) of water or watery materials such as mine tailings, sewage and manure waste.

Department of Ecology's Dam Safety Office rates a dam on its potential consequences in the downstream valley. The follow table shows the rating table that is used.

Dam Hazard Classification				
Downstream Hazard Potential	Downstream Hazard Class	Population at Risk	Economic Loss Generic Description	Environmental Damage
Low	3	0	Minimal. No inhabited structures. Limited agricultural development.	No deleterious material in reservoir contents
Significant	2	1-6	Appreciable. 1 or 2 inhabited structures. Notable agriculture or work sites. Secondary highway and/or rail lines.	Limited water quality degradation from reservoir contents and only short term consequences
High	1C	7-30	Major. 3 to 10 inhabited structures. Low density suburban area with some industry and work sites. Primary highway and/or rail lines.	Severe water quality degradation potential from reservoir contents and long term effects on aquatic and human life
High	1B	31-300	Extreme. 11 to 100 inhabited structures. Medium density suburban or urban area with associated industry, property, and transportation features.	Severe water quality degradation potential from reservoir contents and long term effects on aquatic and human life
High	1A	300+	Extreme. More than 100 inhabited structures. Highly developed, densely populated suburban or urban area with associated industry, property, transportation, and community life line features.	Severe water quality degradation potential from reservoir contents and long term effects on aquatic and human life
Source: Inventory of Dams in the State of Washington, Revised Edition June 2013, Publication #94-16				

Lewis County Dam Inventory				
Name of Dam	Owner	River or Stream	Max Storage Acre-ft	Haz. Class
Barrier Dam	Tacoma Power	Cowlitz River	50	3
Borst Lake Dam	City of Centralia	Skookumchuck River	20	3
Carlisle Lake Dam	SW Wash. Dev. Assoc.	South Fork Newaukum River	300	2
Centralia Coal Mine Dam No. 19	TransAlta	Tr-Packwood Creek	130	3
Centralia Coal Mine Dam No. 19A	TransAlta	Tr-Packwood Creek	130	3
Centralia Coal Mine Dam No. 22	TransAlta	Tr-Hanaford Creek	20	3
Centralia Coal Mine Dam No. 22 Sump	TransAlta	Tr-Hanaford Creek	18	3
Centralia Coal Mine Dam No. 36	TransAlta	Hanaford Creek-Offstream	130	3
Centralia Coal Mine Dam No. 36A	TransAlta	Hanaford Creek-Offstream	90	3
Centralia Coal Mine Dam No. 38	TransAlta	Big Hanaford Creek – Offstream	629	3
Centralia Coal Mine Dam No. 38A	TransAlta	Big Hanaford Creek-Offstream	91	3
Centralia Coal Mine Dam No. 38B	TransAlta	Big Hanaford Creek – Offstream	30	3
Centralia Coal Mine Dam No. 38C	TransAlta	Big Hanaford Creek - Offstream	187	3
Centralia Coal Mine Dam No. 3A	TransAlta	Tr-Hanaford Creek	79	3
Centralia Coal Mine Dam No. 3B	TransAlta	Tr-Hanaford Creek	7,750	2
Centralia Coal Mine Dam No. 3C - East	TransAlta	Tr-Packwood Creek-Offstream	5,000	2
Centralia Coal Mine Dam No. 3C - North	TransAlta	South Hanaford Creek-Offstream	2,000	2
Centralia Coal Mine Dam No. 3C - South	TransAlta	Tr-Packwood Creek-Offstream	9,600	2
Centralia Coal Mine Dam No. 3D	TransAlta	Tr-Packwood Creek	15,000	3
Centralia Coal Mine Dam No. 44	TransAlta	Tr-Packwood Creek	325	3
Centralia Coal Mine Dam No. 45	Alco	Tr-Hanaford Creek	25	3

Centralia Coal Mine Dam No. 5	TransAlta	Tr-Packwood Creek	176	3
Centralia Coal Mine Dam No. 5A	TransAlta	Tr-Hanaford Creek	19	3
Centralia Coal Mine Dam No. 5B	TransAlta	Tr-Hanaford Creek	26	3
Centralia Coal Mine Dam No. 5C	TransAlta	Tr-Packwood Creek	90	3
Centralia Coal Mine Dam No. 5D	TransAlta	Tr-Hanaford Creek	21	3
Centralia Coal Mine Dam No. 6	TransAlta	Tr-Hanaford Creek	18	3
Centralia Coal Mine Dam No. 6A	TransAlta	Tr-Hanaford Creek	28	3
Centralia Coal Mine Dam No. 6B	TransAlta	Tr-Hanaford Creek	74	3
Centralia Coal Mine Dam No. 8	Alco	Tr-South Hanaford Creek	89	3
Centralia Coal Mine Dam No. 8A	TransAlta	Tr-South Hanaford Creek	57	3
Centralia Coal Mine Pond 46 Dam	Alco	Tr - Mitchell Creek	16	2
Centralia Coal Mine Pond 46A Dam	Alco	Unnamed Tr - Mitchell Creek	68	2
Cowlitz Falls Dam	Lewis County PUD No 1	Cowlitz River	15,000	1C
Eagle Creek Dam	WA DNR	Eagle Creek	20	3
KOA Dam No. 1	Mhc Ltra, Inc	Tr-Mill Creek	67	3
Kopper Pond	Warren Freece	Lacamas Creek-Offstream	92	2
Long-Bell Mill Pond Dam	Ralph W Eidsmoe	Winston Creek	65	3
Mayfield Dam	Tacoma Power	Cowlitz River	1,780,000	1A
Mossyrock Dam	Tacoma Power	Cowlitz River	1,790,000	1A
Packwood Dam	WA Public Power	Lake Creek	4,200	2
Powell Dam	W Wood	Blue Creek	82	3
Reilly Dam	Robert & Linda Capps	Tr-South Fork Garrard Creek	16	3
Silverado Waterski Pond	Lake Silverado Assoc.	Tr-Chehalis River	115	3
Surge Pond Dam	Pacific Corp	Hanaford Creek	¼	2
Swofford Valley Rearing Pond Dam	Tacoma Power	Sulphur Creek	2,173	2
Toledo Primary Sewage Lagoon No. 1A	Toledo City	Tr-Cowlitz River-Offstream	18	3
Toledo Primary Sewage Lagoon No. 1B	Toledo City	Tr-Cowlitz River-Offstream	18	3
Toledo Secondary Sewage Lagoon No. 2	Toledo City	Tr-Cowlitz River-Offstream	18	3
Winlock Waterski Pond Dam	Miller, Daniel F Inc	Tr-Coon Creek-Offstream	80	3
Woods Creek Weir	Gifford Pinchot NF	Tr-Coon Creek-Offstream	20	3
Source: Inventory of Dams in the State of Washington, Revised Edition June 2013, Publication #94-16				

Profiling Hazard

According to the Department of Ecology's Inventory of Dams from June 2013, 37 out of 51 dams in Lewis County have a rating of a 3 (meaning little to no lives are at risk). There are 11 dams that are rated 2 (1 to 6 lives at risk). The Cowlitz Falls dam is rated a 1C, and the Mayfield and Mossyrock dams are both rated as 1A. Skookumchuck dam is located in Thurston County, but is significant for purposes of hazard mitigation planning because if it failed it would affect thousands of people including the City of Centralia and its Urban Growth Area.

The only historical occurrence of dam failure within the multi-jurisdictional area was Seminary Hill Reservoir (City of Centralia) in October 1991. There was a failure along a weak rock zone in the hillside that caused a massive slide which breached a reservoir. Three million gallons of water drained from reservoir in three minutes destroying two homes and damaging many others. There was approximately $3 million in damage.

Periodic inspections are the primary tool for detecting deficiencies at dams that could lead to failure. Correction of these safety deficiencies in a timely manner can prevent dam failures and other serious incidents from occurring. The use of periodic inspections to detect deficiencies and avert disasters continues to be an important preventative tool in the dam safety program. Periodic inspections also help identify dams where significant development has occurred downstream, resulting in the need for more stringent design loadings due to greater population at risk.

The Department of Ecology's Dam Safety Office conducts periodic inspections of particular projects to reasonably secure safety to life and property, as authorized under RCW 43.21A.064. Inspections are performed on dams where there is the potential for loss of life and significant property damage in the event of a dam failure. Dam with *high* hazard classifications are to be inspected on a 5-year cycle, while dams with *significant* hazard classifications will be inspected on a 10-year cycle. Dams classified as *low* hazard are not included in the periodic inspection program.

The inspections are performed by professional engineers from the Dam Safety Office and involve:

- Review and analysis of available data on the design, construction, operation, and maintenance of the dam and its appurtenances.
- Visual inspection of the dam and its appurtenances.
- Evaluation of the safety of the dam and its appurtenances, which may include assessment of the hydrologic and hydraulic capabilities, structural stabilities, seismic stabilities, and any other condition which could constitute a hazard to the integrity of the structure.
- Evaluation of the downstream hazard classification.
- Evaluation of the operation, maintenance, and inspection procedures employed by the owner and/or operator.
- Review of the emergency action plan for the dam including review and/or update of dam breach inundation maps.

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan for dealing with dam failure. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections found in their individual sections.

Dam Failure Composite Hazard Identification Table

Participant	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	No	Possible	Catastrophic
City of Centralia	No	No	Possible	Catastrophic
City of Chehalis	No	No	Unlikely	Limited
City of Morton	No	No	Unlikely	None
City of Mossyrock	No	No	Possible	Limited
City of Napavine	No	No	Unlikely	None
City of Toledo	No	No	Unlikely	None
City of Vader	No	No	Unlikely	Catastrophic
City of Winlock	Yes	No	Unlikely	None
Town of Pe Ell	No	No	Unlikely	None

Probability:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.

- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:
- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See each Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

Assessing Vulnerability: Estimating Potential Losses

Potential losses from dam failure are uniquely related to the specific dam and jurisdiction in which they occur. The potential losses are determined by the Dam Hazard Classification of each specific dam. See Participant Sections for jurisdiction-specific information and individual jurisdiction maps (Dam Inundation).

Assessing Vulnerability: Analyzing Development Trends

In general, the areas that are at-risk for damage in dam failure scenarios are the same areas that are at risk for other flooding events. Development restrictions in flood plain areas can help to prevent some potential losses. The Participating Jurisdictions has specific detailed information about the development trends for each participating municipality.

Multi-Jurisdictional Risk Assessment

New development in areas downstream from dams will increase the risk of property loss. The urban areas that lie below the Cowlitz Falls, Mayfield, Mossyrock, and Skookumchuck dams are at the greatest risk of both loss of property and loss of life.

Resources

- Department of Ecology. Inventory of Dams in the State of Washington, Revised Edition June 2013, Publication #94-16.

4.2.3 Debris Flow

Debris flows are often called mudslides, mudflows, or debris avalanches. They consist of debris mixed with water. Debris consists of soil and other substances, such as tree and rock fragments that are picked up as the flow moves down a slope or channel. A mixture of water and soil-rock-woody debris that have become a liquefied slurry in a channel and commonly move very rapidly down slope (>10m/s~25miles/hour).

Debris flows may be generated when hillside colluvium or landslide material becomes rapidly saturated with water and flows into a channel. Intense rainfall, rapid snowmelt, or high levels of ground water flowing through fractured bedrock triggers the movement. Debris flows and floods also occur when heavy rains on slopes cause extensive hillside erosion and channel scour. Repeated debris flows and/or floods deposit sediment at the mouth of a canyon, forming an alluvial fan. The fan shape is a result of periodic diversion of the main channel back and forth across the fan.

Flows may travel farther down the fan from the mouth of the canyon if the channel becomes entrenched and the flow is confined. Alluvial fans are risky places for homes because it is difficult to predict where flooding or debris flows will occur. Debris flows can be as thick as wet concrete and can transport boulders as large as a car; debris flows may eventually become muddy flood waters as they deposit their debris.

Debris flows tend to move in pulses. Early pulses or previous debris flows form levees that channel the flow until the levees are breached. The presence of older levees indicates the recurrence and characteristics of debris flows in a particular canyon. This is valuable information for developing land on the alluvial fan.

Profiling Hazard

The only instances of debris flow identified by participant responses were the 2006 flooding events on the rivers and creeks on the east end of the County and in 2007 on the upper Chehalis river near Doty and Curtis. These instances, along with the associated flooding, caused major damage resulting in millions of dollars in losses. The nature of debris flows is they are usually associated with other natural hazards such as flooding, wildfires, landslides, volcanic activity, severe rain, wind or a major snow event.

Historical Occurrences

- January 7-8, 2009 storm, over 500 landslides initiated in Lewis County, blocking roads and damaging houses. Rainfall totaled over 10 inches between January 7-8, triggering hundreds of

debris flows between Morton and Randle. Near Glenoma, when the debris flows reached the valley, they transformed into hyper-concentrated flows, moving across fields and pirating on Highway 12 and into roads and driveways.

- December 2007 storm just west of Pe Ell, a massive debris avalanche along with numerous smaller landslides blocked State Route 6, from Pe Ell to Raymond, isolating 21 households without electricity and water. In addition, State Route 8, just west between Porter and Malone, and SR 508 near Onalaska were blocked by landslides. In the Chehalis headwaters area, the hardest hit area from the storm, nearly 20 inches of rain was recorded within a 48-hour period, most of that falling within the first 24 hours. Woody debris and sediment, including material from more than 1,000 landslides in the Chehalis headwaters basin, clogged channels at bridges, creating temporary dams and causing widespread deposition of logs and debris, especially around the Boistfort Valley.

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with debris flows. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections found in their section.

Debris Flow Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Possible	Severe
City of Centralia	No	No	Unlikely	None
City of Chehalis	No	No	Possible	Limited
City of Morton	Yes	Yes	Possible	Limited
City of Mossyrock	No	No	Likely	Limited
City of Napavine	Yes	Yes	Possible	Limited
City of Toledo	No	No	Unlikely	None
City of Vader	Yes	Yes	Likely	Severe
City of Winlock	Yes	Yes	Likely	Limited
Town of Pe Ell	No	No	Unlikely	None

Probability:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See the participant sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information of the structures, infrastructure, and critical facilities and potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

Assessing Vulnerability: Estimating Potential Losses

Due to the fact that debris flow events nearly always occur in conjunction with another natural hazard event, it is difficult to identify potential losses for debris flow independent of these other hazards. Specific loss information for local jurisdictions that identified this hazard as significant is found in their sections.

Assessing Vulnerability: Analyzing Development Trends

Any jurisdiction that is adjacent to a river, stream, or creek could be subject to a debris flow. Steep slopes throughout the county are also at risk. Debris-flow risk can be reduced by: (1) preventing debris from entering a stream or river channel, (2) trapping debris on a hillside, in the channel or in a debris basin before it reaches developed property; or (3) distributing or diverting debris on the alluvial fan away from structures.

Most of the debris in a debris flow is picked up as the flow moves down a stream channel; the debris collects in the channel from slope erosion or from other debris flows that did not make it to the mouth of the canyon. Development can increase vulnerability to erosion. Slope erosion can be reduced by terracing, reseeding after wild fires, and intelligent land use such as controlled grazing. Debris can be trapped using sediment fences on slopes, gabion baskets or check dams in channels, and debris basins on alluvial fans.

With proper design and construction, debris and water can be diverted away from buildings by a “plow-shaped” deflection wall, or debris can be trapped with a chain-link fence strengthened to hold the debris. Restrictions on building on slopes, near waterways, and on the alluvial fan will also diminish the risk.

Participating Jurisdictions has specific detailed information about the development trends for each participating municipality.

Multi-Jurisdictional Risk Assessment

While all areas within the scope of the plan are at some risk for debris flow, the towns of Pe Ell and Vader are both particularly vulnerable. The cumulative effect of debris flow (waters picking up debris as they flow) create a situation where the actions of one jurisdiction can directly impact the vulnerability of adjacent jurisdiction.

Resources

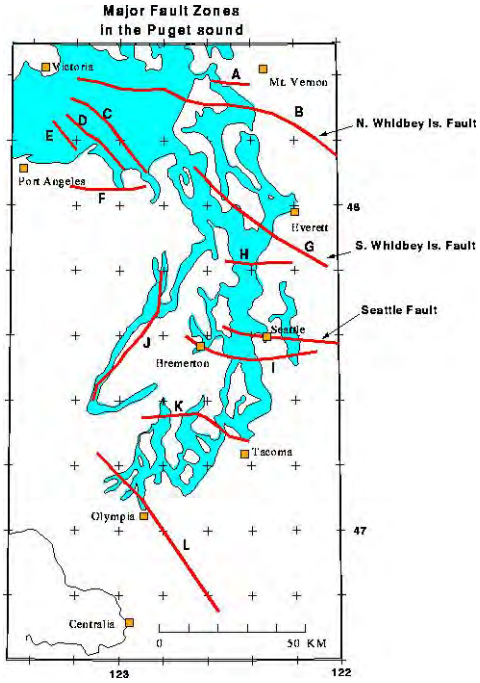
- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Landslide_Hazard_Profile.pdf Accessed May 16, 2015.
- Oregon Department of Geology and Mineral Industries
- http://geology.utah.gov/online_html/pi/pi-70/debrisflow.htm

4.2.4 Earthquake

Counties Most At-Risk and Vulnerable to Earthquake

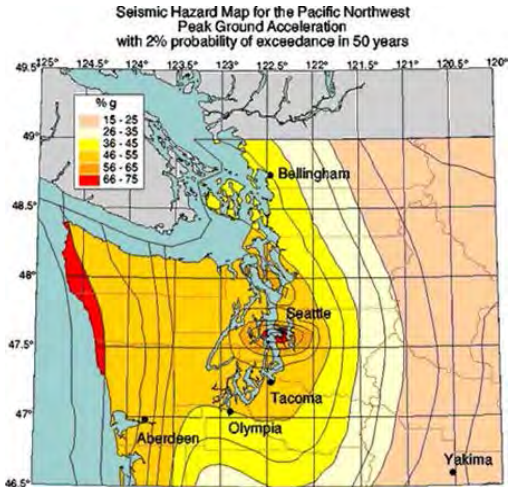
Hazard Profile

There are many faults in the Pacific Northwest that can produce damaging earthquakes, including hard-to-identify faults that exist entirely underground and have not been identified at the earth's surface. At the same time, some mapped faults have been located that have not generated earthquakes in recent geologic time. New faults continue to be discovered as more field observations and earthquake data are collected. (Map: Major Fault Zones in the Puget Sound. Source: Gower and others, 1985, "Seismotectonic Map of the Puget Sound Region, Washington", USGS Map I-1613).



There are three different sources for damaging earthquakes in the Pacific Northwest. The first of these is the "Cascadia Subduction Zone", a 1000 km long thrust fault which is the convergent boundary between the Juan de Fuca and North American plates and is the most extensive fault in the Pacific Northwest area. It surfaces about 50 miles offshore along the coasts of British Columbia, Washington, Oregon and northern California. No historic earthquakes have been directly recorded from this source zone. According to recent research, an earthquake estimated to be as large as 8.0 to 9.0 occurred in this zone in January of 1700.

The second source for damaging earthquakes is the Benioff Zone. This zone is the continuation of the extensive faulting that results as the subduction plate is forced into the upper mantle. The Benioff Zone can probably produce earthquakes with magnitudes as large as 7.5. Benioff Zone earthquakes are deeper than 30km.



(Map: Seismic Hazard Map for the Pacific Northwest. Source: U.S. Department of the Interior/U.S. Geological Survey URL: http://earthquake.usgs.gov/regional/pacnw/hazmap/

The third source consists of shallow crustal earthquake activity (depths of 0 to 20 km) within the North American continental plate where faulting is extensive. Recent examples occurred near Bremerton in 1997, near Duvall in 1996, off Maury Island in 1995, near Deming in 1990, near North Bend in 1945, just north of Portland

in 1962, and on the St. Helens seismic zone (a fault zone running north-northwest through Mount St. Helens) in 1981. Washington State Department of Natural Resources, Geology and Earth Resources Division states that all of these earthquakes were about M5–5.5.

Ground Shaking

The strength of ground shaking generally decreases with distance from the earthquake source, but locally can be much higher than adjacent areas, due to amplification. Strong shaking of long duration is one of the most damaging characteristics of great subduction zone earthquakes. Strong shaking is a hazard both near the epicenter of an earthquake and in areas where amplification occurs. West Seattle and certain areas of downtown Olympia are examples of places where ground motion has been documented as being significantly stronger than in adjacent areas during the same earthquake. Most of the damage and deaths in earthquakes are caused by strong ground motion.

Ground Failures

Ground failures accompanying earthquakes include fault rupture (surface faulting), ground cracking, subsidence, liquefaction, and landslides.

Richter Magnitude Damage Descriptions

Richter Magnitude	Description	Earthquake Effects
10.0+	Great	Never recorded, energy yield extremely high
9.0-9.9	Great	Devastating in areas several thousand miles across
8.0-8.9	Great	Can cause serious damage in areas of several hundred miles
7.0-7.9	Major	Can cause serious damage over larger areas
6.0-6.9	Strong	Can be destructive in areas up to about 100-miles across in population areas
5.0-5.9	Moderate	Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings
4.0-4.9	Light	Noticeable shaking of indoor items, significant damage unlikely
3.0-3.9	Minor	Often felt, but rarely causes damage
2.0-2.9	Minor	Generally not felt, but recorded
0.0-2.0	Micro	Micro earthquakes, not felt
Source: USGS		

Historical Occurrences

The largest historic earthquake in Washington (estimated at M7.4), the North Cascades earthquake of 1872, is also thought to have been shallow. It may rank as Washington's most widely felt earthquake. Because of its remote location and the relatively small population in the region, though, damage was light.

Notable Earthquakes Felt in Lewis County

Date	Location of the Epicenter	Magnitude
February 18, 2015	Ellensburg, WA	4.3

June 26, 2013	Wenatachee Area, WA	4.3
February 14, 2011	Spirit Lake, WA (Mt. St. Helens)	4.3
November 16, 2010	Mossyrock Area, WA	4.2
January 30, 2009	Seattle-Tacoma Urban Area	4.5
June 20, 2003	Carnation, WA	3.6
May 30, 2003	Port Orchard, WA	3.7
September 21, 2002	Friday Harbor, WA	4.1
June 16, 2002	Kitsap Peninsula, WA	3.7
February 28, 2001	Nisqually, WA	6.8
May 18, 1980	Mount St. Helens, WA	5.0
April 29, 1965	Puget Sound, WA – Fatalities 7	6.5
April 13, 1949	Puget Sound, WA – Fatalities 8	7.1
December 15, 1872	Lake Chelan, WA	6.8
Source: U.S. Department of the Interior | U.S. Geological Survey , Accessed 2010 URL: http://earthquake.usgs.gov/regional/states/historical_state.php, Accessed 2010 http://pnsn.org/earthquakes/notable, Accessed: July 7, 2015		

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with earthquakes. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Earthquake Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Likely	Catastrophic
City of Centralia	Yes	Yes	Likely	Limited
City of Chehalis	Yes	Yes	Likely	Catastrophic
City of Morton	Yes	Yes	Likely	Severe
City of Mossyrock	Yes	Yes	Likely	Limited
City of Napavine	Yes	Yes	Possible	Limited
City of Toledo	Yes	Yes	Possible	Limited
City of Vader	Yes	Yes	Likely	Severe
City of Winlock	Yes	Yes	Likely	Catastrophic
Town of Pe Ell	Yes	Yes	Likely	Limited

Probability:

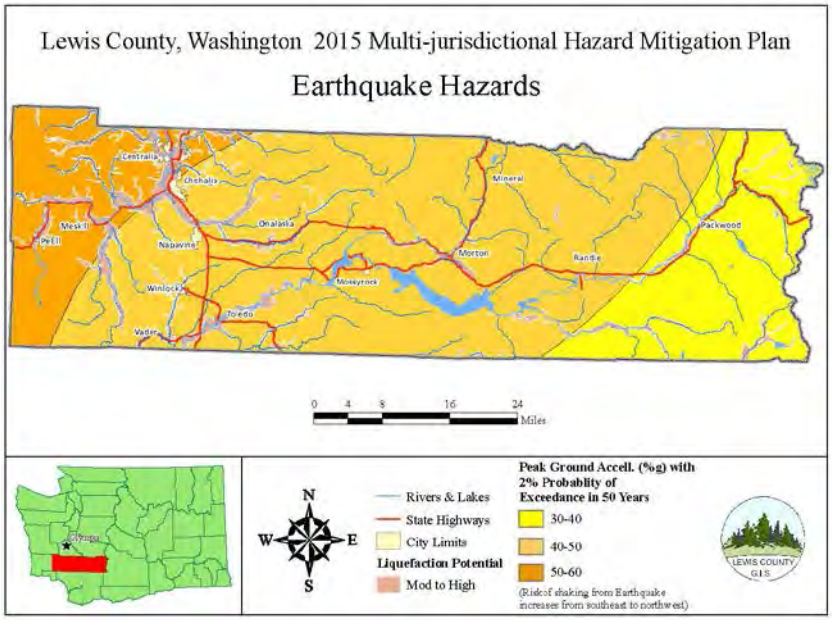
- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

The discover the damage from an earthquake view each Participant Section and review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.



Assessing Vulnerability: Estimating Potential Losses

Any structural development will be vulnerable to the losses sustained from earthquakes. However, the rarity of earthquake events keeps the vulnerability and losses negligible. Due to this and limited resources, it was not deemed necessary, nor even feasible, to assess the value of potential current or future losses associated from an earthquake event.

The effects of an earthquake may vary from unperceivable to near total destruction of the physical and economic infrastructure of the area. The effects are highly variable, depending on the magnitude, proximity to the population centers, depth, types of soil on which structures are located, local building codes, type of structures, time of day, and a host of other factors.

The principal ways in which earthquakes cause damage are by strong ground shaking, by the secondary effects of ground failures (surface rupture, ground cracking, landslides, liquefaction, subsidence), or by tsunamis. Most building damage is caused by ground shaking.

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most causalities result from falling materials. Other effects include, but are not limited to:

- Broken water and sewer mains
- Downed electric lines
- Cracked and partially displaced roadbeds and rail lines
- Loss of telephone or other telecommunication services
- Houses knocked off their foundations
- Partial or complete collapse of buildings, building facades, cornices, or chimneys
- Fires including urban conflagration
- Chemical spills
- Ruptured gas and oil pipelines

- River beds disrupted
- Broken or cracked dams with possible flooding
- Injury and death
- Psychological trauma
- Economic disruption
- Large numbers of displaced persons.

To assess risks and vulnerability, Lewis County GIS has utilized FEMA's loss-estimation model, HAZUS-MH (Version 1.3 MR3). The results using HAZUS-MH MR3 are summarized for the County and the individual municipal jurisdictions.

Assessing Vulnerability: Analyzing Development Trends

There is no human behavior or activity that can modify the area affected by earthquakes, thus earthquakes will always be capable of affecting the entire Planning Area. Lewis County and the municipalities will continue building in areas that are subject to earthquakes but will require all new structure to build according to the International Building Code earthquake standards. The Participating Jurisdictions has specific detailed information about the development trends for each participating municipality.

Resources

- *Washington State Enhanced Hazard Mitigation Plan*, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Earthquake.pdf Accessed May 12, 2015.
- Washington State Department of Natural Resources, Geology and Earth Resources Division; http://www.wa.gov/dnr/htdocs/ger/index.html
- Washington State Department of Transportation; http://www.wsdot.wa.gov
- University of Washington, Geophysics Program; http://www.geophys.washington.edu/
- United States Geological Survey; http://www.usgs.gov/
- Federal Emergency Management Agency; http:www.fema.gov/
- Pacific Northwest Seismic Network. Available at: http://pnsn.org/ Accessed July 7, 2015.

4.2.5 Extreme Heat

Profiling Hazard

Extreme heat is often associated with periods of drought and can be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration. Health risks rise when a person is over exposed to heat. Extreme heat can also cause people to over use air conditioners, which can lead to power failures. Over the last 30 years, more people in the United States have died from extreme heat than from earthquakes, hurricanes, floods, lightning, and tornadoes combined. For the purposes of this plan, extreme heat has been treated as a separate hazard from drought due to the fact that long periods of high temperature and high humidity can occur during a non-drought period.

It was deemed, by a majority of the jurisdictions, that the planning area as a whole has not had previous occurrences of extreme heat. The probability of extreme heat to occur was viewed differently depending on the governmental agency. The extent was determined to be 'limited" or "none" by the participants.

There is no area within the region that is void from the effects from extreme heat periods. Although young children, elderly, and those working and living in non-air-conditioned environments are most vulnerable, no structures are at risk. With high temperatures, people are vulnerable to heatstroke, heat cramps, heat exhaustion, and loss of life. In addition, periods of extreme heat create a significant demand on utilities such as water and electricity which can cause a failure in the electrical system. With the high demand on energy, power loss could occur making an extreme heat event even more dangerous. Structures are not at risk during periods of extreme heat. However periods of extreme heat place a significant demand on utilities, such as water and electricity, which can cause a failure in the system. Power loss could occur with the high demand on energy, making an extreme heat event even more dangerous for the community.

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in the plan dealing with an extreme heat event. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Extreme Heat Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	No	No	Unlikely	None
City of Centralia	No	No	Unlikely	None
City of Chehalis	No	No	Possible	Limited
City of Morton	No	Yes	Possible	Limited
City of Mossyrock	Yes	Yes	Likely	Severe

City of Napavine	No	No	Unlikely	None
City of Toledo	No	No	Unlikely	None
City of Vader	Yes	No	Possible	Limited
City of Winlock	No	No	Unlikely	None
Town of Pe Ell	No	No	Unlikely	None

Probability:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

Due to the nature of this hazard, no structures are at risk due to extreme heat.

Historical Occurrences

Some municipalities and jurisdictions identified extreme heat as a potential hazard. These communities cited previous occurrences, but no official instances have been recorded within the planning area.

Assessing Vulnerability: Estimating Potential Losses

The direct and indirect effects of extreme heat combined with the difficulty of placing value to losses of life create difficulty in calculating losses from this event. Losses such as power outages could affect businesses and critical facilities. There is not enough information available to quantify damages as a result of extreme heat Planning Area wide.

Assessing Vulnerability: Analyzing Development Trends

There is no human behavior or activity that can modify the area affected by extreme heat, thus extreme heat will always be capable of affecting the entire Planning Area. The primary risk of loss with this hazard is loss to human life.

The vulnerability to the planning area and the jurisdictions within could not be assessed further due to data limitations about the effects of extreme heat on power and water supply. Individual sections can provide detailed information about the development trends for each participating municipality.

Resources

- FEMA: http://www.fema.gov/hazard/heat/background.shtm
- NOAA's Weather Service: http://www.weather.gov/om/heat/index.shtml
- University of Washington Emergency Management: http://www.washington.edu/emergency/hazards/heat
- U.S. Drought Monitor: http://www.drought.unl.edu/dm/index.html

4.2.6 Flooding

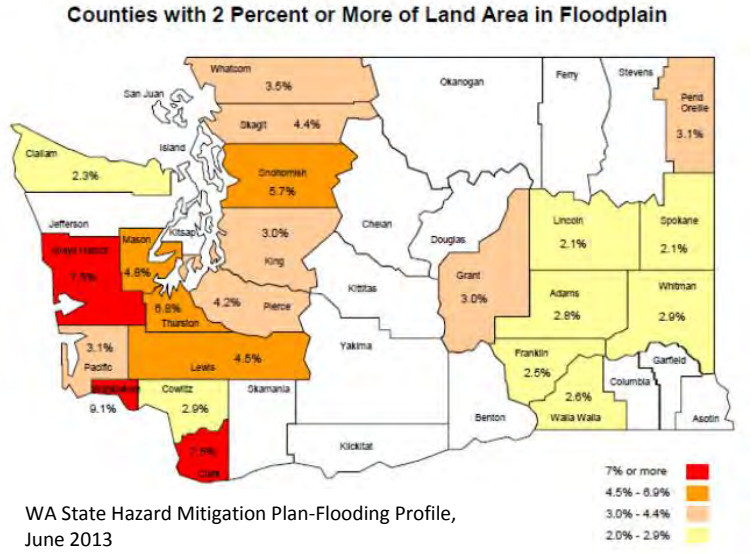
Hazard Profile

Flooding is the accumulation of water where there is usually none or the overflow of excess water from a stream, river, lake, reservoir, or coastal body of water onto adjacent floodplains. Floodplains are lowlands adjacent to water bodies that are subject to recurring floods.

Floods are natural events that are considered hazards only when people and property are affected. Nationwide, on an annual basis, floods have resulted in more property damage than any other natural hazard. Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.
- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.
- Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines severed.

Floods also cause economic losses through closure of businesses and government facilities; disrupt communication; disrupt utilities such as water and sewer service; result in excessive expenditures for emergency response; and generally disrupt the normal function of a community.



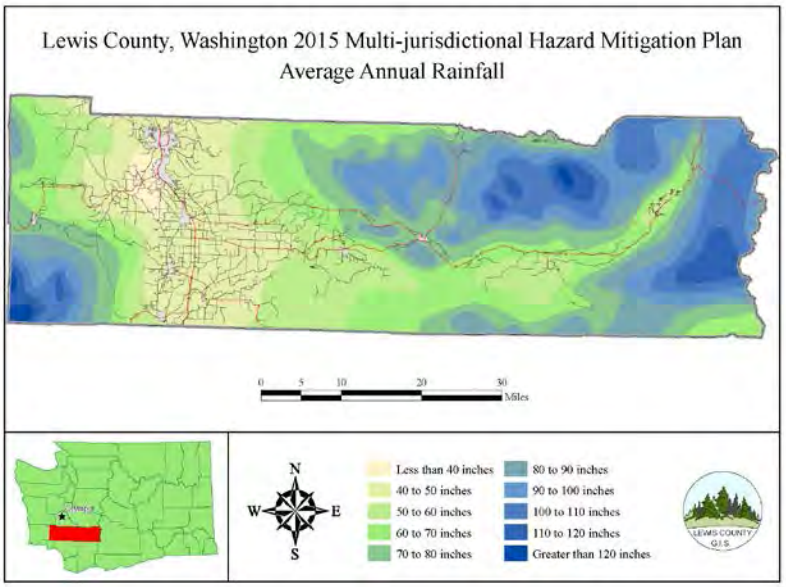
WA State Hazard Mitigation Plan-Flooding Profile, June 2013

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as stream flow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed as a percentage for the chance of a flood of a specific extent occurring in any given year.

Factors contributing to the frequency and severity of flooding include the following:

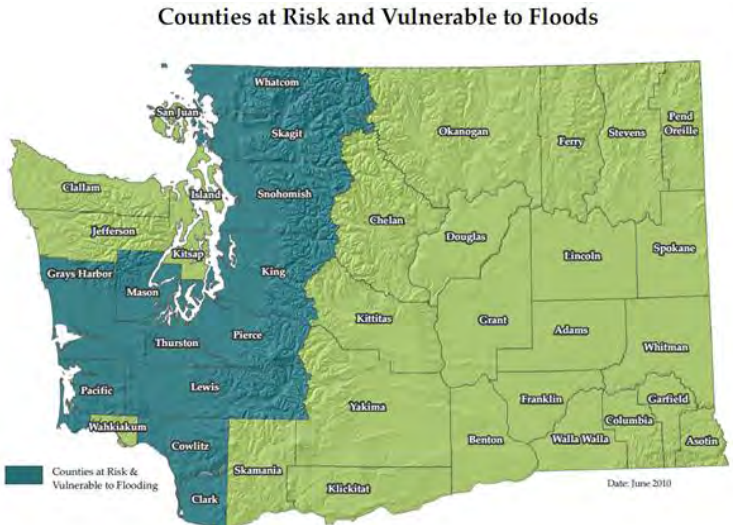
- Rainfall intensity and duration
- Antecedent moisture conditions
- Watershed conditions, including steepness of terrain, soil types, amount and type of vegetation, and density of development
- Changes in landscape resulting from wild fires (loss of moisture-trapping vegetation and increased sediment available for runoff)

- The existence of attenuating features in the watershed, including natural features such as swamps and lakes, and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Availability of sediment for transport, and the erodibility of the bed and banks of the watercourse



These factors are evaluated using (1) a hydrologic analysis to determine the probability that a discharge of a certain size will occur, and (2) a hydraulic analysis to determine the characteristics and depth of the flood that results from that discharge.

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a 1 percent probability of occurrence in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program (NFIP). The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements.



Source: Washington State Emergency Management Division Hazard Mitigation Plan, Oct 2013

Damage during a flood is typically caused by one of two river processes active during flooding. The first process is inundation, defined as floodwater and debris flowing through an area. Inundation occurs when the water in the river channel rises to the level where it flows over the riverbanks and onto the surrounding floodplain. The level of damage caused by inundation is determined by the velocity and depth of the water, the amount of debris in the water, and the level of development in the inundated area. Areas of flood inundation can be determined through hydrologic analysis and study of historical records. Inundation areas may vary from flood to flood because of the impact of different hydraulic responses from the river system or possible failures of flood control structures.

The second river process that causes damage during a flood is bank erosion. Bank erosion occurs when a river scours its banks, causing the channel to shift position. Sometimes the river will actually move to an entirely new channel during a flood. Bank erosion can also threaten structures high above the floodplain by undermining the bank near where the structure is located. Areas prone to bank erosion can be identified through mapping and hydrologic analysis, but the occurrence of channel migration and channel "jumps" cannot be predicted with confidence.

It was deemed, by both the public input and factual research that the planning area as a whole has had previous occurrences of flooding. The probability of flooding to occur again is 'highly likely' with a near 100% chance they will occur every year within the planning area. The extent varied depending on the jurisdiction some listed that it would be 'limited', as 0 to 25% of the planning area could be affected by a flooding event whereas others listed that it could be much more widespread in the area. Lewis County will continue to have flooding events because of its geography (numerous rivers), mountains, and low-lying areas.

Historical Occurrences

Flooding has been a historic problem in Lewis County, particularly with the Chehalis, Nisqually, and Cowlitz Rivers. Below in the table is the Summary of the Ten Peak Annual Flows for the major rivers in Lewis County.

Summary of Ten Peak Annual Flows

WRIA 11 Nisqually at National		WRIA Chehalis near Grand Mound		WRIA Newaukum at Chehalis		WRIA 26 Cowlitz at Packwood		WRIA 26 Cowlitz below Mayfield Dam*	
Date	Flows (cfs)	Date	Flows (cfs)	Date	Flows (cfs)	Date	Flows (cfs)	Date	Flows (cfs)
Nov-06	21,800	Dec-07	79,100	Feb-96	13,300	Nov -06	40,100	Nov-95	68,400
Feb-96	21,200	Feb-96	74,800	Jan 09	13,100	Dec-33	36,600	Dec-46	67,000
Dec-77	17,100	Jan-90	68,700	Dec07	12,900	Dec 77	36,200	Jan-65	64,700
Jan-74	15,000	Dec-07	62,700	Nov06	11,200	Nov-59	34,300	Dec-75	64,700
Jan-90	14,500	Nov86	51,600	Nov86	10,700	Feb-96	32,900	Nov-59	60,800
Dec-75	13,200	Jan-09	50,700	Jan-90	10,400	Nov-62	32,100	Dec-77	55,200
Dec-80	11,600	Jan-72	49,200	Dec77	10,300	Dec-75	30,600	Feb-51	51,200
Jan-75	11,000	Dec-3	48,400	Nov90	10,300	Dec-80	30,600	Dec-55	49,900
Nov-90	11,000	Nov90	48,000	Nov98	10,000	Dec-17	28,800	Nov-62	49,500
Nov-59	10,900	Dec-33	45,700	Jan-72	9,770	Nov-90	28,700	Dec-53	47,600

Source: USGS National Water Information System, Surface Water for Washington: Peak Streamflow, 2015
National Weather Service, National Oceanic and Atmospheric Administration. http://www.water.weather.gov/ Accessed July 2015.

In more than 30 years, Lewis County has experienced 19 federally declared disasters. Of these, 15 were either caused or exacerbated by flooding. These damage costs are approximate, and of primary and significant structures and businesses. Information about damages is collected by different agencies, and does not include unreported damages. The information is further confused when initial estimates of damage are refined. This can either result in a higher or lower value. At best, the primary damage was erosion of public infrastructures (riverbanks, roads, bridges, and revetments). Costs for public damages are based on actual costs or cost estimates reviewed by FEMA. Private costs are based on information provided by victims, Red Cross, and FEMA, and do not include any reduction in property values.

The scope of the flood damages is related to the magnitude of the flood and location. Low-lying areas, especially river valleys, have flooded regularly for hundreds of years. Final flood damage estimates in Lewis County totaled in the hundreds of millions. FEMA estimated the damages to be around $166

million to private and public property (Lewis County Health Department, February 10, 2008; Long Term Recovery Project). The 1996 flood event was also severe. It too affected interstate travel, thus making the associated damage costs (estimated up to $100 million) the one of the highest to date. The $30 million estimate given in the Table represents damage costs to public structures incurred within the County.

Assessing Vulnerability: Overview

The Composite Hazard Identification Table for Lewis County and the municipalities for flooding is listed below. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Presidential Declared Flood Disasters for Lewis County

Federal Declaration No.	Date	River/Area	Reported Public Damages ($)
DR-4056	March 2012	-	-
DR-1963	March 2011	-	-
DR-1817	Dec 2008	Chehalis	-
DR-1734	Dec 2007	Chehalis	166 M
DR-1172	March 1997	Cowlitz	9.4 M
DR-1159	Dec 96-Jan 1997	Chehalis, Cowlitz	3.2 M
DR-1100	Feb 1996	Chehalis, Cowlitz	30.0 M
DR-1079	Nov-Dec 1995	Cowlitz	12.0 M
DR- 981	Dec 1994	Chehalis	40,000
DR-0883	Dec 1990	Nisqually	700,000
DR-0883	Nov 1990	Chehalis	1.0 M
-	Feb 1990	Chehalis	200,000
DR-0852	Jan 1990	Chehalis	1.4 M
DR-784	Nov 1986	Chehalis	3.9 M
DR-545	Dec 1977	Cowlitz	1.3 M
DR-1079	Dec 1975	Cowlitz	50.2 M
DR-414	Jan 1974	-	-
DR-322	Jan 1972	Chehalis	2.0 M
-	Jan 1971	Chehalis	446,570

Source: FEMA's website: http://www.fema.gov/disasters/grid/state-tribal-government/89 Accessed: 7/12/2015

Flooding Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Highly Likely	Catastrophic
City of Centralia	Yes	Yes	Highly Likely	Limited
City of Chehalis	Yes	Yes	Highly Likely	Severe
City of Morton	Yes	Yes	Likely	Severe
City of Mossyrock	Yes	Yes	Likely	Limited
City of Napavine	Yes	Yes	Highly Likely	Limited
City of Toledo	Yes	Yes	Likely	Limited
City of Vader	Yes	Yes	Highly Likely	Limited
City of Winlock	Yes	Yes	Likely	Severe
Town of Pe Ell	Yes	Yes	Possible	Limited

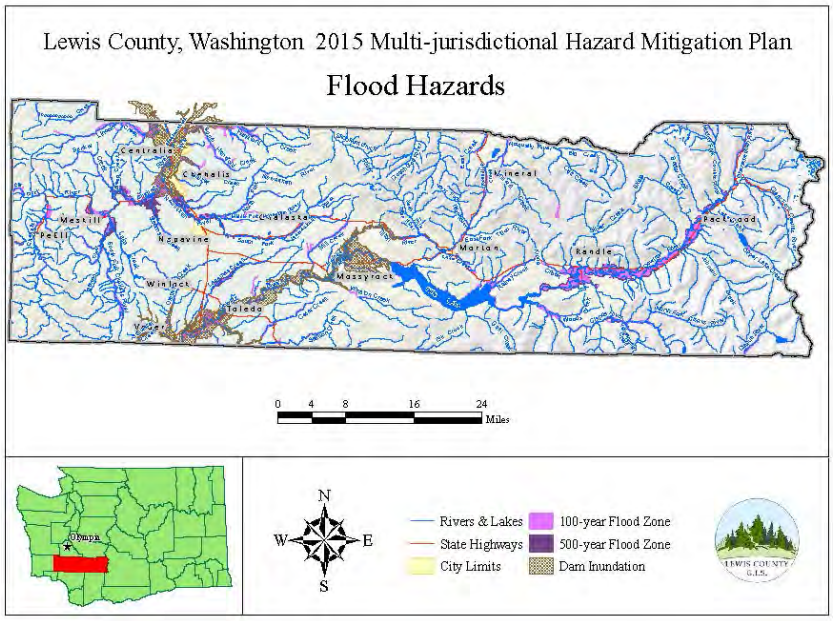
Probability:
- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:
- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected

- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

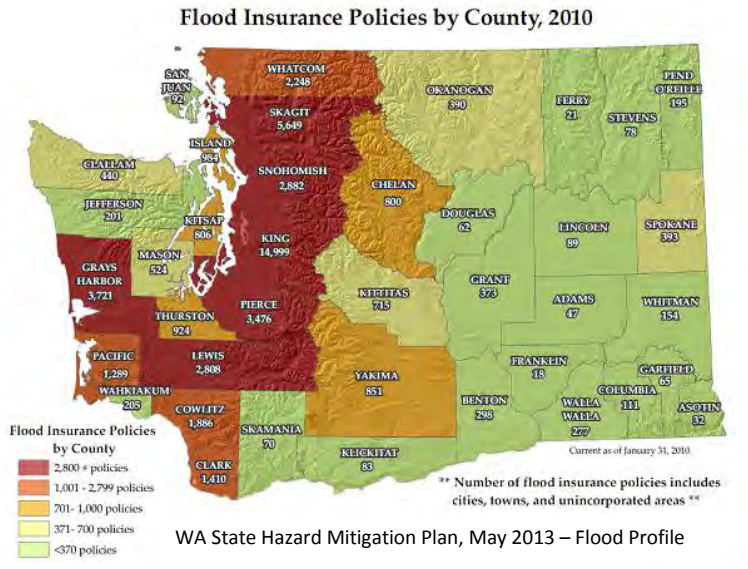
Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See the Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.



Assessing Vulnerability: Estimating Potential Losses

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. Flood damage costs are a way to compare the impacts of different size floods. Flood damage information was obtained by the US Army Corps of Engineers (USACE) from field investigations, damage survey reports, and personal interviews with homeowners, farmers, businessmen, and federal, state, county, city, and public utility officials. Eyewitness accounts of flooding and reports of damage in local newspapers were also used in identifying and quantifying flood damages.



WA State Hazard Mitigation Plan, May 2013 – Flood Profile

Precise information on private property damage is, for the most part, unavailable. FEMA collects several types of data for private property: human resources claims, and requests for short-term assistance and claims through the NFIP and the Small Business Administration (SBA). Human resource claims data and the damage reported in the newspapers are not necessarily alike. Human resource data are aggregated by zip code to protect the privacy of applicants, which makes it difficult to identify localized flood problems, trends, and causes.

Another factor to consider is the unreported private property damages. Flood insurance claims were either not filed due to lapsed flood insurance policies, or to fear of increased rates. Unfortunately, this is a common misconception; rates do not automatically increase based on submission of claims. In any case, the actual damages are likely understated and do not reflect the true magnitude of problems.

To assess risks and vulnerability, Lewis County GIS has utilized FEMA's loss-estimation model, HAZUS-MH (Version 1.3 MR3). The results using HAZUS-MH MR3 are summarized for the County and the individual municipal jurisdictions.

Assessing Vulnerability: Analyzing Development Trends

Flooding will happen again in most of Lewis County. The only question is when it will happen in the future. Floods affect many areas developed for businesses and homes, and they occur with more frequency than most other natural disasters. Based on the frequency of flooding in the past, the probability of future damaging floods is high.

Participating Jurisdictions has specific detailed information about the development trends for each participating municipality. Development trends differ for each jurisdiction some limit growth within the floodplain leaving open space areas, others limit growth based on the finish floor height (1-3 feet above the base flood elevation), others limit the amount of fill.

National Flood Insurance Program (NFIP)

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood losses;
2. Facilitate accurate insurance rating; and
3. Promote the awareness of flood insurance.

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.

Source: FEMA - www.fema.gov/business/nfip/crs.shtm

For CRS participating communities, flood insurance premium rates are discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount (a Class 10 is not participating in the CRS and receives no discount). The CRS classes for local communities are based on 18 creditable activities, organized under four categories:

1. Public Information,
2. Mapping and Regulations,
3. Flood Damage Reduction, and
4. Flood Preparedness.

The Community Rating System (CRS) class is important because participating in CRS can reduce the amount of money that residents pay for flood insurance. A lower score provides a higher percentage reduction.

Each year, a jurisdiction must recertify by October 1st that it is continuing to implement the activities for which it has earned credit. Recertification is done on the recertification worksheet, AW-214, which is prepared by ISO and sent to the community each August. The recertification worksheet lists community data and the activities and elements the community is implementing for CRS credit. The table below shows the activities for which a community can receive points for as of October 1, 2007. Lewis County and the City of Chehalis are currently following the 2007 CRS Manual whereas the City of Centralia is following the 2013 edition. Lewis County is currently ranked a Class 6, and residents receive a 20 percent discount on flood insurance rates.

To calculate the number of points a municipality receives, a few term definitions are necessary:

- Series - The CRS activities are divided into four series: Public Information, Mapping and Regulation, Damage Reduction, and Flood Preparedness. Their titles are self-explanatory, and the credits within them follow the main objective of the titles.
- Activity - Each series has from three to six activities. Each activity has a title, such as "Additional Flood Data" or "Flood Warning Program." The titles are mostly self-explanatory, but they may include components that are not specifically named in the title. At the end of the credit calculation process, the credits for all activities are added together to get the community's total score.
- Elements - Within each activity, there are one or more elements. These are discrete pieces of a community's floodplain management program, and each receives a certain number of credit points.

The first step is to review each activity proposed by the community for adequacy and completeness. Under each activity in the CRS Schedule is a section entitled "Credit Points." Each element has a maximum number of credit points that can be earned if the element is being implemented to certain standards throughout the community or throughout the floodplain. A community will receive less than the maximum points if its program does not include all the elements listed in the Credit Points section.

CRS Annual Certification	
Activity #	**Activity Description**
Public Information Activities (Series 300)	
310	(Elevation Certificates) Maintain FEMA elevation certificates for all new construction. Maintaining them after the date of CRS application is a minimum requirement for any CRS credit.
310	(Map Information) Respond to inquiries to identify a property's FIRM zone and publicize this service.

CRS Annual Certification	
Activity #	**Activity Description**
330	(Outreach Projects) Send information about the flood hazard, flood insurance, and flood protection measures to flood prone residents or all residents of the community.
340	(Hazard Disclosure) Real estate agents advise potential purchasers of flood prone property about the flood hazard; or regulations require a notice of the flood hazard.
350	(Flood Protection Information) The public library maintains references on flood insurance and flood protection.
360	(Flood Protection Assistance) Give inquiring property owners technical advice on protecting their buildings from flooding, and publicize this service.
Mapping and Regulatory Activities (Series 400)	
410	(Additional Flood Data) Develop new flood elevations, floodway delineations, wave heights, or other regulatory flood hazard data for an area that was not mapped in detail by the flood insurance study; or have the flood insurance study's hydrology or allowable floodway surcharge based on a higher state or local standard.
420	(Open Space Preservation) Guarantee that a portion of currently vacant floodplain will be kept free from development.
430	(Higher Regulatory Standards) Require freeboard; require soil tests or engineered foundations; require compensatory storage; zone the floodplain for minimum lot sizes of 1 acre or larger; regulate to protect sand dunes; or have regulations tailored to protect critical facilities or areas subject to special flood hazards (e.g., alluvial fans, ice jams, or subsidence).
440	(Flood Data Maintenance) Keep flood and property data on computer records; use better base maps; or maintain elevation reference marks.
450	(Stormwater Management) Regulate new development throughout the watershed to ensure that post-development runoff is no worse than pre-development runoff.
Flood Damage Reduction Activities (Series 500)	
510	(Floodplain Management Planning) Prepare, adopt, implement, and update a comprehensive plan using a standard planning process.
520	(Acquisition and Relocation) Acquire and/or relocate floodprone buildings so that they are out of the floodplain.
530	(Flood Protection) Document flood proofed or elevated pre-FIRM buildings.
540	(Drainage System Maintenance) Conduct periodic inspections of all channels and retention basins and perform maintenance as needed.
Flood Preparedness Activities (Series 600)	
610	(Flood Warning Program) Provide early flood warnings to the public and have a detailed flood response plan keyed to flood crest predictions.
620	(Levee Safety) Maintain levees that are not credited with providing base flood protection.
630	(Dam Safety) All communities in a State with an approved dam safety program receive credit.

Jurisdiction's NFIP Participation

Lewis County Communities – NFIP Program 2015 Status						
CID #	**NFIP Status**	**Jurisdiction**	**Initial FHBM Identified**	**Initial FIRM Identified**	**Current Effective Map Date**	**Reg-Emer Date**
530102	Participating	Lewis County	11/29/1977	12/15/1981	7/17/2006	12/15/1981
530103	Participating	Centralia	3/15/1974	6/1/1982	6/1/1982	6/1/1982
530104	Participating	Chehalis	6/7/1974	5/1/1980	7/17/2006	5/1/1980
530105	Participating	Morton	5/24/1974	12/4/1979	3/2/1982	12/4/1979
	Not in NFIP	Mossyrock				
530254	NOT in NFIP	Napavine	2/14/1975	7/17/2006	7/17/2006	Sanctioned 2/14/1976

530296	Participating	Pe Ell	7/18/1975	3/04/1980	3/04/1980	3/04/1980
530303	Participating	Toledo	7/11/1975	11/5/1980	11/5/1980	11/19/1980
530266	Participating	Vader	9/5/1975	9/14-1979	9/14/1979	1/17/1997
530306	Participating	Winlock	7/18/1975	9/14/1979	9/14/1979	9/14/1979
Source: FEMA http://www.fema.gov/cis/WA.pdf Accessed 7/7/2015.						

Community Name	Date Participating in the NFIP	Number of NFIP Policies	Insurance in Force (Total coverage)	Number of Claims Paid Since 1978	Total Paid Since 1978	Number of Repetitive Losses	CAV Date	FIRM Date	Participating in CRS
Lewis County	12/15/81	1380	$272,959,900	631	$20,635,179.93	137	3/24/2000	7/17/2006	Yes
Centralia	6/1/82	1049	$198,873,600	663	$24,435,760.91	133	6/7/2005	6/1/1982	Yes
Chehalis	5/1/80	332	$67,246,600	440	$26,242,335.82	189	3/26/2004	7/17/2006	Yes
Morton	12/4/79	4	$1,120,000	0	$0	0	1/1/1993	3/2/1982	No
Toledo	11/19/80	32	$6,542,700	3	$75,538.10	0	-	11/5/1980	No
Vader	1/17/97	2	$235,800	0	$0	0	-	9/14/1979	No
Winlock	9/14/79	2	$575,400	1	$859.31	0	-	9/14/1979	No
Town of Pe Ell	3/4/80	7	$1,495,400	1	$37,770.81	0	5/20/1994	3/4/1980	No
County Total	-	2808	$549,049,400	-	$71,427,445	459	-	-	-
Numbers from 2010 Plan									

NFIP Repetitive Loss List (Structures)

Repetitive flooding is a priority for FEMA and the National Flood Insurance Program (NFIP). FEMA defines a Repetitive Loss (RL) property as any insurable building for which two or more claims of more than *$1,000* were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

As of December, 2011, Lewis County has fifty-three (53) of which 34 are unmitigated, Centralia has sixty-four (64), and Chehalis has sixty-five (65) repetitive loss properties. The County and cities address repetitive loss properties that are residential by elevating, relocating or buying out the homes. These remedies are usually addressed through the Flood Hazard Mitigation Grant funds or by the property owner.

For, CRS purposes, there are three categories of repetitive loss communities based on the number of properties on the updated repetitive loss list (i.e. after the changes and updates have been reported and accepted by FEMA):
Category A: A community that has no repetitive loss properties, or whose repetitive loss properties all have been mitigated.
Category B: A community with at least one, but fewer than 10, repetitive loss properties that have not been mitigated. At each verification visit a Category B community must
a) Prepare a map of the repetitive loss area(s)
b) Review and describe its repetitive loss problem,
c) Prepare a list of the addresses of all properties with insurable buildings in those areas, and
d) Undertake an annual outreach project to those addresses. A copy of the outreach project is submitted with each year's recertification.
Category C: A community with 10 or more repetitive loss properties that have not been mitigated. A Category C must
a) Do the same things as a Category B community, and
b) Prepare a floodplain management plan or area analyses for its repetitive loss area(s). The plan and area analysis requirements are explained in Activity 510. CRS Coordinator's Manual. Page 500-7 Edition:2013

The County and cities in the past have worked with property owners to elevate, relocate, flood-proof or purchased. The County and cities understand that many repetitive loss properties were constructed prior to the adoption of the floodplain regulations. Governmental agencies are working with the existing commercial buildings that are located in the floodplain to reduce flood losses by developing an emergency flood plan as well as encouraging property owners to flood-proof their structures. Maps are

attached identifying the locations within the community of where the Repetitive Loss Properties are located in each jurisdiction's section.

Lewis County Repetitive Loss Analysis

#	Mitigated	Insured	Address	Area	#	Mitigated	Insured	Address	Area
1	M		XXX BIG HANAFORD RD		27	U		XXX LINCOLN CREEK RD	
2	M		XXX LINCOLN AVE		28	U		XXX JOPPISH RD	
3	M		XXX LINCOLN AVE		29	U		XXXX PACIFIC AVE	
4	M		XXX UNION AVE		30	U		XXX GROVE ST	
5	M		XXX OTTO RD		31	U		XXXX BUNKER CREEK RD	
6	M		XXXX A ST HWY 6		32	U		XXX LITERAL RD	
7	M		XXX SW HILLBURGER RD		33	U		XXXX RIVERSIDE RD	
8	M		XXX SHOREY RD		34	U		XXXX RIVERSIDE RD	
9	M		XXX TUNE RD		35	U		XXX SW HILLBURGER RD	
10	M		XXXX ST HWY 6		36	U		XXX SHOREY RD	
11	M		XXX BUNKER CREEK RD		37	U		XXXX CERES HILL RD	
12	M		XXX BOISTFORT RD		38	U		XXXX RICE RD	
13	M		XXX C STOVER RD		39	U		XXXX A RICE RD	
14	M		XXX ST ROUTE 131		40	U		XXXX RICE RD	
15	M		XXX HAMPTON RD		41	U		XXX TIMBERLINE DR	
16	M		XXX SKINNER RD		42	U		XXX TAUSCHER RD	
17	M		XXX LANCIE RD		43	U		XXXX JACKSON HWY	
18	M		XXX SKINNER RD		44	U		XXX NORTH FORK RD	
19	M		X STATE ROUTE 131		45	U		XXX BOISTFORT RD	
20	U		XXX INDEPENDENCE RD		46	U		XXX GUERRIER RD	
21	U		XXX STATE HWY 507		47	U		XXX ST ROUTE 131	
22	U		XXX BIG HANAFORD RD		48	U		XXX CLINE RD	
23	U		XXX LINCOLN AVE		49	U		XXX CISPUS RD	
24	U		XXX UNION AVE		50	U		XXX KAREN RD	
25	U		XXXX HOWARD RD		51	U		XXX SKINNER RD	
26	U		XXX JOPPISH RD		52	U		XXX LANCIE RD	

Map of Repetitive Loss Properties and Areas are located in the Lewis County Section

Total RLP Properties – 52
Residential Properties: 51
Commercial Properties: 1
Total # of Severe Repetitive Loss Properties – 4

Flood Insurance Coverage in Lewis County, as of May 31, 2014
(Flood Management Analysis-Lewis County, French & Associates, LTD. Dated October 8, 2014)

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
AO1-30 & AE Zones	**496**	**$409,092**	**$83,904,800**	**419**	**$15,702,615.35**	**$499,247.19**
A Zones	**103**	**$90,303**	**$16,297,700**	**48**	**$1,477,3613.31**	**$46,614.71**
AO Zones	**31**	**$29,155**	**$4,759,700**	**0**	**$0**	**$0**
AH Zones	**1**	**$1,291**	**$1,000,000**	**0**	**$0**	**$0**
B, C, & X Zones						
Standard	**43**	**$49,296**	**$8,089,100**	**39**	**$1,108,714.41**	**$39,136.94**
Preferred	**559**	**$241,348**	**$160,103,000**	**78**	**$2,951,505.89**	**$119,949.79**
Total	**1,233**	**$820,485**	**$274,154,300**	**584**	**$21,240,195**	**$704,946**

CRS Data - 2015

CRS Rating 2015 – Class 6 – 20% premium reduction
Number of Building in the SFHA:
Acres of the SFHA in the City Limits:

Lewis County BECEGS Report Summary – March 2013

The Washington Surveying and Rating Bureau prepares reports for participating communities using the Building Code Effectiveness Grading Schedule (BCEGS). BCEGS looks at building code requirements designed to mitigate losses from natural hazards.

BCEGS Class: 4/3 (Residential Other)

Code Activity	Score	Max	Percent
Administration of Codes Section Total	38.6	54.0	71%
Plan Review Section Total	18.3	23.0	80%
Field Inspection Total	22.5	23.0	98%

Adjustment for non-adoption of residential sprinklers	.95		
Total	75.4	100.0	75%

In 2014, French & Associates, LTD of Steilacoom, Washington was contracted by the Flood Authority to perform an analysis of local floodplain management programs to see how communities could strengthen their programs. Lewis County's recommendations from the report included the following:

1. Continue efforts to get updated and accurate mapping
2. Continue supporting programs promoting open space in floodplain areas
3. Review ordinance revisions needed to comply with the NFIP
4. Proceed with developing a coordinated shoreline master program
5. Formally adopt the current Western Washington Stormwater Manual
6. Staff should follow through with intent to attend training
7. Continue to advise residents of the flooding hazard
8. Support efforts to educate insurance agents
9. Support a joint effort to improve hazard mitigation grants
10. Review current outreach projects in light of the new CRS Manual
11. The new CRS Coordinator should become familiar with the program
12. Review current programs in light of the new CRS Manual

City of Centralia Repetitive Loss Analysis

#	Mitigated	Insured	Address	Area	#	Mitigated	Insured	Address	Area
1	YES-Dem	NO	XXXX LENORE ST	DEM	34	NO	YES	XXX COURTLAND	14
2	YES	NO	XXXX LONG RD	1	35	NO-Com	YES	XXX W MAIN ST	12
3	YES-Rai	YES	XXX STATE ST	4	36	YES	YES	XXXX LONG RD	1
4	NO	SDF	XXXX LAKE SHORE DR	14	37	YES	YES	XXX W 7TH ST	11
5	YES-Com	YES	XXX HARRISON AVE	7	38	NO-Com	YES	XXXX ECKERSON RD	7
6	NO	YES	XXXX BROTHERSON RD	1	39	YES	YES	XXX E OAKVIEW AVE	8
7	YES	YES	XXXX HOWARD AVE	8	40	NO	SDF	XXXX GRAND AVE	6
8	NO-Com	NO	XXXX GRAND AVE	DEM	41	YES-Rai	YES	XXX BRYDEN AVE	2
9	YES	NO	XXXX WOODLAND AVE	DEM	42	YES	NO	XXX LAKE SHORE DR	14
10	NO-Com	SDF	XXXX LAKE SHORE DR	14	43	YES-Rai	YES	XXXX W PLUM ST	14
11	NO	NO	XXX HARRISON AVE	DEM	44	NO	YES	XXXX W 1ST ST	7
12	NO	No SDF	XXXX SOUTHGATE DR	2	45	NO-Com	NO	XXX N GOLD ST	10
13	YES	YES	XXXX SHAMROCK DR	3	46	YES	YES	XXX HEMLOCK ST	14
14	NO-Com	YES	XXX HARRISON AVE	7	47	YES-Rai	NO	XXX COURTLAND ST	14
15	NO	NO	XXX W MAGNOLIA ST-MFR	12	48	NO	YES	XXXX N PEARL ST	13
16	YES-Rai	YES	XXXX EUREKA AVE	8	49	YES	YES	XXXX SHAMROCK DR	3
17	YES-Dem	NO	XXXX LONG RD	1	50	YES-Rai	YES	XXX WILLOW LN	13
18	NO-Com	NO	XXXX NATIONAL AVE	6	51	NO	NO	XXX HEMLOCK ST	14
19	YES-Rai	NO	XXXX W MAIN ST	13	52	NO	YES	XXXX LEWIS ST	13
20	YES	YES	XXXX EUREKA AVE	8	53	NO	YES	XXXX W MAIN ST	13
21	YES	YES	XXXX LONG RD	1	54	YES-Rai	YES	XXX YEW ST	14
22	YES-Rai	YES	XXXX HOWARD AVE	8	55	NO	YES	XXX TILLEY AVE	17
23	NO	YES	XXX LAKE SHORE DR	14	56	NO	YES	XXXX SOUTHGATE DR	2
24	YES	YES	XXXX H ST	11	57	NO	YES	XXX CENTRALIA COLLEGE BLVD	12
25	YES	NO	XXXX SEWARD AVE	9	58	NO	YES	XXXX NW AIRPORT WAY	NIC
26	YES-Rai	NO	XXX PURVIS AVE	9	59	NO	YES	XXXX SOUTHGATE DR ST	2
27	NO-Com	SDF	XXX E UNION ST	6	60	NO-Com	YES	XXX STATE ST	4
28	YES	YES	XXXX HOWARD AVE	8	61	NO	YES	XXXX MILITARY RD	3
29	YES	YES	XXXX SHAMROCK DR	3	62	YES	YES	XXX E BRIDGE ST	7
30	NO	NO	XXXX LONG RD	DEM	63	NO	YES	XXXX KRESKY AVE	6
31	NO	NO	XXXX SOUTHGATE DR	2	64	YES-Rai	NO	XXX YEW ST	14

32	NO	YES	XXX LONG RD	1	65				
33	YES-Rai	YES	XXXX N TOWER AVE	11					

Mitigated: Dem (Demolished), Rai – (Elevated), Com (Commercial), NIC (Not in Centralia)

Map of Repetitive Loss Properties and Areas are located in the City of Centralia Section

Total RLP Properties – 64
Residential Properties: 55
Commercial Properties: 9
Total # of Severe Repetitive Loss Properties: 6

Flood Insurance Coverage in Centralia, as of May 31, 2014
(Flood Management Analysis-Centralia, French & Associates, LTD. Dated September 16, 2014)

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
AO1-30 & AE Zones	**559**	**$493,109**	**$105,508,800**	**542**	**$20,855,637.52**	**$606,898.70**
A Zones	**0**	**$0**	**$0**	**17**	**$205,983.71**	**$7,450.00**
AO Zones	**0**	**$0**	**$0**	**0**	**$0**	**$0**
AH Zones	**0**	**$0**	**$0**	**0**	**$0**	**$0**
B, C, & X Zones						
Standard	**23**	**$34,222**	**$5,144,400**	**60**	**$2,538,519.46**	**$68,845.81**
Preferred	**328**	**$140,445**	**$82,921,000**	**51**	**$1,466,760.91**	**$54,521.86**
Total	**910**	**$667,776**	**$193,646,200**	**670**	**$25,066,899**	**$737,714**

Causes of Repetitive Loss and Repetitive Loss Areas in Centralia

Total Properties in Centralia's Repetitive Loss Area(s) - 272

Area 1: 18 properties – Area 1 is located on Long road. It is subject to flooding from the Chehalis River overflowing its banks and going over the Long Road Levee and around the Interstate at Mellen Street. Once this occurs, water will follows the lowest contours until it returns to the Chehalis River channel or goes into the ground. A number of homes have been elevated in this neighborhood or purchased to resolve the flooding issue.

Area 2: 16 properties – Area 2 is located by Bryden Avenue and Southgate road. This are floods when the Chehalis river overflows its banks. The water follows the lowest contours which go right through this area. Most of the homes that flood have been raised in the past.

Area 3: 30 properties – Area 3 is adjacent to Shamrock and Military drives. Area 3 is subject to flooding from the Chehalis River overflowing its banks. Once this occurs, water will follows the lowest contours until it returns to the Chehalis River channel. This area also floods because of the narrowness of the Mellen Street Bridge and elevation of the ground in your area. A number of homes have been elevated in this area to resolve the flooding issue.

Area 4: 4 properties – Area 4 is located adjacent to Kresky and Grand roads. This Area is subject to flooding from the Chehalis River and Salzer Creek overflowing its banks and not able drain back into the Chehalis River Channel because of the high water levels. Once this occurs, water will follows the lowest contours until it returns to the Chehalis River channel or goes into the ground. A number of homes have been elevated in the area or purchased to resolve their flooding issue. A number of businesses in the area have been flood proofed

Area 5: 5 properties – Area 5 is located on Woodland Avenue. It is subject to flooding from the Chehalis River overflowing its banks and going over the Long Road Levee and around the Interstate at Mellen Street. Once this occurs, water will follows the lowest contours until it returns to the Chehalis River channel or goes into the ground. A number of homes have been elevated in this neighborhood or purchased to resolve the flooding issue.

Area 6: 16 properties – Area 6 is located adjacent to Kresky and Grand roads. This Area is subject to flooding from the Chehalis River and Salzer Creek overflowing its banks and not able drain back into the Chehalis River Channel because of the high water levels. Once this occurs, water will follows the lowest contours until it returns to the Chehalis River channel or goes into the ground. A number of homes have been elevated in the area or purchased to resolve their flooding issue. A number of businesses in the area have been flood proofed.

Area 7: 17 properties – Area 7 is located on Harrison road. This area floods when the Skookumchuck River overflows its banks and the water flows towards the Chehalis River across Hayes Lake. This area backs up because of the Skookumchuck bridge constriction and the high level of the Chehalis river.

Area 8: 28 properties – Area 8 is located in the northeast corner of the City of Centralia this area floods because the Skookumchuck River overflows its banks and it follows the lowest contours until it can reach Coffee Creek or return to the Skookumchuck river or goes into the ground. A number of homes have been elevated in the area to resolve their flooding issue.

Area 9: 18 properties – Area 9 is located in the northeast corner of the City of Centralia this area floods because the Skookumchuck River overflows its banks and it follows the lowest contours until it can reach Coffee Creek or return to the river or goes into the ground. A number of homes have been elevated in the area to resolve their flooding issue.

Area 10: 7 properties - Area 10 is adjacent to China Creek and the Agnew mill ponds. This area floods when water overflows China Creek's banks. China Creek is part of the City's stormwater system and when heavy rains occur and we experience urban flooding.

Area 11: 30 properties - Area 11 is located in south of Skookumchuck river by 6th and 7th streets. This area floods because the Skookumchuck River overflows its banks or goes around the 25-year levee and it follows the lowest contours until it can reach the river or goes into the ground. A number of homes have been elevated in the area to resolve their flooding issue.

Area 12: 30 properties - Area 12 is adjacent to China Creek and this area floods when the creek overflows its banks. China Creek is part of the City's stormwater system and when heavy rains occur and we experience urban flooding.

Area 13: 24 properties - is located by Plummer's and Hayes' lakes. This area floods when the Skookumchuck river overflows its bank which raises Hayes and Plummer's lake and then it combines with China creek which is also flooding. Many homes in this area have been raised in the past.

Area 14: 35 properties - is located by Plummer's and Hayes' lakes. This area floods when the Skookumchuck river overflows its bank which raises Hayes and Plummer's lake and then it combines with China creek which is also flooding. Many homes in this area have been raised in the past.

CRS Data - 2015

- CRS Rating 2015 – Class 6 – 20% premium reduction (November 5, 2015)
- Number of Building in the SFHA: 1490 (1,143 residential + 347 non-residential)
- Acres of the SFHA in City Limits: 1787
- Acres in the City's Zero Rise Area: 426 (294 Residential+132 non-residential)
- Total NFOS in acres: 146.79
- Total Open Space Preserved in SFHA in the City Limits: 369 acres

Centralia BECEGS Report Summary – June 2014

The Washington Surveying and Rating Bureau prepares reports for participating communities using the Building Code Effectiveness Grading Schedule (BCEGS). BCEGS looks at building code requirements designed to mitigate losses from natural hazards.

BCEGS Class: 3 (Residential: Class 3, Commercial/Industrial: Class 3)

Code Activity	Score	Max	Percent
Section 1: Administration of Codes Section Total	39.81	54.0	73.2
Section 2: Plan Review Section Total	21.36	23.0	92.9
Section 3: Field Inspection Total	22	23.0	95.7
Adjustment for non-adoption of residential sprinklers			
Total	83.17	100.0	83.2%

In 2014, French & Associates, LTD of Steilacoom, Washington was contracted by the Flood Authority to perform an analysis of local floodplain management programs to see how communities could strengthen their programs. Centralia's recommendations from the report included the following:

1. Continue efforts to get updated and accurate mapping
2. Revise ordinance to comply with the NFIP
3. Continue to enforce floodplain management criteria in other regulations
4. Proceed with developing a coordinated shoreline master program
5. Formally adopt the current Western Washington Stormwater Manual
6. Continue to advise residents of the flooding hazard
7. Educate insurance agents
8. Continue to implement hazard mitigation plans' recommendations
9. Update the County Hazard Mitigation Plan by 2015 with Lewis County
10. Support a joint effort to improve hazard mitigation grants
11. Review current outreach projects in light of the new CRS Manual

City of Chehalis Repetitive Loss Analysis

#	Mitigated	Insured	Address	Area	#	Mitigated	Insured	Address	Area
1	X		XXX NW FLORIDA AVE		34			XXX SW NEWAUKUM AVE	
2	X		XXX SW RIVERSIDE DRIVE		35			XXX SW CHEHALIS AVE	
3			XXX SW ELZINA ST		36			XXX N NATIONAL AVE	
4	X		XXX SW JAMES ST		37			XXX N NATIONAL AVE	
5			XXX SW PACIFIC AVE		38	X		XXX SW NEWAUKUM AVE	
6			XXX SW NEWAUKUM AVE		39			XXX SW CHEHALIS AVE	
7			XXX SW 3RD ST		40			XXX NW FLORIDA AVE	
8			XXX SW ELZINA ST		41			XXX SW NEWAUKUM AVE	
9	X		XXX SW RIVERSIDE DR		42	X		XXX SW JAMES ST	
10			XXX SW CHEHALIS AVE		43			XXX SW CHEHALIS AVE	
11			XXX NE KRESKY AVE		44			XXX N NATIONAL AVE	
12			XXX SW PACIFIC AVE		45			XXX SW RIVERSIDE DR	
13			XXX SW 3RD ST		46			XXX SW CHEHALIS AVE	
14			XXX N NATIONAL AVE		47			XXX NW SHORELINE DR	
15			XXX SW 3RD ST		48	X		XXX NW PRINDLE ST	

16			XXX SW 3RD ST		49	X		XXX NW PRINDLE ST	
17			XXX SW 3RD ST		50			XXX SW CHEHALIS AVE	
18			XXX SW NEWAUKUM AVE		51			XXX AIRPORT RD	
19			XXX SW 3RD ST		52	X		XXX SW JAMES ST	
20			XXX NW OREGON WAY		53	X		XXX SW JAMES ST	
21			XXX NW LAKE ST		54			XXX SW THOMSEN AVE	
22			XXX SW ELZINA ST		55			XXX NW PRINDLE ST	
23			XXX NW FLORIDA AVE		56			XXX SW CHEHALIS AVE	
24			XXX SW NEWAUKUM AVE		57			XXX N NATIONAL AVE	
25			XXX SW 3RD ST		58			XXX NW RIVER ST	
26			XXX SW JAMES ST		59			XXX SW JAMES ST	
27			XXX SW PACIFIC ST		60			XXX INTERSTATE AVE	
28			XXX SW 3RD ST		61			XXX SW JAMES ST	
29			XXX SW 3RD ST		62			XXX SW JAMES ST	
30			XXX SW 3RD ST		63			XXX SW 3RD ST	
31			XXX NE MEDIAN RD		64			XXX NW PRINDLE ST	
32			XXX NW MARYLAND AVE		65			XXX SW Thomsen Ave	
33			XXX NW RIVER ST						

Mitigated: Dem (Demolished), Rai – (Elevated), Com (Commercial), NIC (Not in Chehalis)

Map of Repetitive Loss Properties and Areas are located in the City of Chehalis Section

Total RLP Properties: 65
Residential Properties: 59
Commercial Properties: 6
Total # of Severe Repetitive Loss Properties: 11

Flood Insurance Coverage in Chehalis, as of May 31, 2014
(Flood Management Analysis-Chehalis, French & Associates, LTD. Dated October 8, 2014)

	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
AO1-30 & AE Zones	**207**	**$295,168**	**$50,837,100**	**404**	**$22,534,534.89**	**$621,009.75**
A Zones	**0**	**$0**	**$0**	**2**	**$17,210.06**	**$760.00**
AO Zones	**0**	**$0**	**$0**	**0**	**$0**	**$0**
AH Zones	**4**	**$17,880**	**$1,631,100**	**1**	**$685,800.16**	**$14,668.50**
B, C, & X Zones						
Standard	**8**	**$12,242**	**$1,950,400**	**19**	**$3,679,643.06**	**$38,920**
Preferred	**33**	**$15,247**	**$8,524,000**	**8**	**$177,520.70**	**$7,982.53**
Total	**252**	**$340,537**	**$82,942,600**	**434**	**$27,094,707**	**$683,339**

Causes of Repetitive Loss and Repetitive Loss Areas in Chehalis

Total Properties in Chehalis' Repetitive Loss Area(s) – 65

Flooding occurs when climate (or weather patterns), geology, and hydrology combine to create conditions where river and stream waters flow outside of their usual course and "overspill" beyond their banks. In the City of Chehalis, the combination of these factors, including ongoing development, create seasonal flooding conditions.

Flooding is most common from October through April, when storms from the Pacific Ocean, bring intense rainfall to the area. The City of Chehalis receives approximately 40 inches of rain on average each year. Larger floods result from heavy rains that continue over the course of several days, augmented by snowmelt at a time when the soil is near saturation from previous rains. Frozen topsoil also contributes to the frequency of floods. Snowmelt from the Willapa Hills and Cascade Mountain Range may contribute to, but is not considered a significant source of flooding on the Chehalis and Newaukum Rivers.

Riverine and urban are the two types of flooding that primarily affect Chehalis. Riverine flooding is the overbank flooding of rivers and streams, the natural processes of which add sediment and nutrients to fertile floodplain areas. Urban flooding results from the conversion of land from fields or woodlands to parking lots and roads, through which the land loses its ability to absorb rainfall.

Commercial and residential development within the City continues to potentially displace natural areas that have historically functioned as flood storage, but the city has addressed this potential displacement by requiring development to be consistent with the City of Chehalis and Washington State storm water & floodplain management requirements. The city has adopted the FEMA Flood Insurance Study (revised 2006), and associated requirements, so the would-be increase in flood levels caused by the development are within the Federal Insurance Administration and Washington State requirements (no increase in the water-surface elevation of the 100-year flood more than one foot at any point). Source: Chehalis Flood Information Letter – http://ci.chehalis.wa.us/building/floodplain-management Accessed 7/21/2015

CRS Data – 2014

- CRS Rating 2014 – Class 6 – 20% premium reduction

- Number of Building in the SFHA:
- Acres of the SFHA:

Chehalis BECEGS Report Summary – 2009

The Washington Surveying and Rating Bureau prepares reports for participating communities using the Building Code Effectiveness Grading Schedule (BCEGS). BCEGS looks at building code requirements designed to mitigate losses from natural hazards.

BCEGS Class: 3 (Residential: Class 3, Commercial/Industrial: Class 3)

Code Activity	Score	Max	Percent
Section 1: Administration of Codes Section Total	37.4	54.0	69%
Section 2: Plan Review Section Total	18.9	23.0	82%
Section 3: Field Inspection Total	77.6	100	78%
Adjustment for non-adoption of residential sprinklers			
Total	77.6	100.0	78%

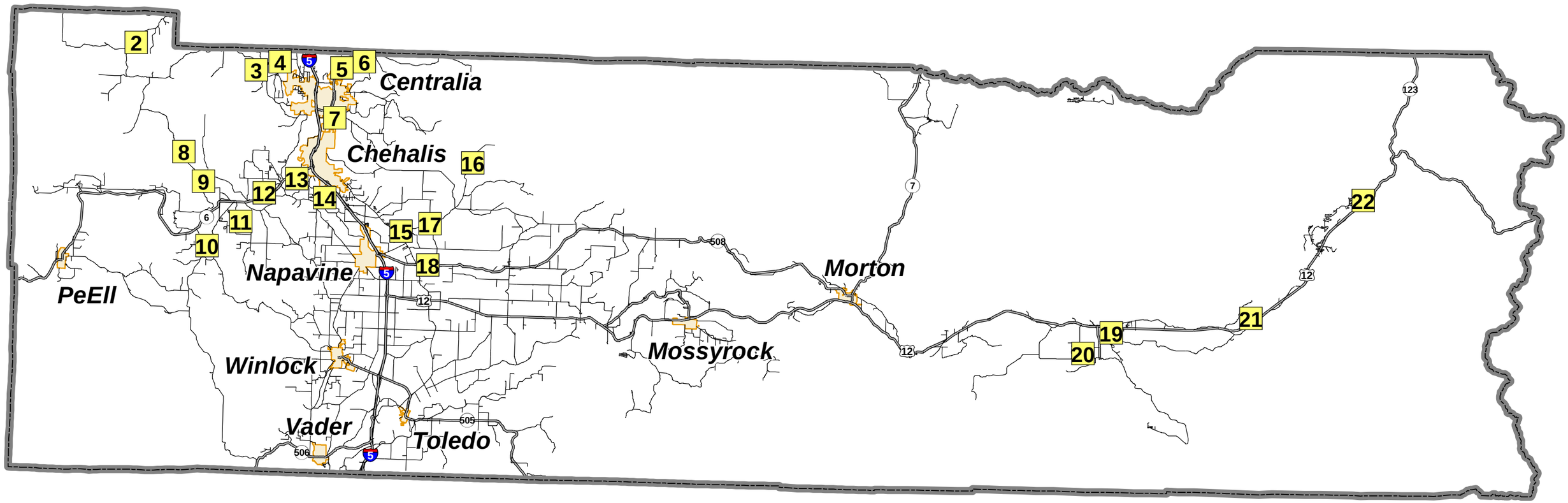
In 2014, French & Associates, LTD of Steilacoom, Washington was contracted by the Flood Authority to perform an analysis of local floodplain management programs to see how communities could strengthen their programs. Chehalis's recommendations from the report included the following:

1. Continue efforts to get updated and accurate mapping
2. Consider alternatives for future development in the floodplain
3. Amend definition of "substantial reconstruction" in 17.21.030
4. Amend ordinance to include Lewis County FIRM data now within City
5. Proceed with developing a coordinated shoreline master program
6. Formally adopt the Western Washington Stormwater Manual
7. Staff should consider training
8. Continue to advise residents of flooding hazard
9. Educate insurance agents
10. Continue to implement the Hazard Mitigation Plan
11. Update Hazard Mitigation Plan by 2015 with Lewis County
12. Support a joint effort to improve hazard mitigation grants
13. Review current outreach projects in light of new CRS Manual
14. The CRS Coordinator should become more familiar with the program
15. Review current programs in light of the new CRS Manual

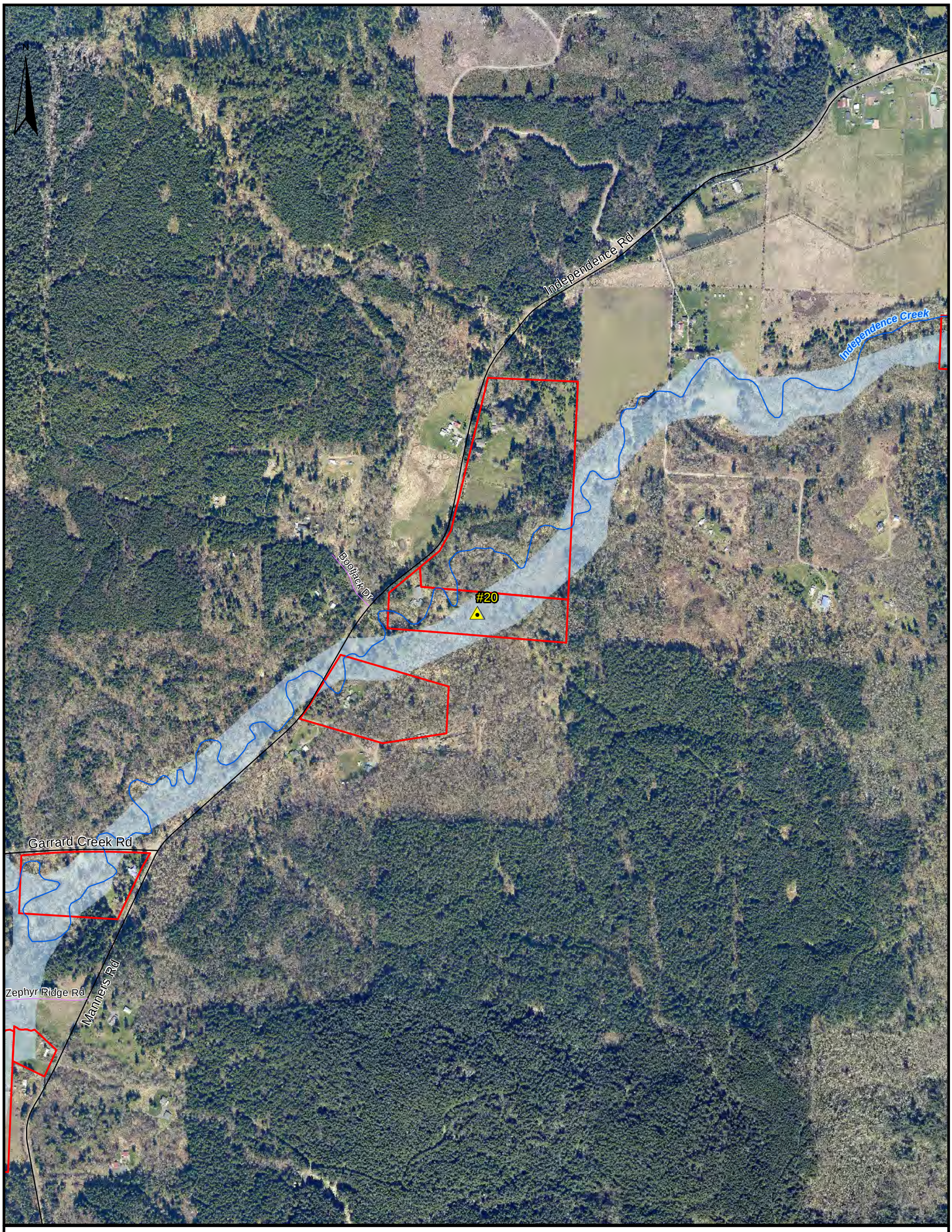
Resources

- Lewis County Flood Hazard Management Plan, 2008
- USGS National Water Information System, www.usgs.gov/ Accessed July 2015.
- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Flood_Hazard_Profile.pdf Accessed July 7, 2015.
- FEMA, http://www.fema.gov/index.shtm . Accessed July 2015.
- Chehalis River Basin Flood Authority. https://www.ezview.wa.gov/site/alias__home/34166/default.aspx Accessed on July 7, 2015.
- Flood Protection and Ecosystem Services in the Chehalis River Basin. May 2010. http://www.eartheconomics.org/FileLibrary/file/Reports/Chehalis/Earth_Economics_Report_on_the_Chehalis_River_Basin_compressed.pdf Accessed on July 7, 2015.
- U.S. Department of Homeland Security, FEMA Repetitive Loss Data for Lewis County, Centralia, and Chehalis
- Floodplain Management Analysis – Lewis County. French & Associates, LTD. September 16,2014
    - Lewis County, City of Centralia, City of Chehalis

Map Book Page Index



NFIP CRS 2013 - Repetitive Loss Areas



Repetitive Loss Area - Independence Rd Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

Parcels in the SFHA w/structures were determined by matching the Assessor's structure and parcel data with GIS. There are 3,102 parcels in the NFIP community with greater than 9% of their total area contained by the SFHA. As per the CRS description for primary stuctures, there are 3,278 structures located on those parcels.

Repetitive Loss Area parcels were selected from within a half-mile buffer of each Repetitive Loss site. Each parcel on the list has a primary structure with more than 9% of the parcel area contained in the SFHA. Of the 447 parcels in the Repetitive Loss Areas, there are 509 primary structures located on those parcels.

- Repetitive Loss Site (With RL No.)
- Repetitive Loss Site - Mitigated (With RL No.)
- Parcel in SFHA w/Structure(s)
- FEMA Special Flood Hazard Area
- City Limits

The NFIP community of Lewis County includes all unincorporated portions of the county.

This map was compiled by Lewis County Geographic Information Services.
Aerial photography from Pictometry and flown in 2013.
The accuracy of the map has not been verified, and it should be used for informational purposes only. Any possible discrepancies should be brought to the attention of Lewis County Geographic Information Services.

Projection: Lambert Conformal Conic
Datum: 1983 North American Datum
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.

Repetitive Loss Area - Galvin W Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

Parcels in the SFHA w/structures were determined by matching the Assessor's structure and parcel data with GIS. There are 3,102 parcels in the NFIP community with greater than 9% of their total area contained by the SFHA. As per the CRS description for primary stuctures, there are 3,278 structures located on those parcels.

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- Repetitive Loss Site (With RL No.)
- Repetitive Loss Site - Mitigated (With RL No.)
- Parcel in SFHA w/Structure(s)
- FEMA Special Flood Hazard Area
- City Limits

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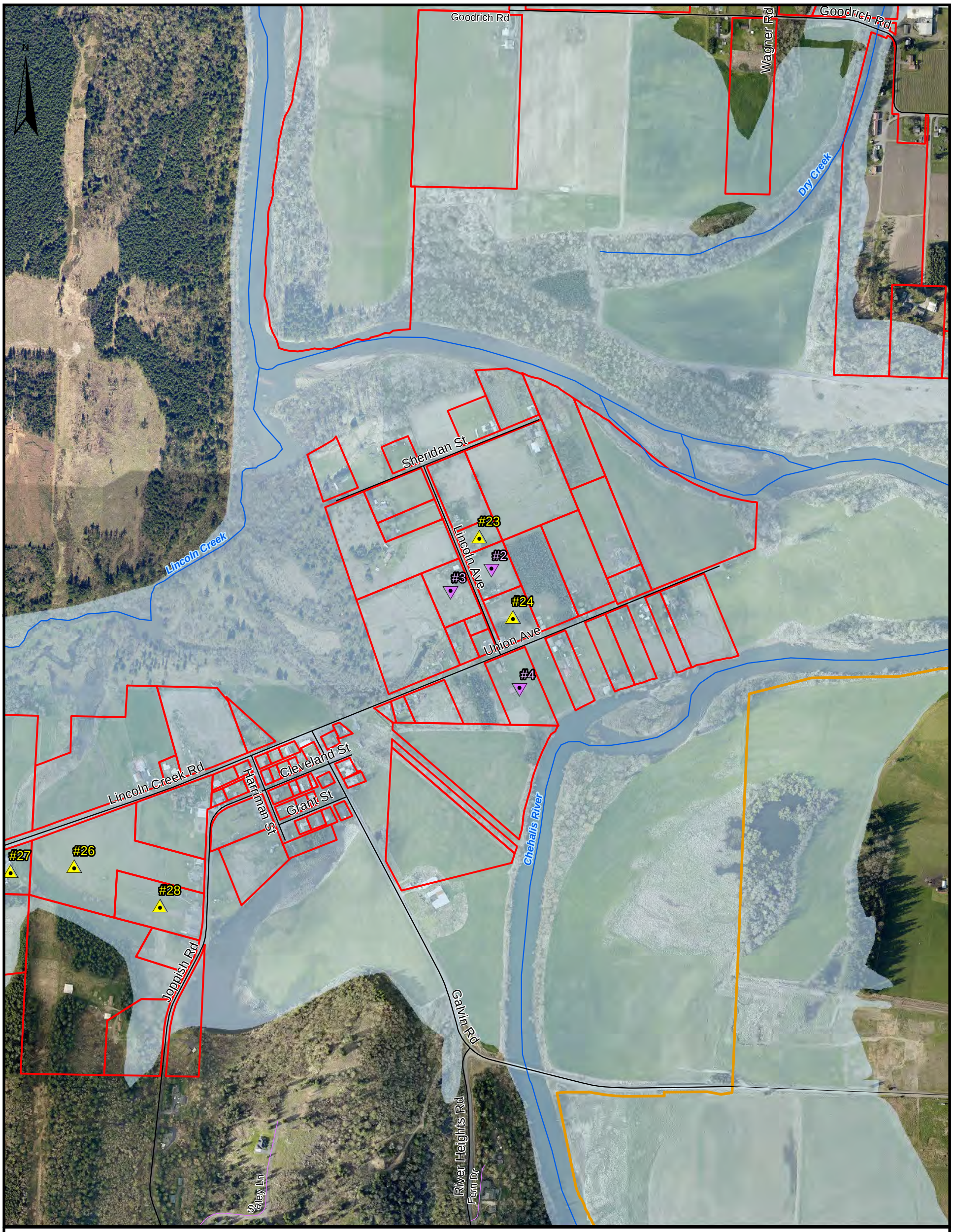
Projection: Lambert Conformal Conic
Datum: 1983 North American Datum
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.



Repetitive Loss Area - Galvin E Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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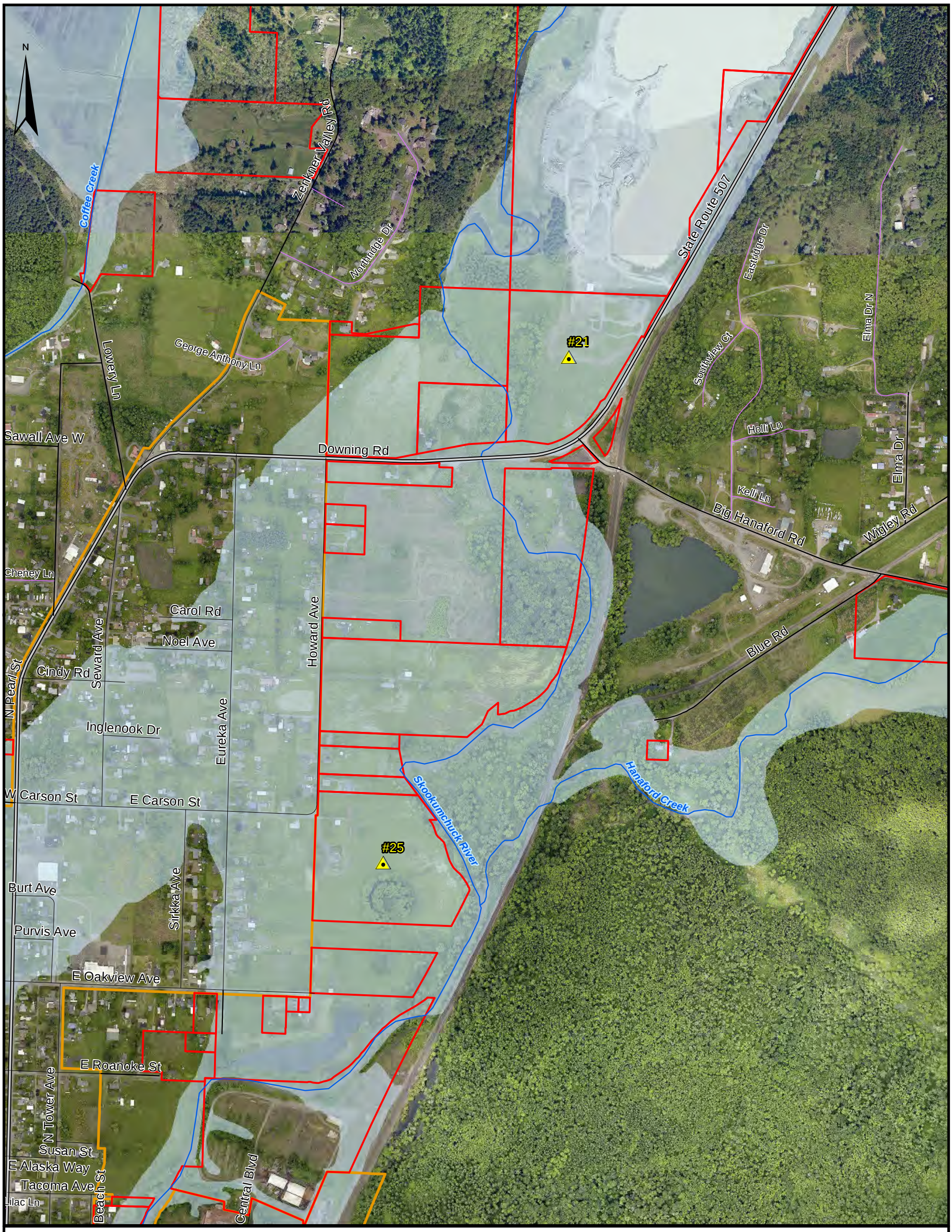
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Centralia NE Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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LEWIS COUNTY G.I.S.

Repetitive Loss Area - Big Hanaford Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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- Repetitive Loss Site - Mitigated (With RL No.)
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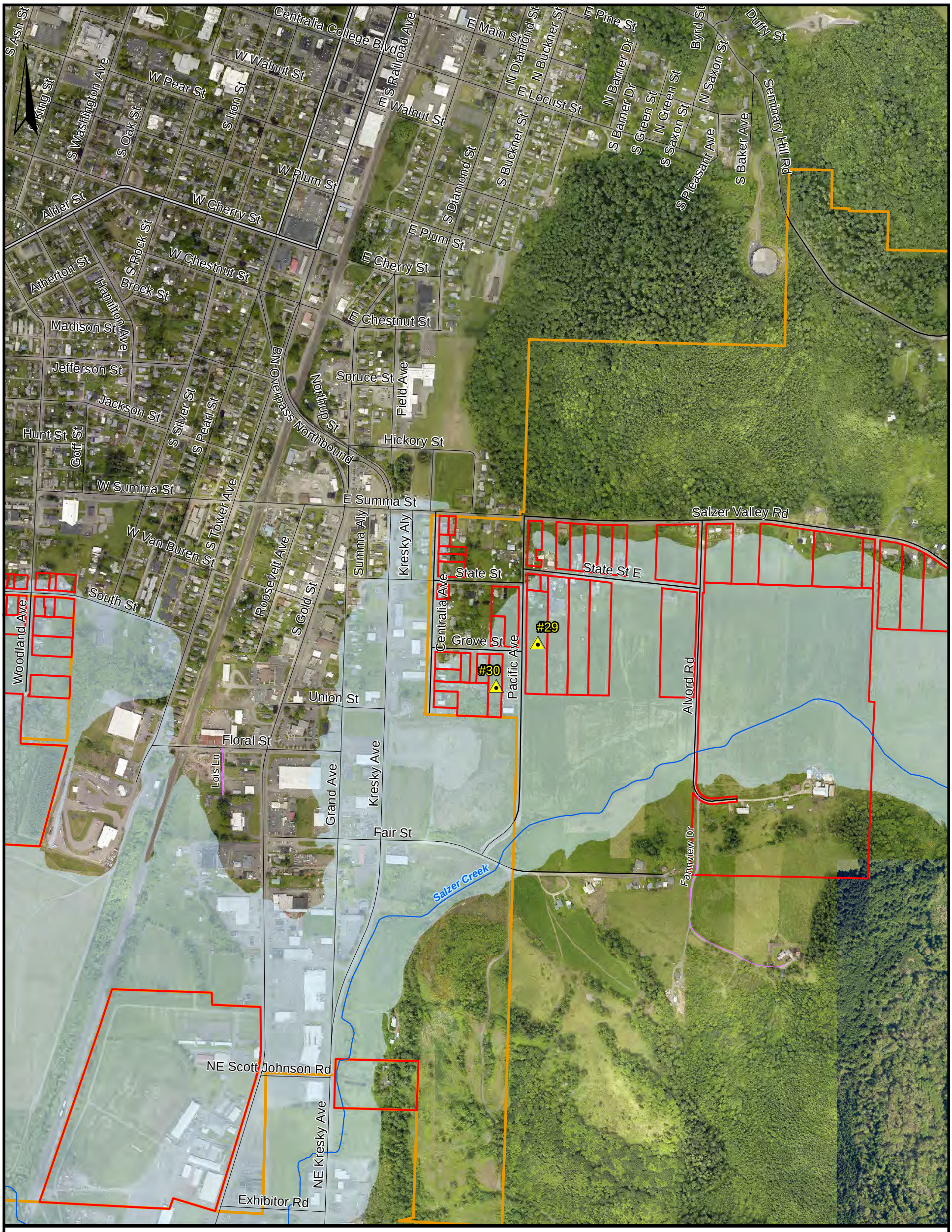
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Centralia SE Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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- FEMA Special Flood Hazard Area
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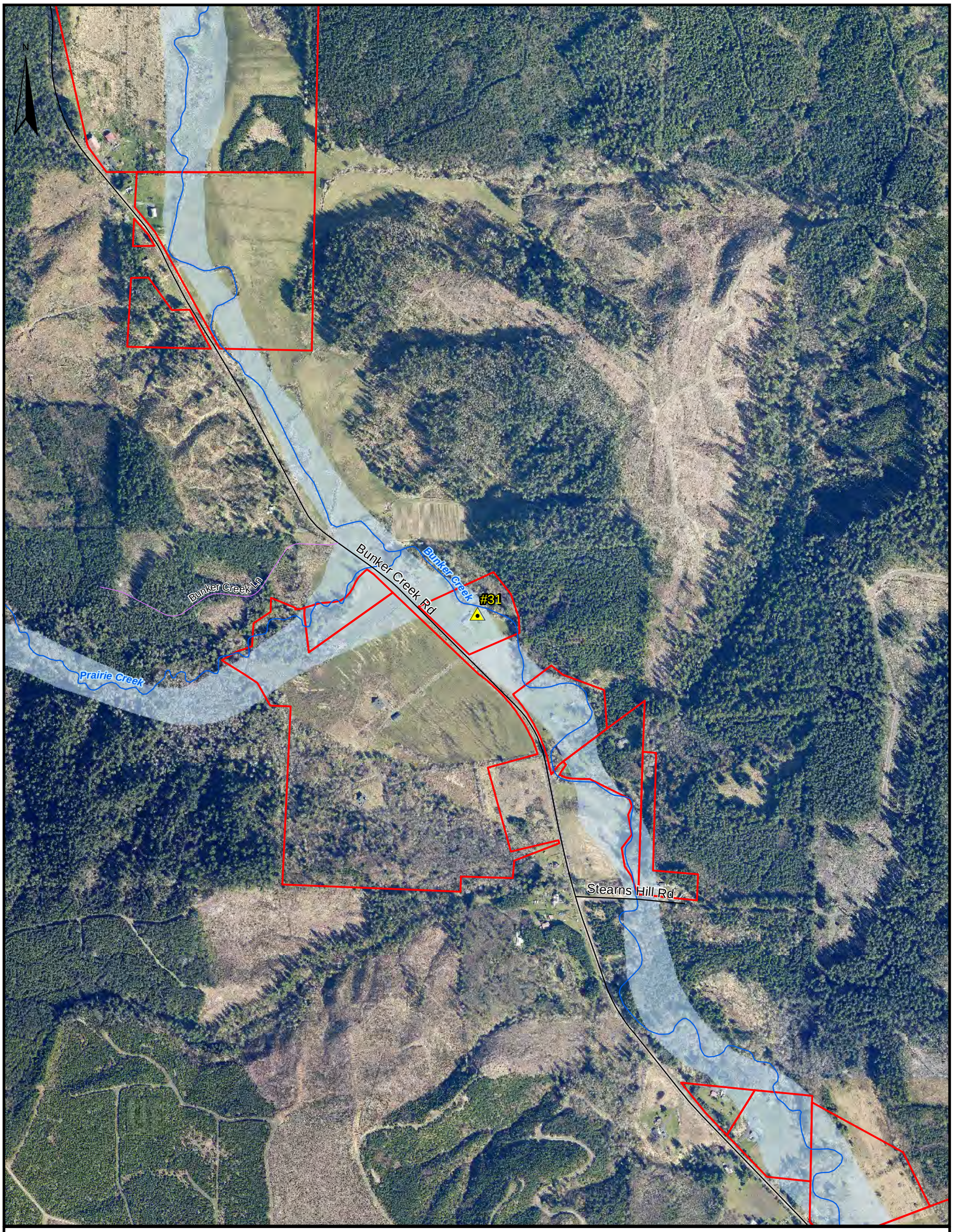
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Bunker Creek Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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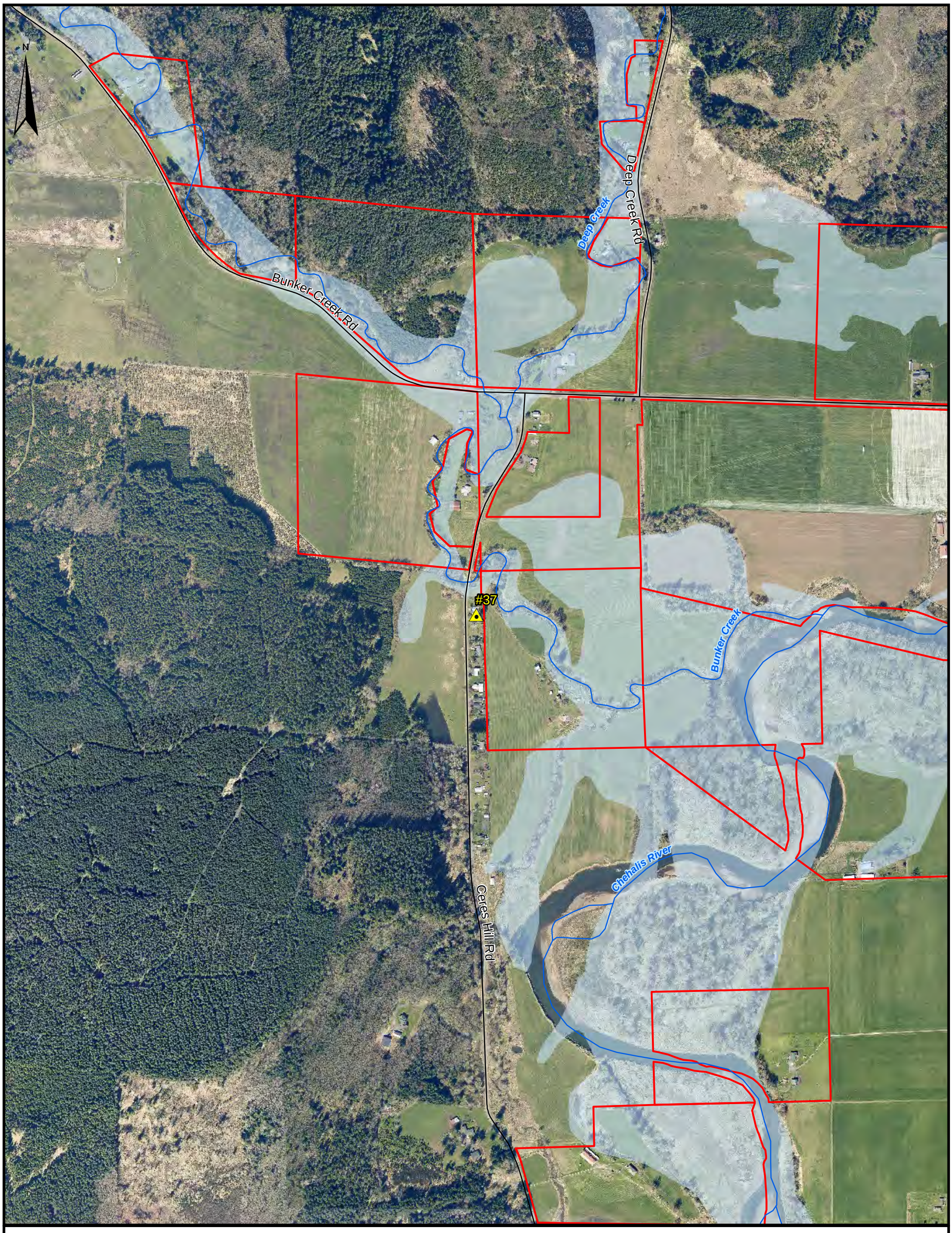
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Ceres Hill Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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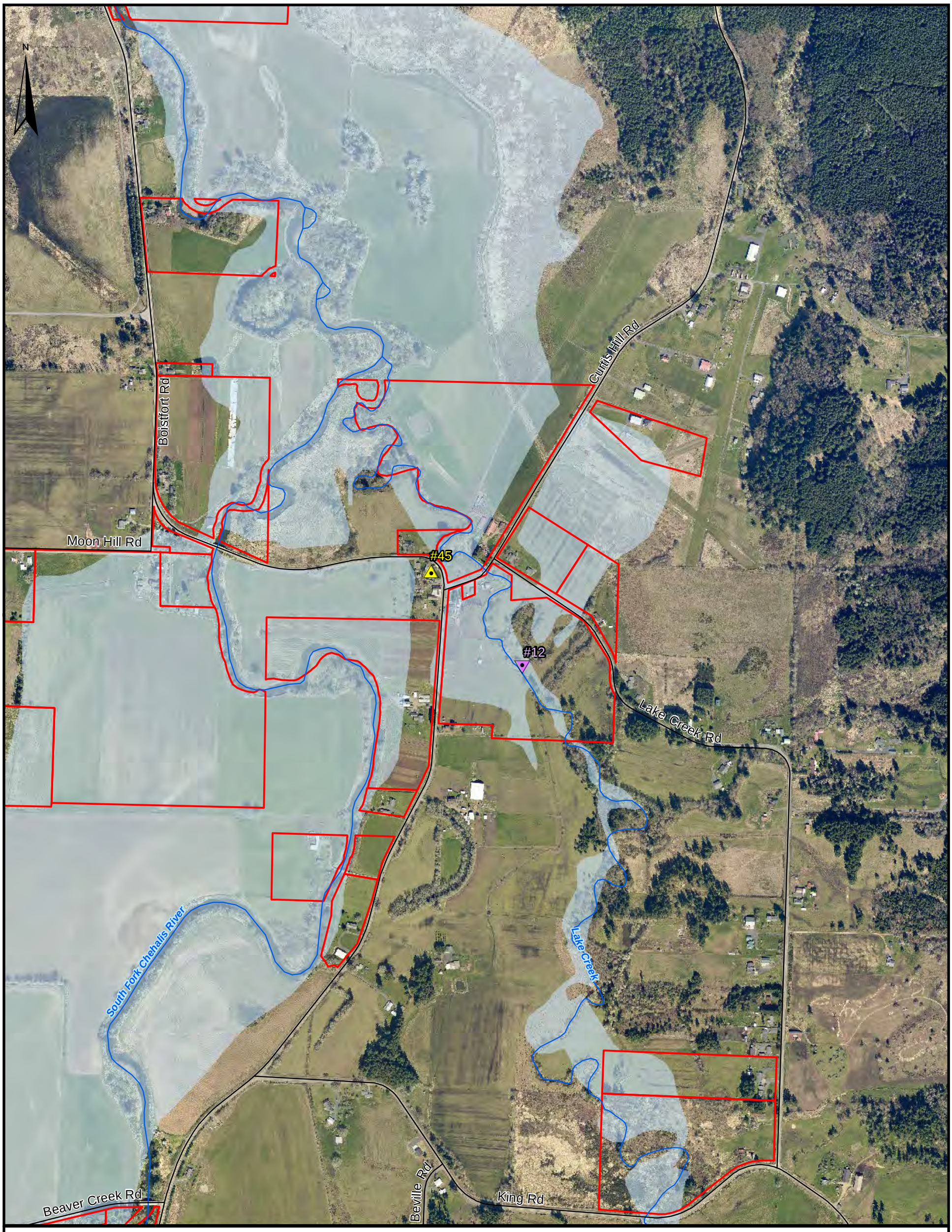
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Boistfort Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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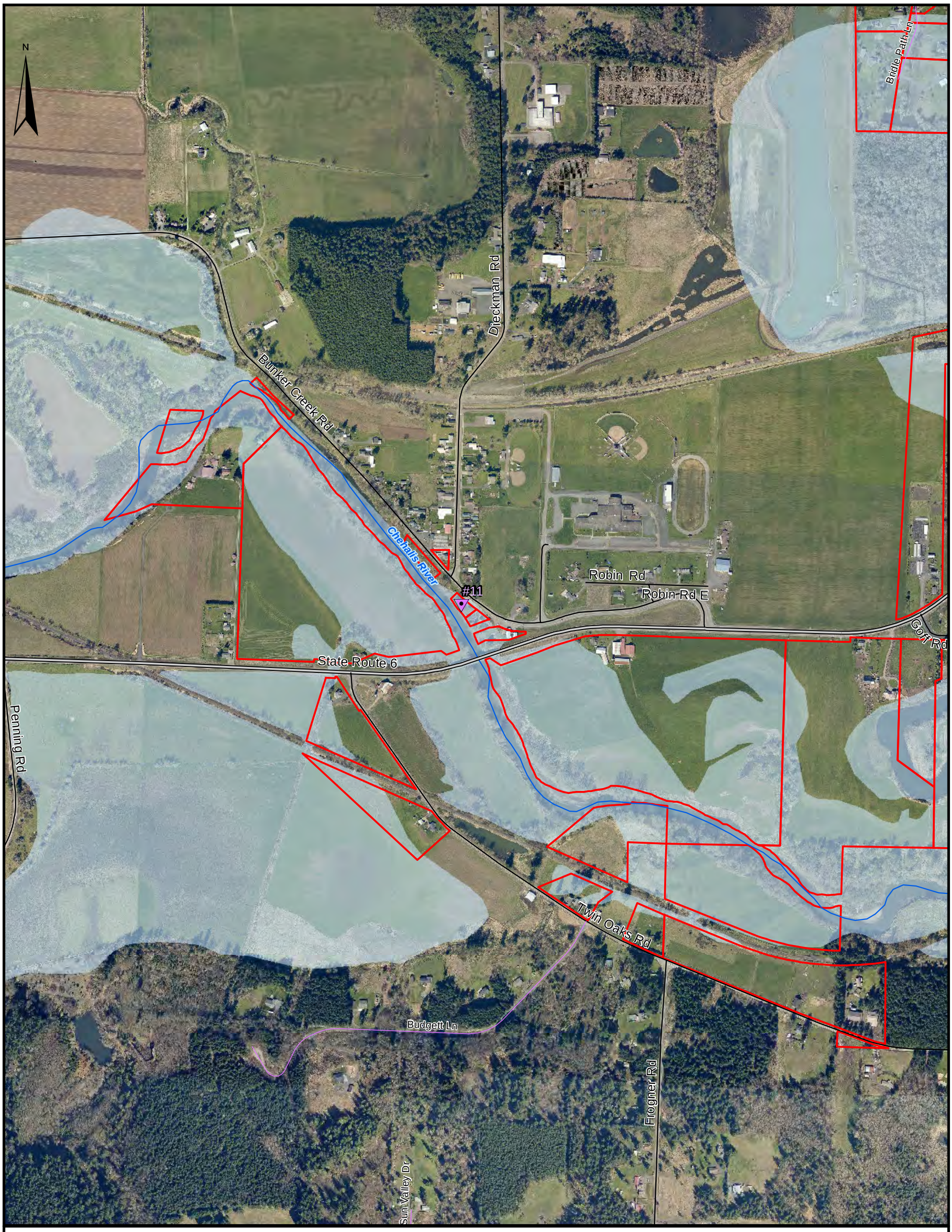
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Adna W Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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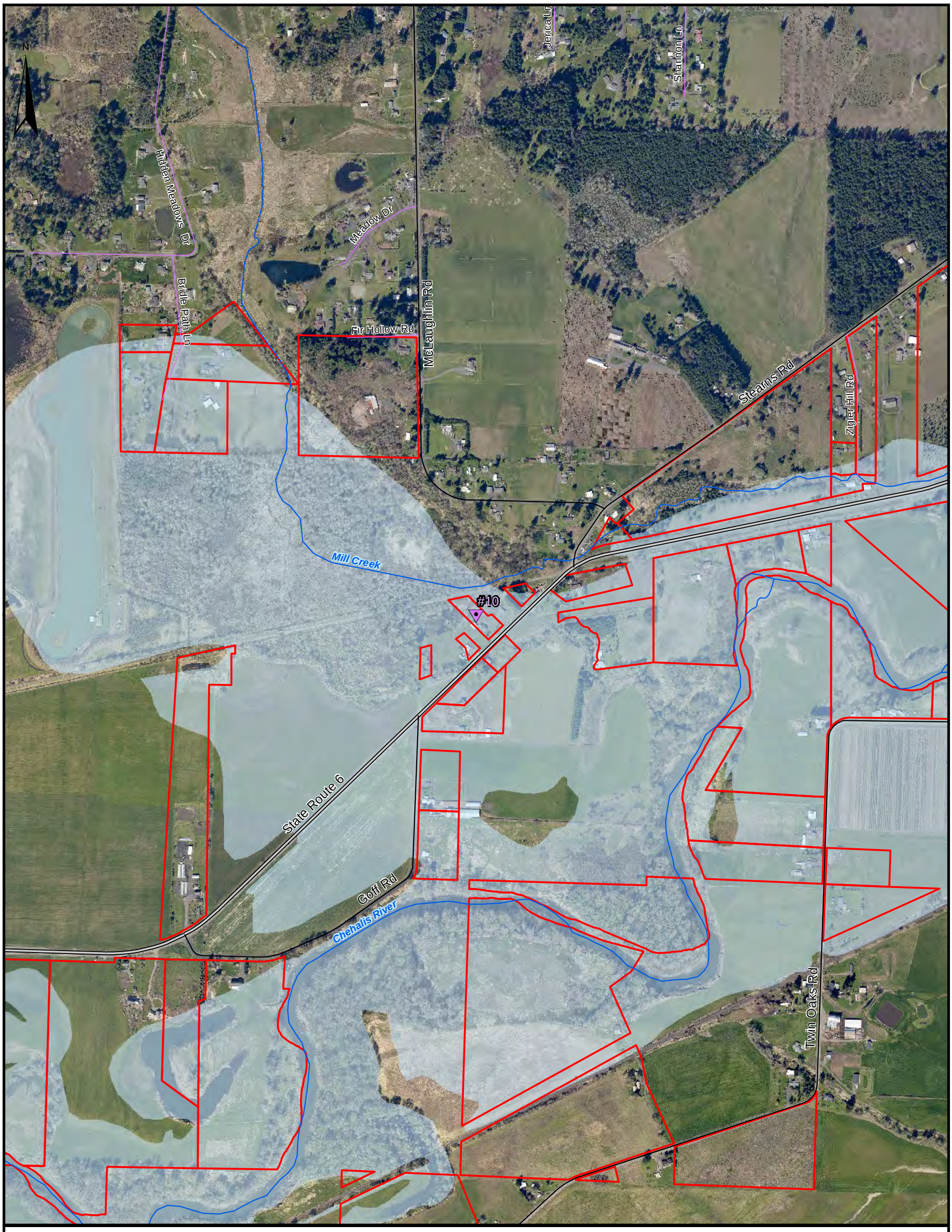
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Adna E Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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LEWIS COUNTY G.I.S.

Repetitive Loss Area - Chehalis W Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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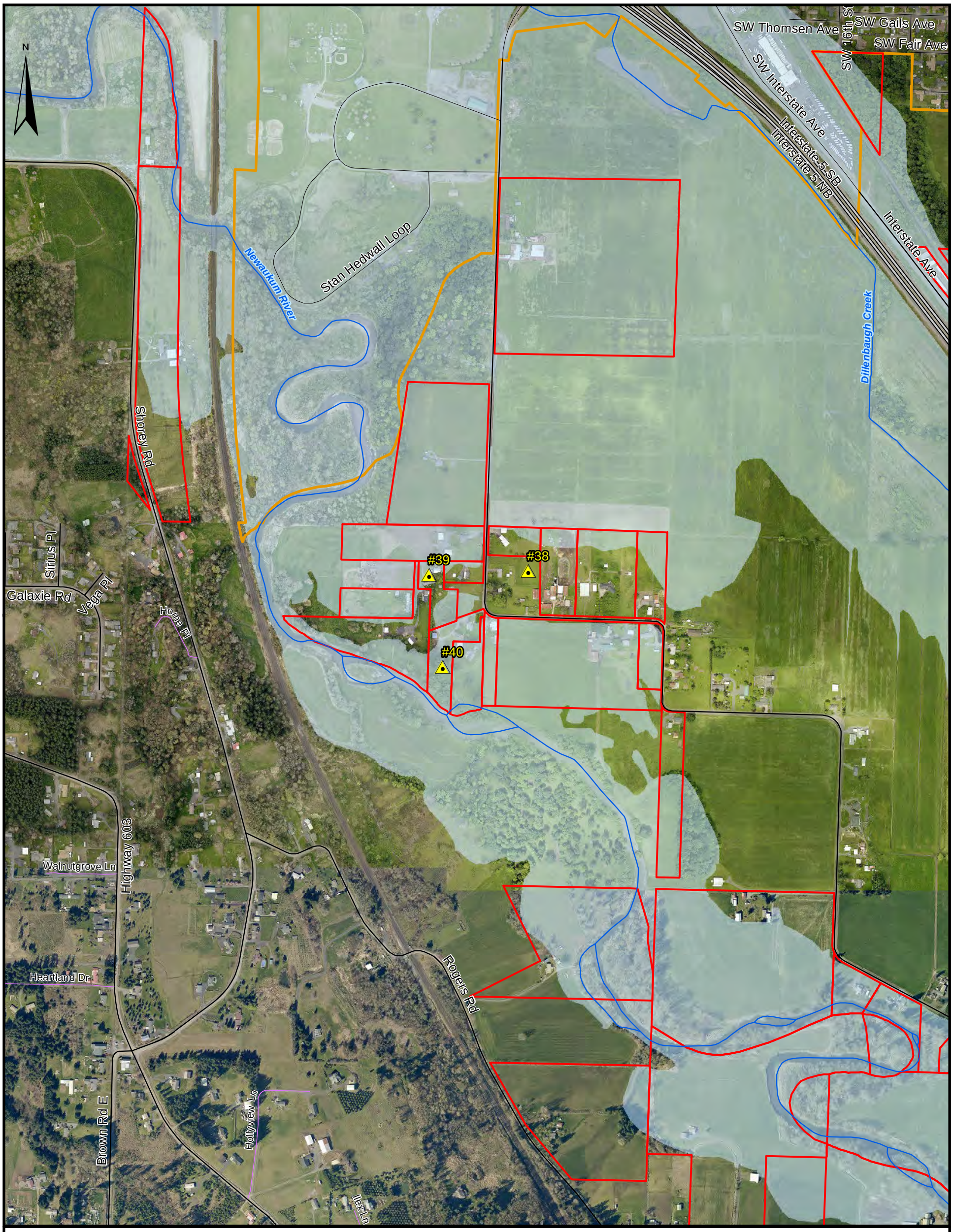
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Chehalis SW Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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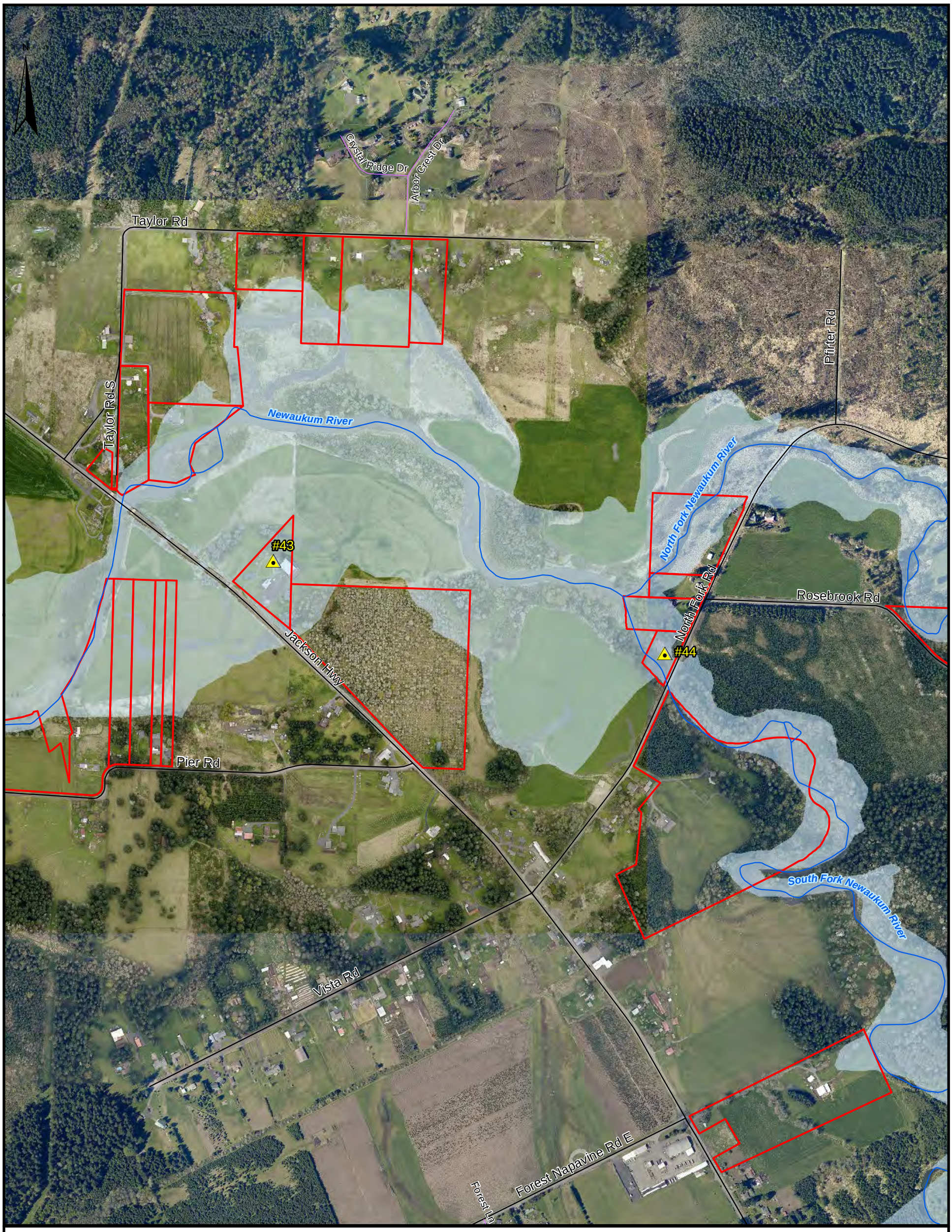
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Newaukum River Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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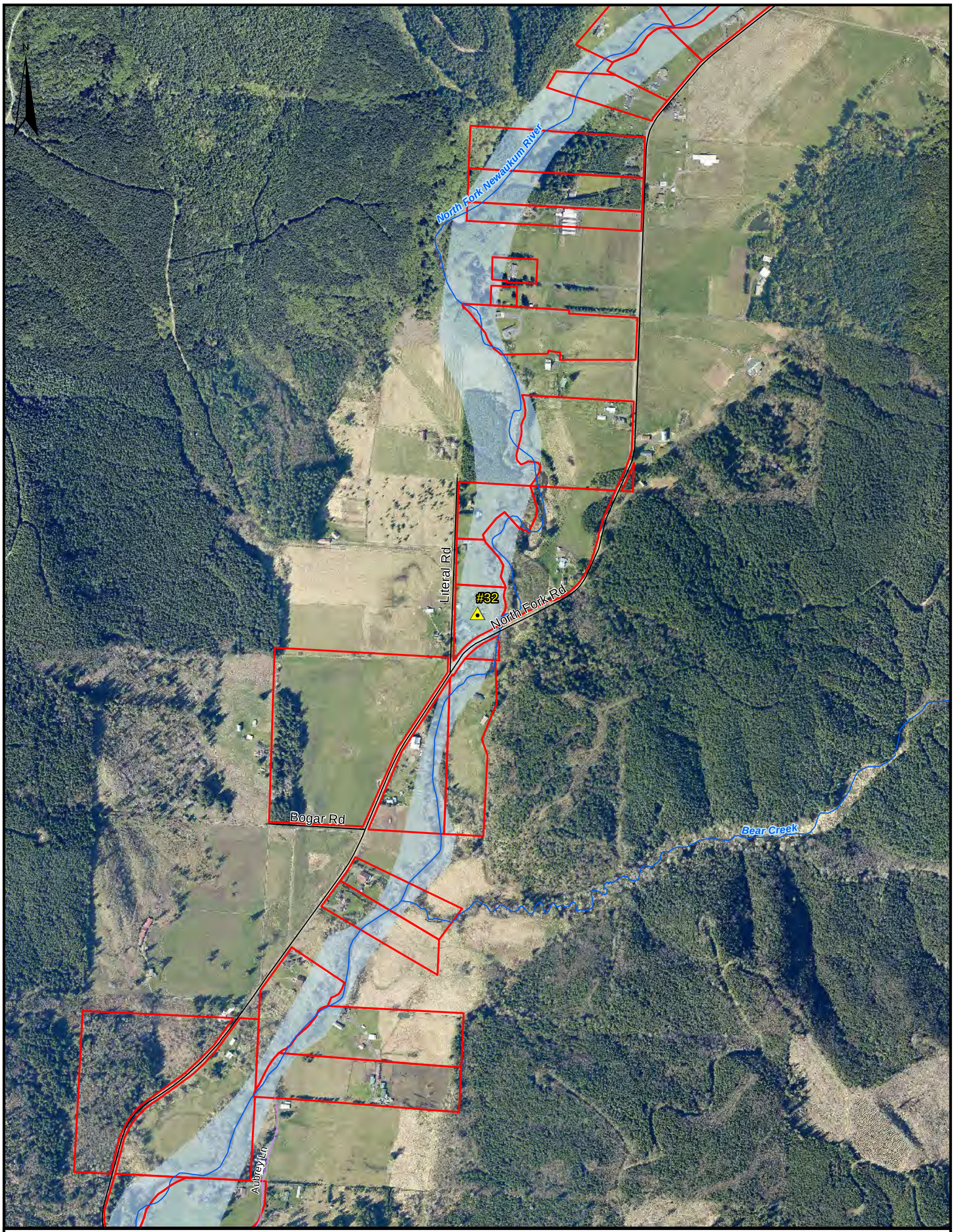
LEWIS COUNTY G.I.S.



Repetitive Loss Area - North Fork Rd Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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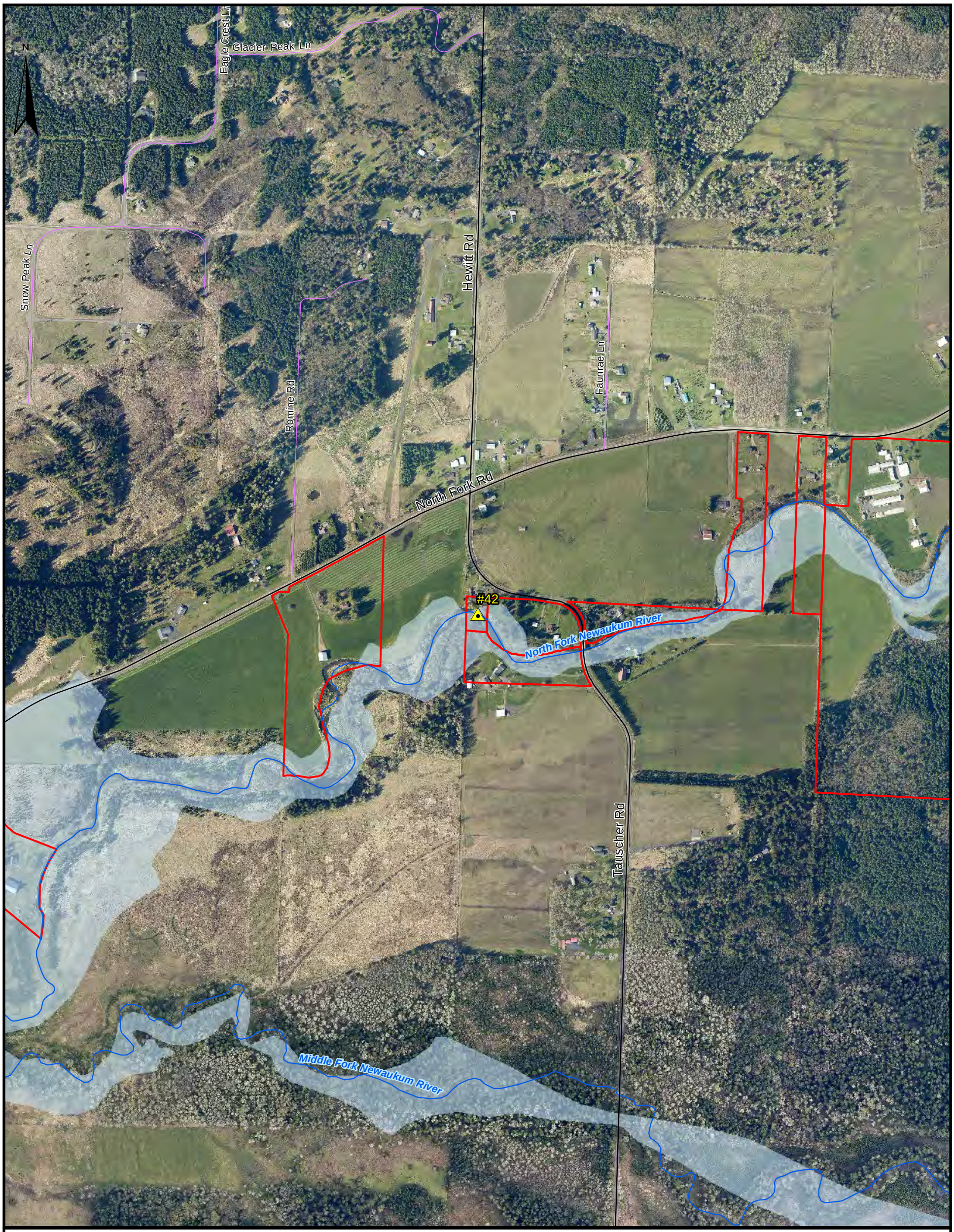
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Tauscher Rd Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

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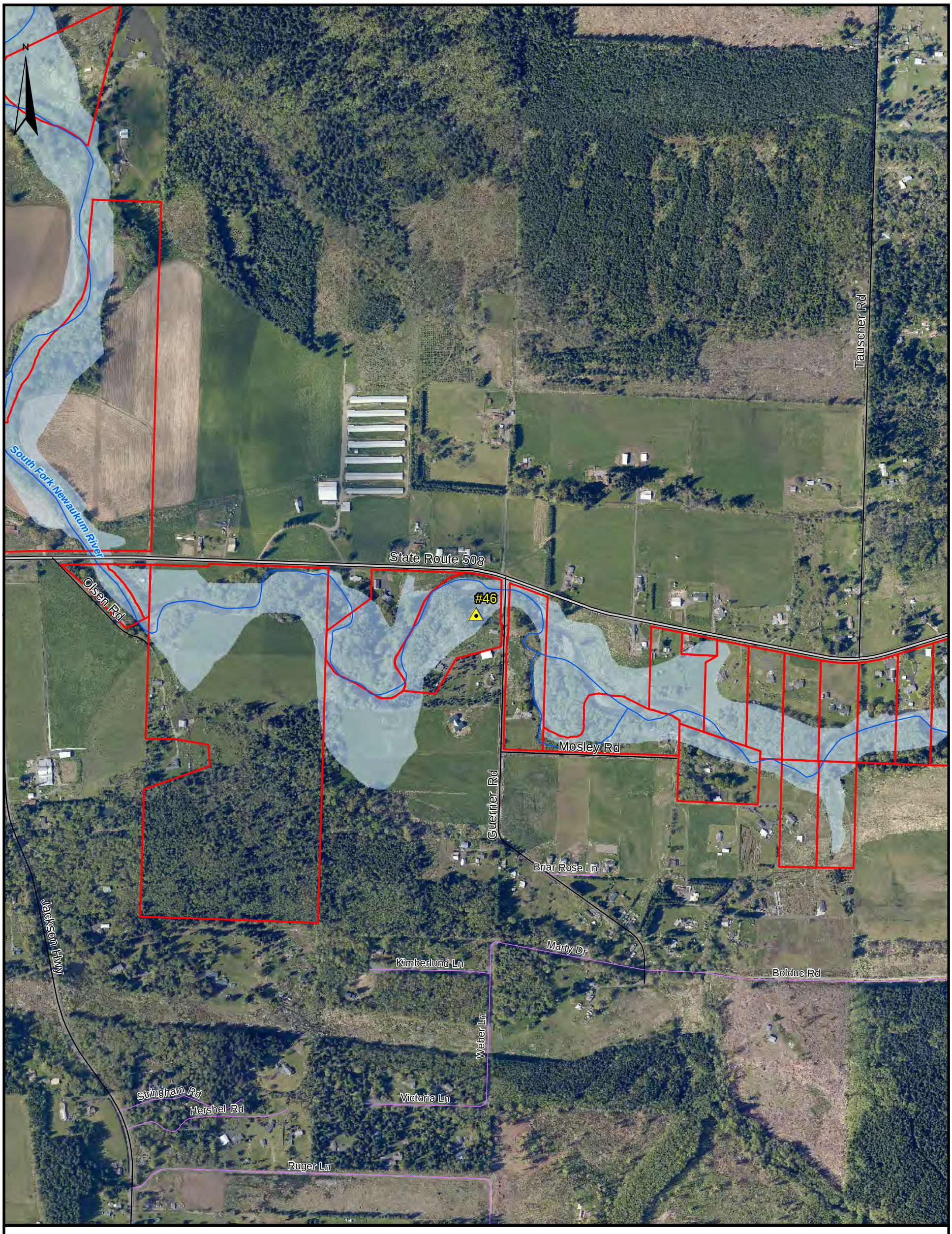
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.



Repetitive Loss Area - Guerrier Rd Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

Parcels in the SFHA w/structures were determined by matching the Assessor's structure and parcel data with GIS. There are 3,102 parcels in the NFIP community with greater than 9% of their total area contained by the SFHA. As per the CRS description for primary stuctures, there are 3,278 structures located on those parcels.

Repetitive Loss Area parcels were selected from within a half-mile buffer of each Repetitive Loss site. Each parcel on the list has a primary structure with more than 9% of the parcel area contained in the SFHA. Of the 447 parcels in the Repetitive Loss Areas, there are 509 primary structures located on those parcels.

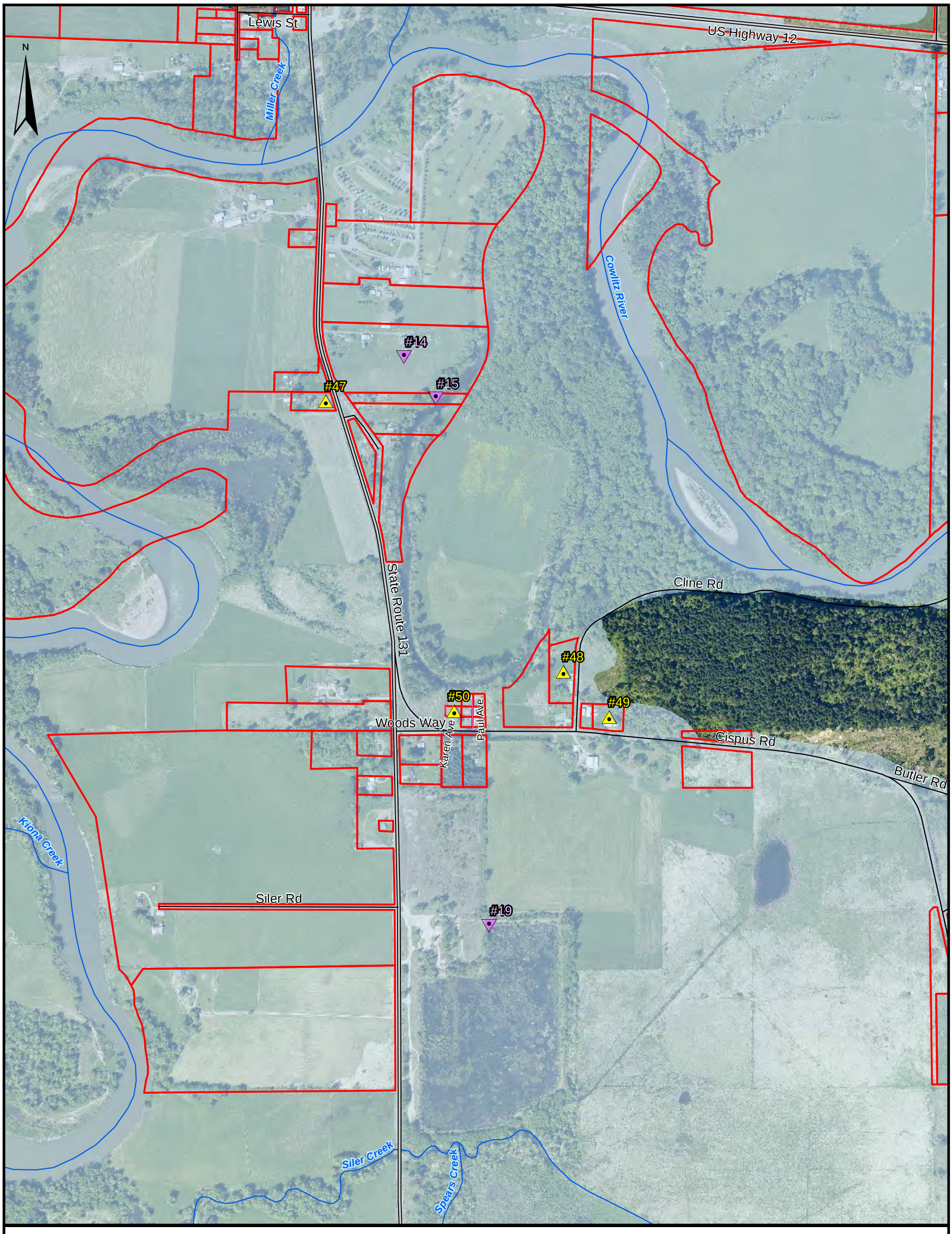
- Repetitive Loss Site (With RL No.)
- Repetitive Loss Site - Mitigated (With RL No.)
- Parcel in SFHA w/Structure(s)
- FEMA Special Flood Hazard Area
- City Limits

The NFIP community of Lewis County includes all unincorporated portions of the county.

This map was compiled by Lewis County Geographic Information Services.
Aerial photography from Pictometry and flown in 2013.
The accuracy of the map has not been verified, and it should be used for informational purposes only. Any possible discrepancies should be brought to the attention of Lewis County Geographic Information Services.

Projection: Lambert Conformal Conic
Datum: 1983 North American Datum
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.



Repetitive Loss Area - Randle Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

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- City Limits

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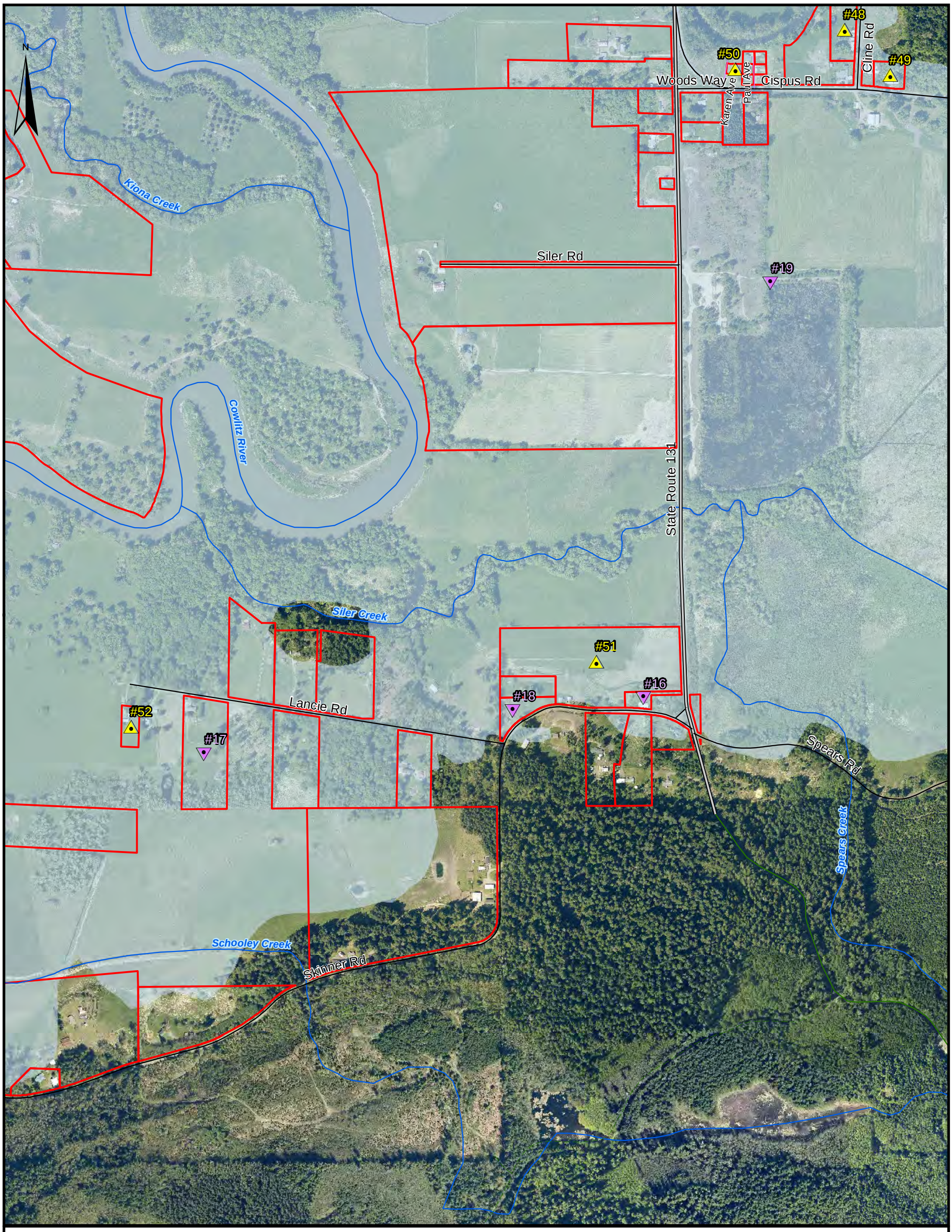
Projection: Lambert Conformal Conic
Datum: 1983 North American Datum
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.



Repetitive Loss Area - Randle S Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

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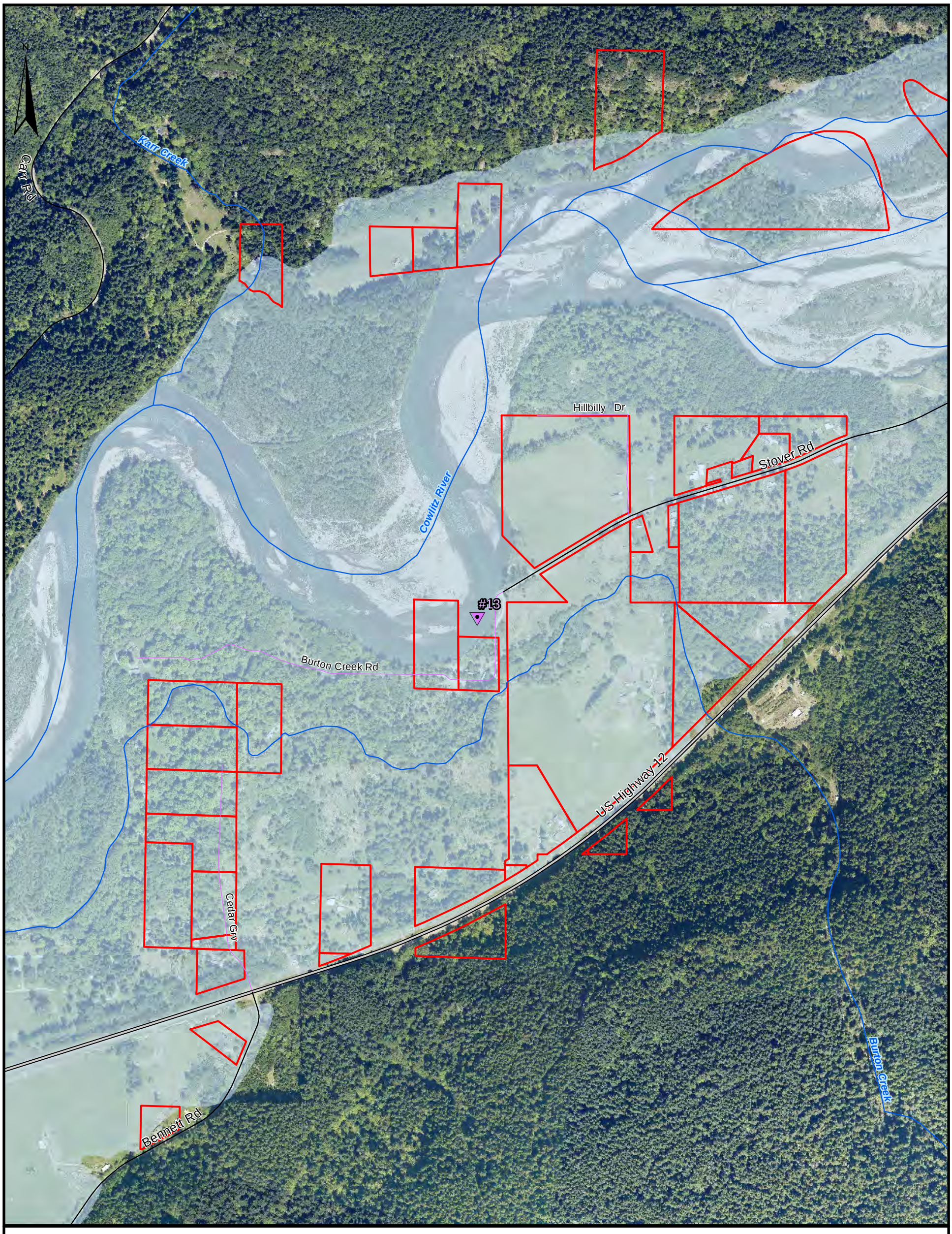
Datum: 1983 North American Datum
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.



Repetitive Loss Area - Stover Rd Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

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- Parcel in SFHA w/Structure(s)
- FEMA Special Flood Hazard Area
- City Limits

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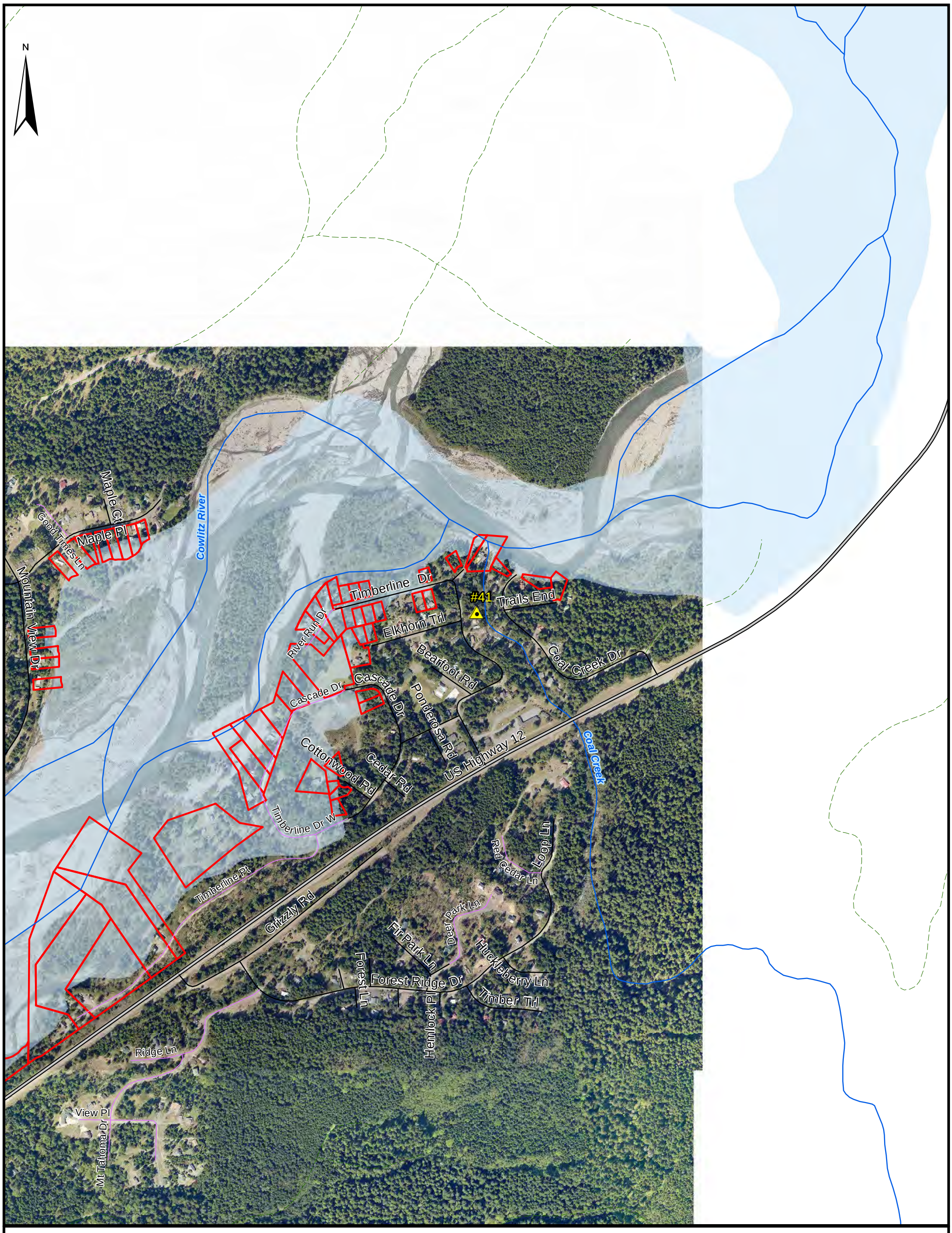
LEWIS COUNTY G.I.S.



Repetitive Loss Area - Timberline Village Vicinity

Lewis County, Washington

Scale: 1 Inch = 700 Feet

Repetitive Loss sites from FEMA NFIP list, current as of December 31, 2011. The NFIP community of Lewis County has 54 sites total, all the result of riverine flooding, with 20 mitigated and 34 unmitigated locations. Of the 54 sites, 2 properties along Centralia Ave have been annexed by the City of Centralia since December 31, 2011.

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- FEMA Special Flood Hazard Area
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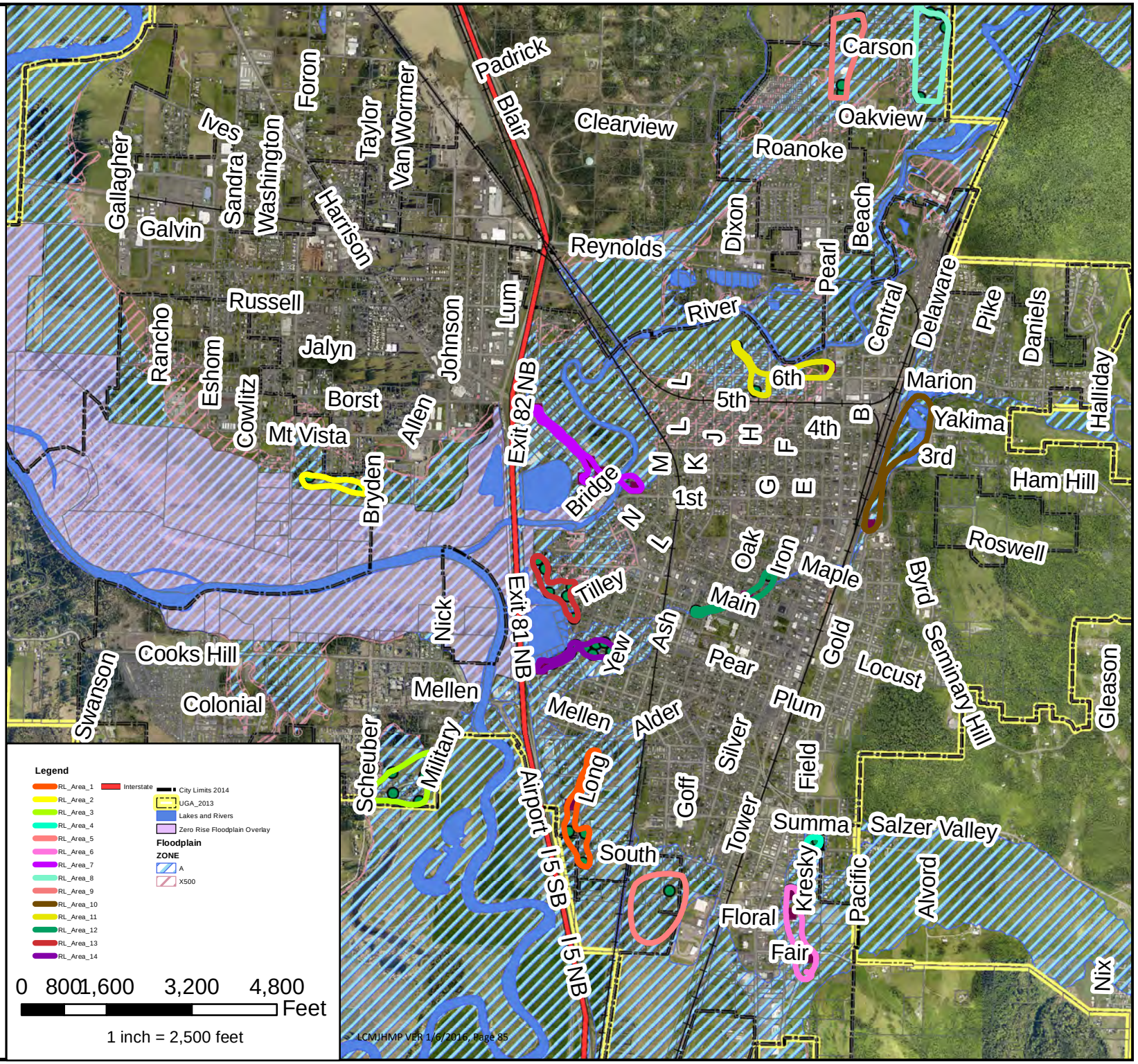
Projection: Lambert Conformal Conic
Datum: 1983 North American Datum
U.S.G.S. State Plane Zone 5626

LEWIS COUNTY G.I.S.

Activity 503
Repetitive Loss Areas
City Wide

Community Number 530103

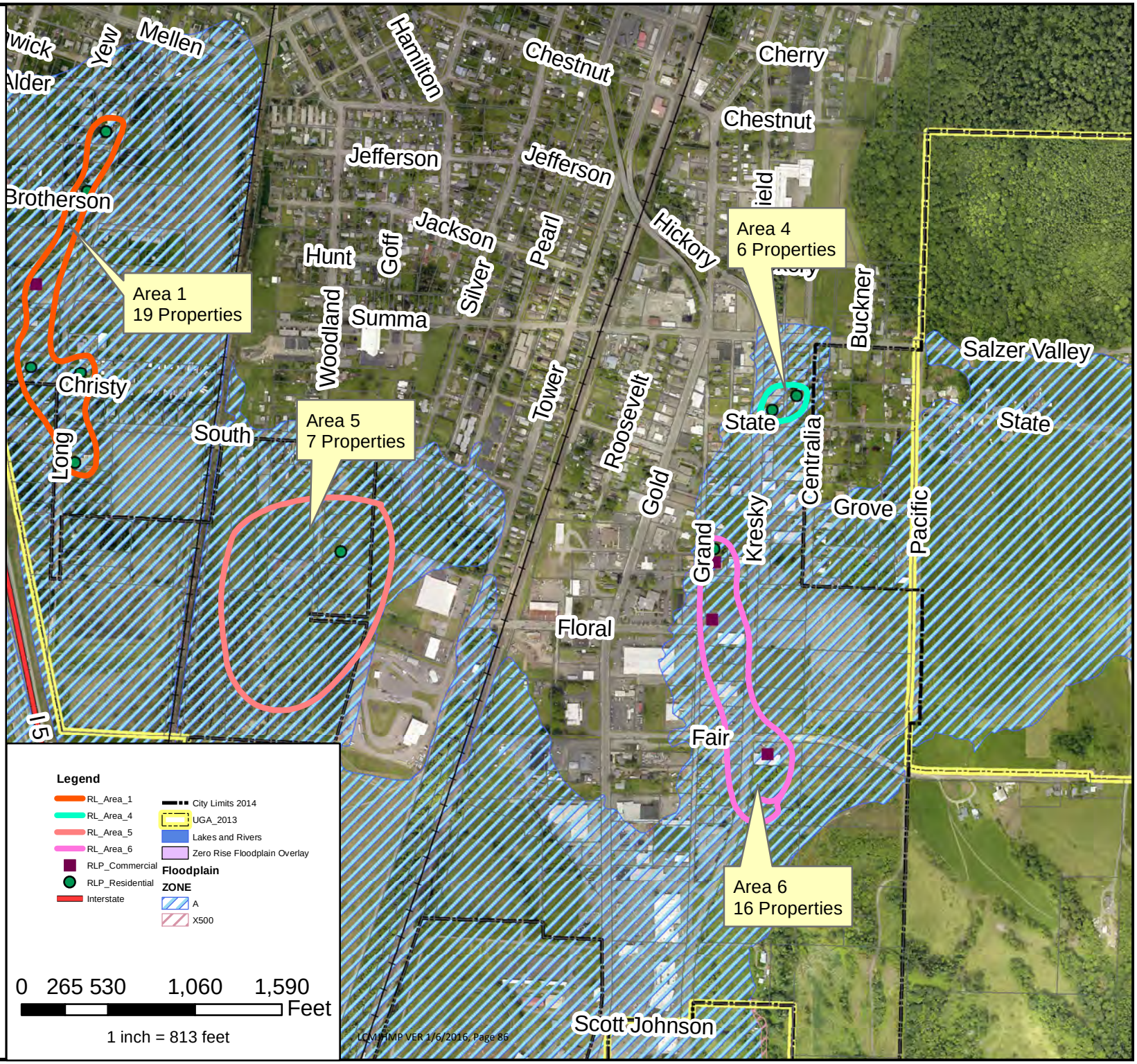
Created September 19, 2014



Activity 503
Repetitive Loss Areas
RL Areas 1, 4, 5, 6

Community Number 530103

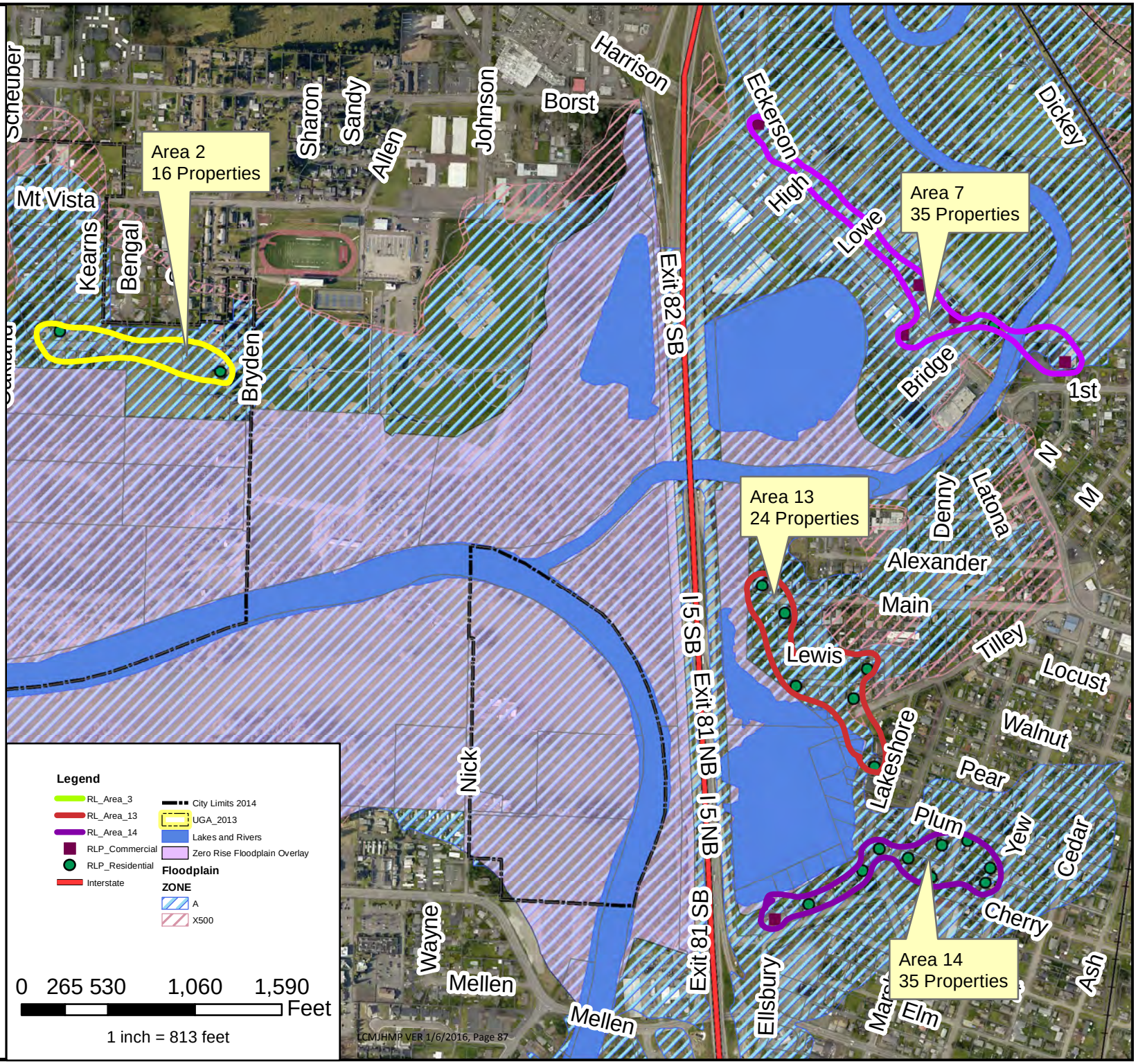
Created September 19, 2014



Activity 503
Repetitive Loss Areas
RL Areas 2, 7, 13, 14

Community Number 530103

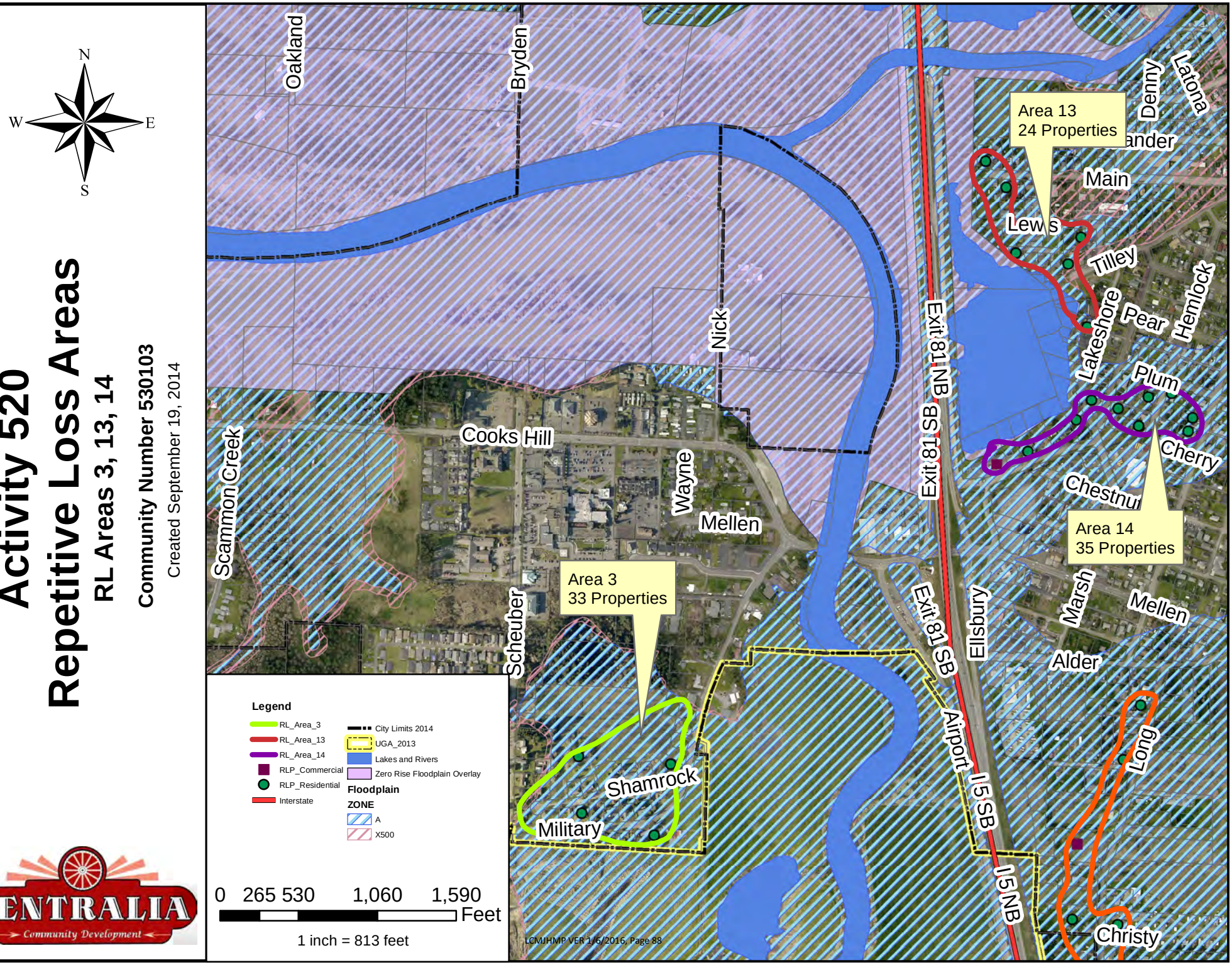
Created September 19, 2014



Activity 520
Repetitive Loss Areas
RL Areas 3, 13, 14

Community Number 530103

Created September 19, 2014

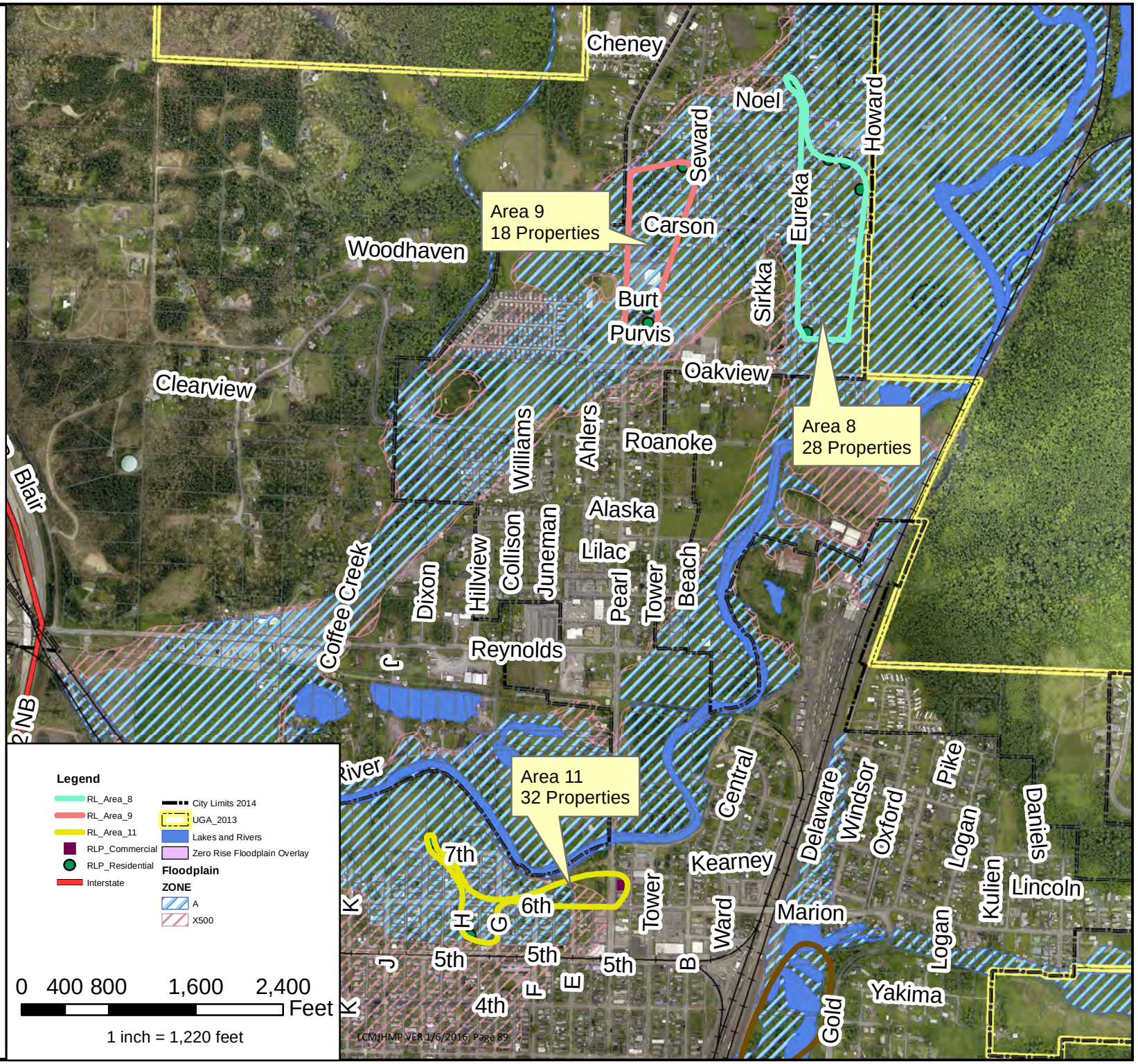


CENTRALIA
Community Development

Activity 503
Repetitive Loss Areas
RL Areas 8, 9, 11

Community Number 530103

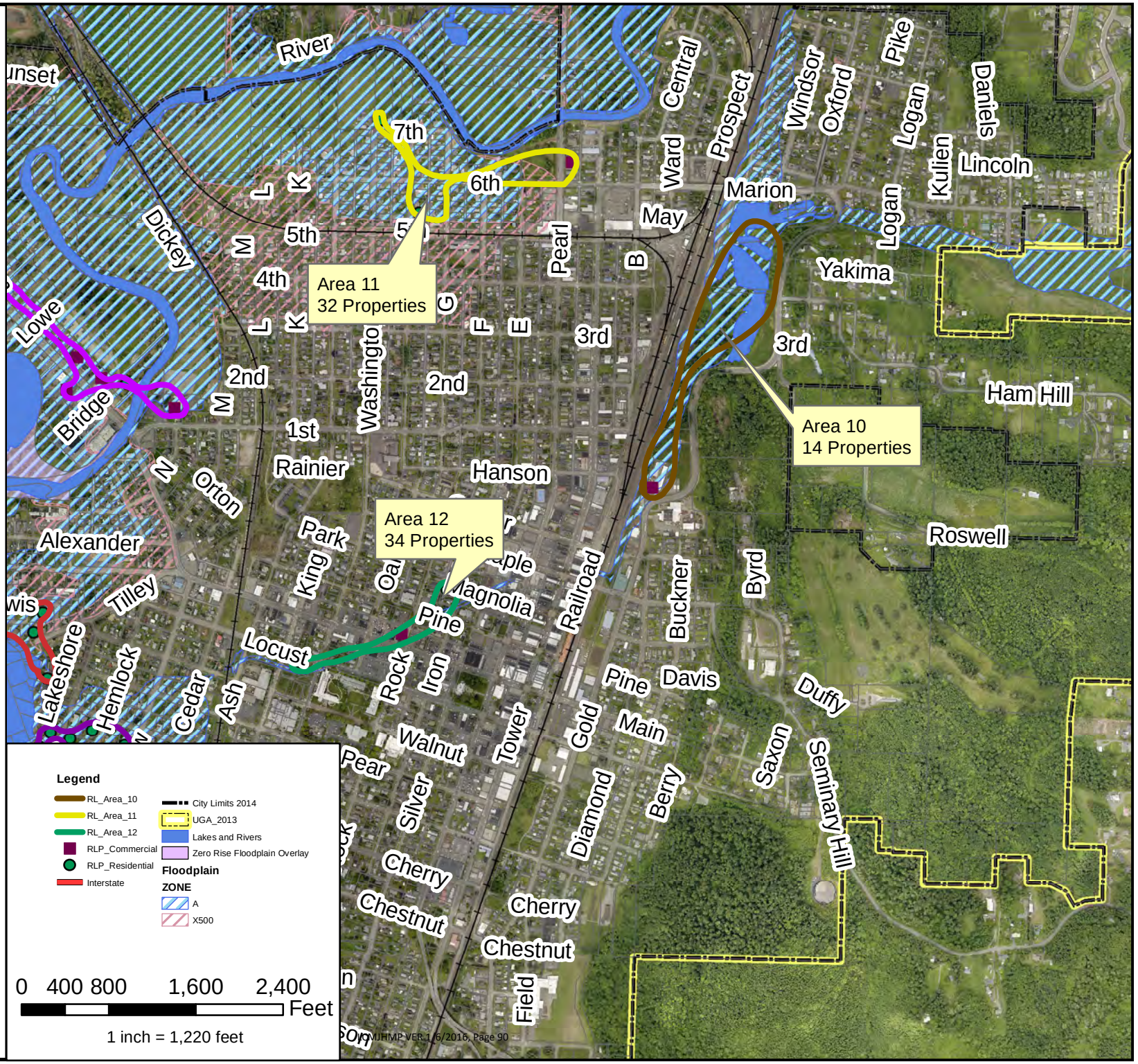
Created September 19, 2014



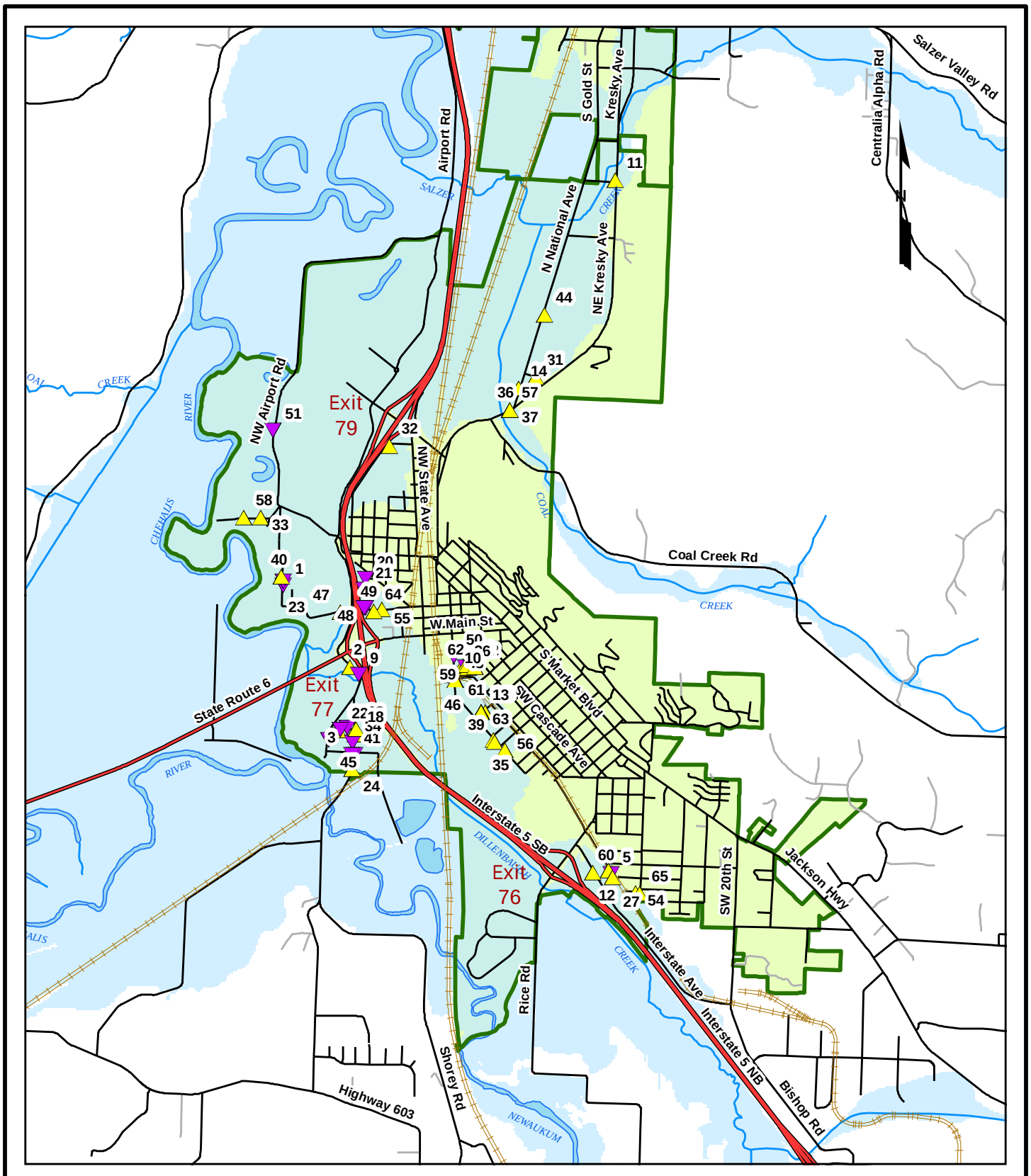
Activity 503
Repetitive Loss Areas
RL Areas 10, 11, 12

Community Number 530103

Created September 19, 2014



CENTRALIA
Community Development



City Limits

Repetitive Loss Site

Repetitive Loss Site - Mitigated

(Rep Loss data per 2011 FEMA list)

Lewis County, Washington

2015 Multi-jurisdictional Hazard Mitigation Plan

Chehalis Repetetive Loss Sites

0 0.25 0.5 1 Miles

Date: June 17, 2015

4.2.7 Landslide

Hazard Profile

The USGS reports that landslides occur in all 50 states and U.S. territories and cause nearly $2 billion in damages and more than 25 deaths on average, each year. The threat of landslide to human life and property has increased with urban and recreational expansion into hillside areas. The likelihood of a landslide has also increased in connection with the frequency of other major natural disasters that destabilize the ground such as earthquakes, volcanoes, wildfires, floods, storms, and thawing of land as well as other natural phenomena that cause ground failure.

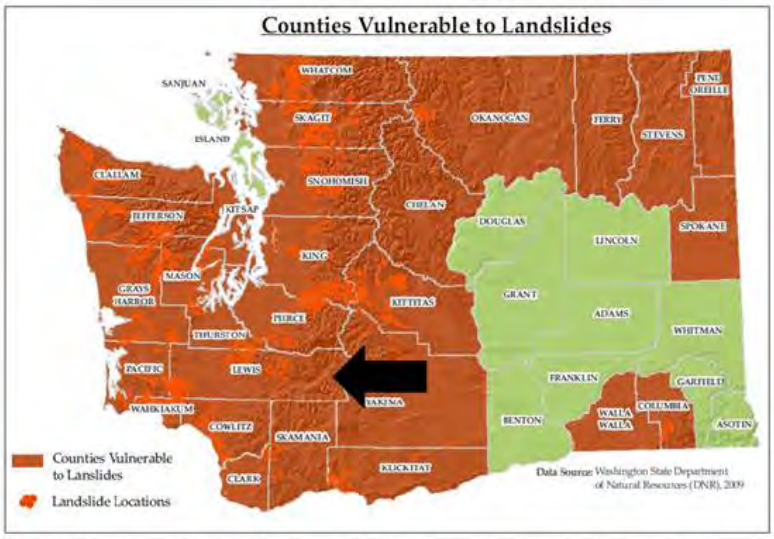


Figure 1 Counties Vulnerable to Landslides Map: Washington State Enhanced Hazard Mitigation Plan, October 2013.

FEMA describes landslides as masses of rock, earth, or debris that moves down a slope. The debris and mud flows that occur are essentially rivers of rock, earth, and other debris saturated with water, which can that move slowly or rapidly. They develop when water accumulates in the ground during heavy rainfall or rapid snowmelt and over saturates the underlying soil, causing it to slip and fall from the side of a slope. Landslides act like avalanches because they can strike with little or no warning, travel several miles from their source and grow in size as they pick up debris in the form of trees, boulders, cars and other materials.

It was deemed, by both the public input and factual research, that the planning area as a whole has had some occurrences of landslides. The probability of a landslide to occur again is 'likely' with between a 10 & 100% chance that they will occur every year within the planning area. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by landslide. While landslides don't generally occur constantly in Lewis County, there are particular areas that are more vulnerable.

Landslides in the planning area generally occur along cuts in a hillside usually along a roads or highway. Land that lies along river bluffs is also susceptible to landslides and could cause damage to, or completely destroy, any structure built on it.

Landslides occur where certain combinations of geologic formations are present. For example, groundwater can accumulate and zones of weakness can develop when layers of sand and gravel lay above less permeable silt and clay layers. In the Puget Sound region, for example, this combination is common and widespread; glacial outwash, often Esperance Sand or gravel, overlies the fine-grained Lawton Clay or Whidbey formation (Source: www.emd.wa.gov/).

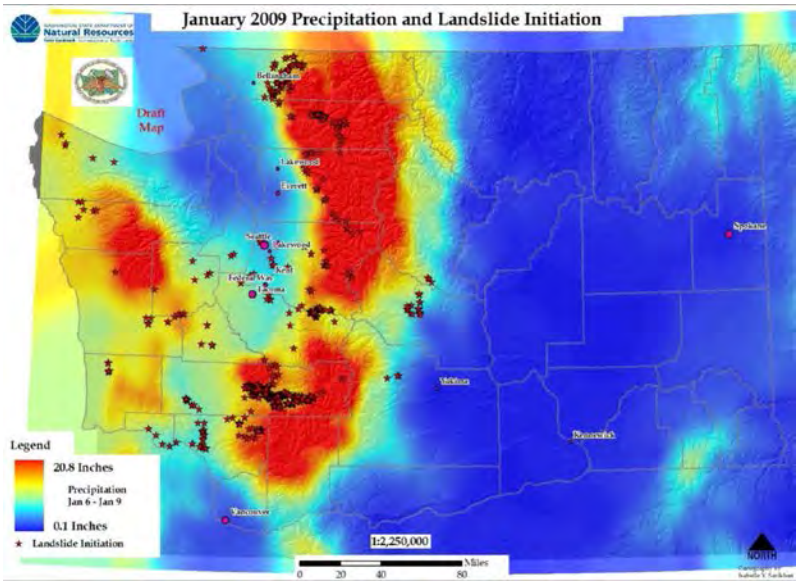
The two primary types of landslides are:

- *Earth flow* – This is the dominant form of landslide in the area. Both ancient and active earth flows are common, not only in the high and steep terrain, but also in the low, rolling hills of the

Chehalis-Centralia area. Stream erosion along the toes of the flow usually causes reactivation of these landslides. Excavations, such as those for freeway construction, also may reactivate dormant earth flows or start new ones.

- *Debris flow* – These types of landslides are locally a problem in the western Cascades and Olympic mountains; they tend to occur where the rocks are strong and relatively un-weathered. These rocks tend to have steep slopes and smooth surfaces overlain by thin soils. Intense rainstorms, or rain on the wet snow in the mountains trigger these landslides (Source: Washington State Hazard Mitigation Plan, 2013).

<u>Historical Occurrences</u>



- January 7-8, 2009 storm, over 500 landslides initiated in Lewis County, blocking roads and damaging houses. Rainfall totaled over 10 inches between January 7-8, triggering hundreds of debris flows between Morton and Randle. Near Glenoma, when the debris flows reached the valley, they transformed into hyper-concentrated flows, moving across fields and pirating on Highway 12 and into roads and driveways.
- December 2007 storm just west of Pe Ell, a massive debris avalanche along with numerous smaller landslides blocked State Route 6, from Pe Ell to Raymond, isolating 21 households without electricity and water. In addition, State Route 8, just west between Porter and Malone, and SR 508 near Onalaska were blocked by landslides. In the Chehalis headwaters area, the hardest hit area from the storm, nearly 20 inches of rain was recorded within a 48-hour period, most of that falling within the first 24 hours. Woody debris and sediment, including material from more than 1,000 landslides in the Chehalis headwaters basin, clogged channels at bridges, creating temporary dams and causing widespread deposition of logs and debris, especially around the Boistfort valley.
- The winter storms of January 29 thru March 11, 1999 – brought snow, heavy rains, high winds, and landslides. Heavy saturated soils and unstable conditions on the hillside above Kresky Avenue (Chehalis) resulted in a large mass land movement. It caused severe damage (over $100,000) to the Elks Lodge. During this same time frame, Pe Ell had a newly installed water line collapse from another mass land movement.
- February 1996 – Lewis County experienced its largest recorded landslide with an estimated 1.5 million cubic yards of debris. The event destroyed a house five miles east of Glenoma. Landslides blocked State Route 504 in two places by landslides in Kid Valley, and a landslide closed State Route 7 near Mineral Lake for two days.
- 1984 – A mudslide shut down the water supply intake to the reservoir of the cities of Centralia and Chehalis. In November 1990 and January 1991 muddy water was observed at the same location.

- November 1994 – After heavy rains, a mass land movement occurred approximately one-half mile west of Randle between Peters and Silverbrook Roads. An entire portion of a hill near State Route 12 rolled down on to the highway. The slide was about 30 feet high and more than 100 feet wide. The clean cost an estimated $1.2 million.

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with landslides. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Landslide Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Highly Likely	Severe
City of Centralia	No	Yes	Likely	Limited
City of Chehalis	Yes	No	Possible	Limited
City of Morton	Yes	Yes	Likely	Limited
City of Mossyrock	No	No	Possible	Severe
City of Napavine	No	No	Unlikely	None
City of Toledo	Yes	Yes	Possible	Limited
City of Vader	No	No	Possible	Limited
City of Winlock	Yes	Yes	Likely	Severe
Town of Pe Ell	Yes	Yes	Likely	Limited

Probability:
- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:
- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See the Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

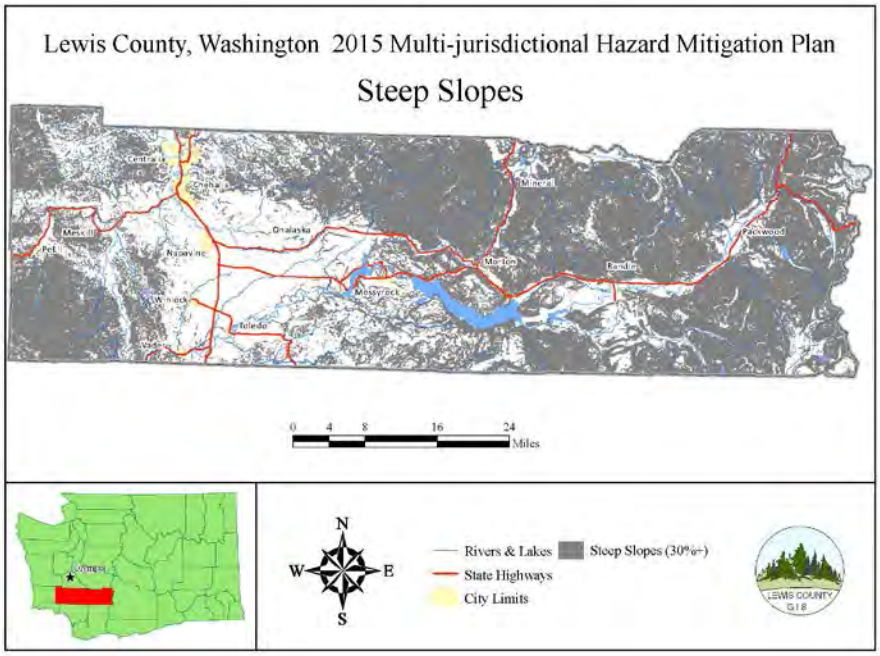
Assessing Vulnerability: Estimating Potential Losses

Potential losses from a landslide event vary greatly depending on the area affected. A landslide that occurs in an undeveloped rural area may cause no monetary damage at all. In other instances, there

may be extensive road damage or destruction of homes or other structures. Landslides also damage the land or the hillsides, making roadway conditions unsafe. Depending on the magnitude and severity of a landslide event, losses could reach well into the millions of dollars. Additionally, landslides can cause a disruption of commerce if a road closure results. In certain circumstances, there could also be a loss to human life as a result of a landslide. For more specific information regarding landslides in the jurisdictions within the planning area, refer to each jurisdiction's respective participant section found in their sections.

<u>Assessing Vulnerability: Analyzing Development Trends</u>

Enforcing development standards that limit or place conditions on development that occurs on slopes, river banks, and other landslide prone areas will limit the vulnerability of structures. Additional building that occurs in sensitive areas can increase the potential for loss due to landslides.



<u>Resources</u>

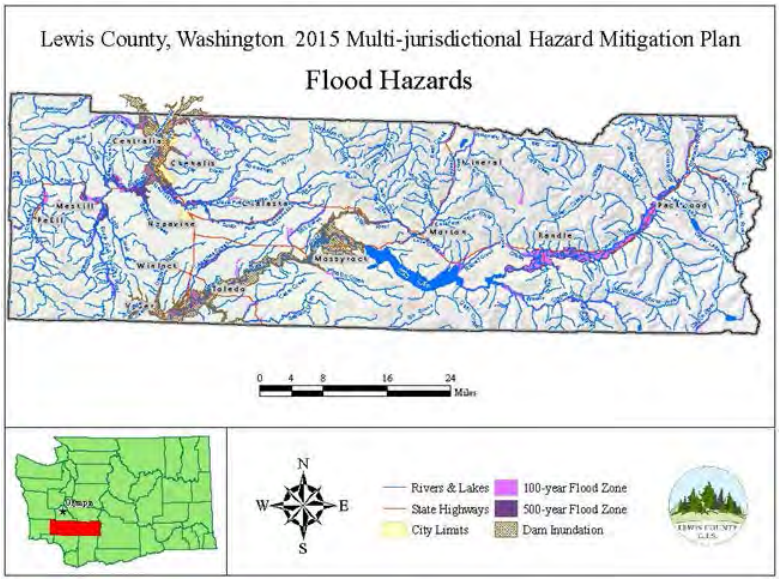
- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Landslide_Hazard_Profile.pdf Accessed May 16, 2015.
- Hazard Fact Sheet, U.S. Geological Survey, Landslide Information Center, March 2002, http://landslides.usgs.gov/html_files/nlic/page5.html, (August 12, 2003)
- Washington Division of Geology and Earth Resources, Open File Report 2009-1. January 2009 Washington

4.2.8 Levee Failure

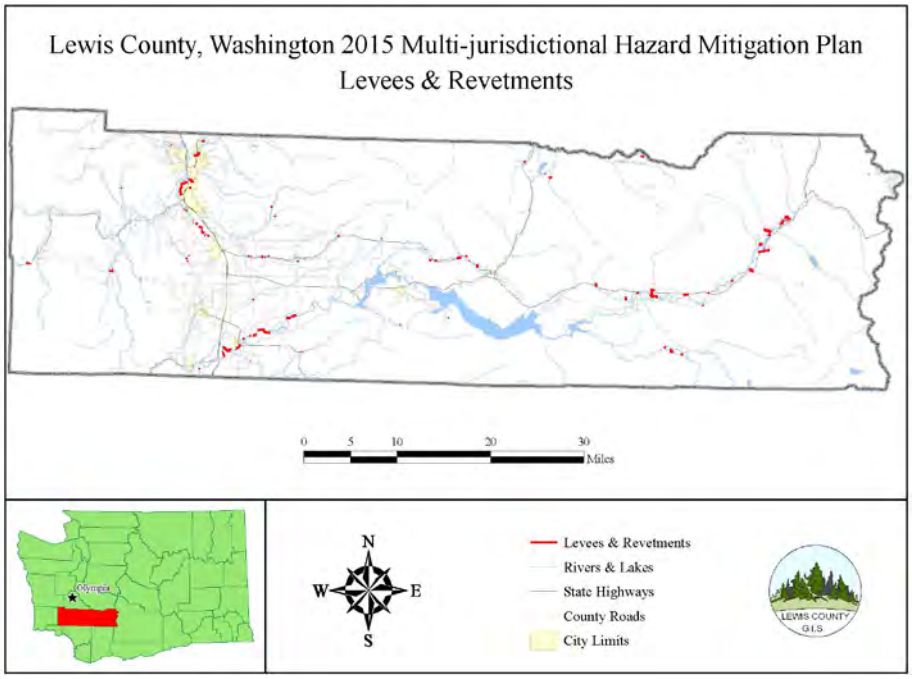
Hazard Profile

According to FEMA's website:

> "The United States has thousands of miles of levee systems. These manmade structures are most commonly earthen embankments designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide some level of protection from flooding. Those levee systems designed to protect urban areas have typically been built to higher standards. Levee systems are designed to provide a specific level of flood protection. No levee system provides full protection from all flooding events to the people and structures located behind it. Thus, some level of flood risk exists in these levee-impacted areas."



Levee failure can occur several different ways. A breach of a levee is when part of the levee breaks away, leaving a large opening for floodwaters to flow through. A levee breach can be gradual by surface or subsurface erosion, or it can be sudden. A sudden breach of a levee often occurs when there are soil pores in the levee that allow water to flow through causing an upward pressure greater than the downward pressure from the weight of the soil of the levee. This under seepage can then resurface on the backside of the levee and can quickly erode a hole to cause a breach. Sometimes the levee actually sinks into a liquefied subsurface below.



Another way a levee failure can occur is when the levee overtops the crest of the levee. This happens when the flood waters simply exceed the lowest crest elevation of the levee. An overtopping can lead to significant erosion of the backside of the levee and can result

to a breach and thus a levee failure.

The primary levees in the planning area are the Centralia/Chehalis Airport Levee and the Skookumchuck Dike. However, there are many smaller levees and dikes in the area due to the large number of rivers and streams. Any community that has levees or dikes within the Planning Area has the chance to have the levee or dike fail. If proper levee maintenance is performed the structural integrate of the levee can be maintained.

Historical Occurrences

- Centralia/Chehalis Airport Levee – December 2007
- Cowlitz River Dike: November 2006
- Skookumchuck Dike: 1996

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with levee failures. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Levee Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Likely	Severe
City of Centralia	Yes	Yes	Likely	Limited
City of Chehalis	Yes	No	Possible	Limited
City of Morton	No	No	Unlikely	None
City of Mossyrock	No	No	Unlikely	None
City of Napavine	No	No	Unlikely	None
City of Toledo	No	No	Unlikely	None
City of Vader	No	No	Unlikely	None
City of Winlock	No	No	Unlikely	None
Town of Pe Ell	No	No	Unlikely	None

Probability:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
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See the Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

Assessing Vulnerability: Estimating Potential Losses

Due to the lack of resources and data deficiencies, potential losses were not calculated for a levee failure. Losses could be similar to those of a flood, damaging or destroying structures that are protected by the levee, displacing people and losses of functional down time, economic effects, or recovery and replacement costs. Because levee and dike failures are often part of a larger flood event, it is difficult to itemize potential losses in isolation.

HAZUS-MH

To assess risks and vulnerability, Lewis County GIS has run FEMA's loss-estimation model, HAZUS-MH (Version 1.3 MR3). The results using HAZUS-MR3 are summarized for the County and the individual municipal jurisdictions.

Assessing Vulnerability: Analyzing Development Trends

The areas at risk for loss in a levee failure are those lands downstream from the levee. Development standards that apply to the floodplain and other sensitive areas are enforced to limit the potential for future losses during these disasters. Specific development trends are analyzed in the participant section of this plan.

Resources

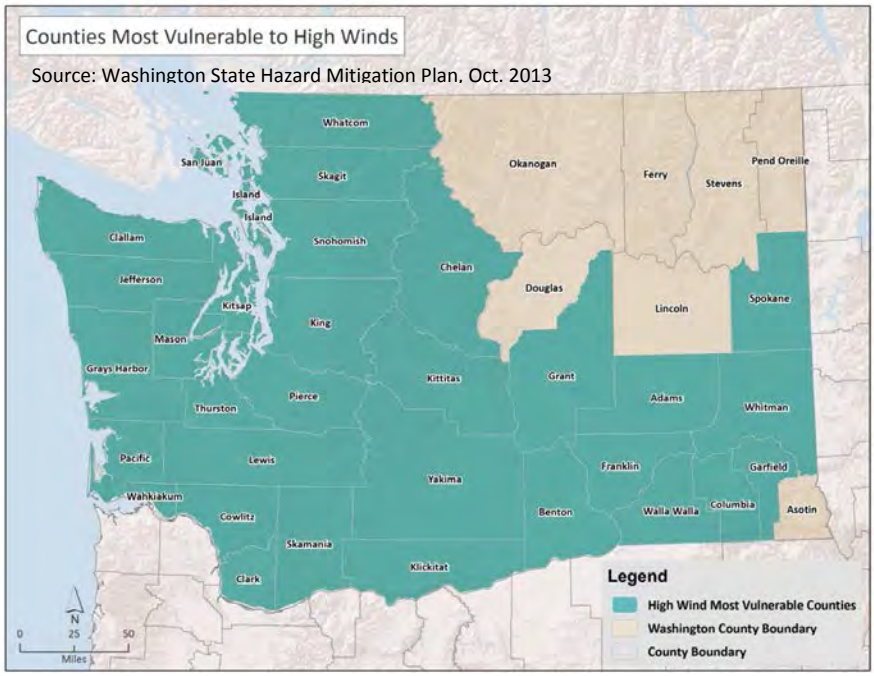
- FEMA: http://www.fema.gov/plan/prevent/fhm/lv_intro.shtm Accessed June 2015.

4.2.9 Severe Wind Storm

Hazard Profile

The National Weather Service defines high winds as sustained winds of 40 mph or gusts of 58 mph or greater, not caused by thunderstorms, expected to last for an hour or more. Areas most vulnerable to high winds are those affected by a strong pressure difference from deep storms originating over the Pacific Ocean; an outbreak of very cold, Arctic air originating over Canada; or air pressure differences between western and eastern Washington that primarily affect the Columbia River Gorge, Cascade Mountain passes, ridges and east slopes, and portions of the Columbia Basin.

Counties considered most vulnerable to high winds are 1) those most affected by conditions that lead to high winds, as described above, and 2) those with a high wind recurrence rate of 100 percent, meaning the county experiences at least one damaging high wind event every year. Counties that meet both criteria, or recommended for inclusion by Kerry Jones, Warning Coordination Meteorologist, National Weather Service – Spokane (Source: Washington State Hazard Mitigation Plan, October 2013).



Large wind events most often occur in the autumn and winter due a low pressure cyclone system takes over in the North Pacific Ocean, with air spiraling inward in a counter-clockwise fashion. This causes Washington's prevailing winds to come from the southwest, bringing relatively warm and moist air masses and a predictably wet season. The term Pineapple Express is used to describe the extreme form of this wet season pattern.

The most frequent surface winds in Washington are from the southwest. These widespread winds are associated with storms moving onto the coast from the Pacific Ocean. Winds coming from the south and west are the most destructive. The storm of December 14-15, 2006 and also the January 20, 1993 storm are examples of this type of windstorm.

West winds generate from the Pacific Ocean and are strong along the coast, but slow down inland due to the obstruction of the mountain ranges. Prevailing winds in Lewis County vary with the seasons. In summer, the most common wind directions are from the west or northwest; in winter, they are from the south and east. Local topography, however, plays a major role in affecting wind direction (Source: Office of the Washington State Climatologist, www.climate.washington.edu).

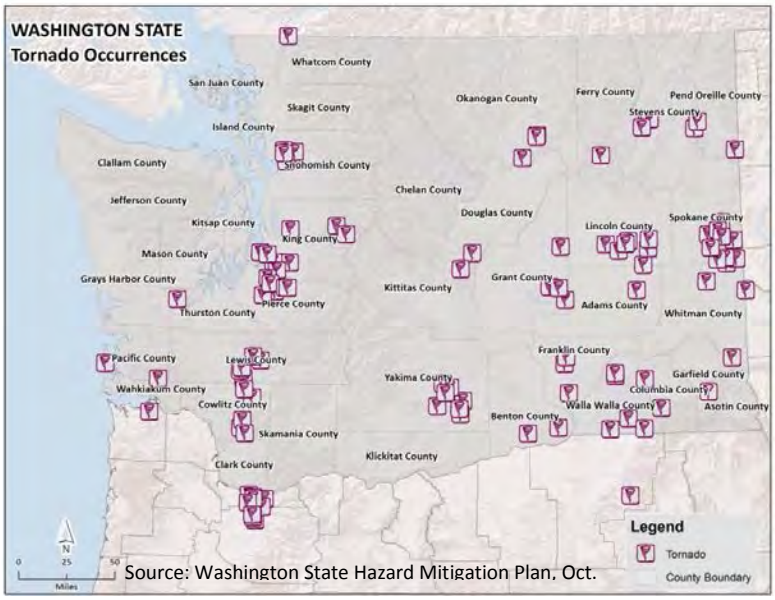
It was deemed, by both the public input and factual research, that the planning area as a whole has had previous occurrences of high winds. The probability of high winds to occur again is 'possible and likely' equaling somewhere between a 10 and 100% probability in the next year, or at least one chance in 10 years and between 1 and 10% probability in the next year, or at least one chance in next 100 years. This all depends on the specific location within the Planning Area.

High winds have the capability to affect an entire community within the planning area as there is no area within it void to their affects. The entire infrastructure, including all structures and critical facilities in the planning area is vulnerable and is at risk of being damaged by high winds.

High winds can cause structure loss, downed power lines, loss of electricity, obstruct traffic flow, and significantly damage trees. A catastrophic event could lead to major economic loss for the community.

Furthermore, high wind speeds and flying debris can pose a significant threat to human life.
The planning area as a whole may not be affected by a single event as high winds usually occur in one area at a time. This is why the planning area as a whole will experience 'limited' extent, while a single community could be entirely affected by a high wind, thus being 'severe.'

The unique characteristics of different jurisdictions allow high winds to impact them differently. Municipalities are very vulnerable in that residential, commercial, public and out buildings, as well as critical facilities, can be destroyed or damages significantly. Their power, cable and telephone lines can break. Residents in the rural areas of the county can be cut off for a more significant timeframe by the effects of wind storms. Power may not be restored for days, and sometimes even weeks, because of the distance from main power lines.



Source: Washington State Hazard Mitigation Plan, Oct.

Historical Occurrences

A few of the major wind storms to hit Lewis County include:

- December 1 - 3, 2007. The Great Coastal Gale. On November 29, 2007, a strong low pressure system, fed by the remnants of Typhoon Mitag and Typhoon Hagibis, formed in the central Pacific Ocean, and was carried via the Pineapple Express to the Pacific Northwest.
- October 18, 2007. Gale. This low developed from the remnants of tropical storm Linling. Another cyclone developed right on the heels of this tropically-fed low, cutting off a large supply of cold air that probably would have contributed to a much stronger storm.
- December 14-15, 2006. The Major Wind Storm (Hanukkah Eve Wind Storm)
- January 29-30, 2004. Minor Windstorm
- January 15-16, 2000. The Sou'wester

- December 12, 1995. The Major West Coast Windstorm
- January 20, 1993. The Devastating Inaugural Day Storm
- November 13-15, 1981. Double wind storms in 3 days. Gusts were 60 to 70 mph with Newaukum Hill station reporting 52 mph.
- October 12, 1962. Columbus Day Storm was a tropical storm named Freda formed 500 miles (800 km) from Wake Island in the central Pacific Ocean. The system became an extratropical cyclone as it moved into colder waters and interacted with the jet stream. The low moved northeastward, and then hooked straight north as it neared southwest Oregon. The storm then raced nearly northward at an average speed of 40 miles per hour (64 km/h), with the center just 50 miles (80 km) off the Pacific Coast.
- November 3, 1958. Wind came out of west with gusts around 60-80 mph.
- October 26-27, 1950. The Double Windstorms.
- October 21, 1934. The Major Windstorm. Wind gusts reported around 80-90 mph.

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with severe wind storms. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Severe Wind Storm Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Likely	Severe
City of Centralia	Yes	Yes	Likely	Limited
City of Chehalis	Yes	No	Possible	Limited
City of Morton	No	Yes	Possible	Limited
City of Mossyrock	No	No	Likely	Limited
City of Napavine	Yes	Yes	Possible	Limited
City of Toledo	Yes	Yes	Possible	Limited
City of Vader	Yes	Yes	Highly Likely	Limited
City of Winlock	Yes	Yes	Likely	Severe
Town of Pe Ell	Yes	Yes	Likely	Limited

Probability:
- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:
- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See each Participant Section to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

Assessing Vulnerability: Estimating Potential Losses

The Planning Area could potentially receive damages reaching millions of dollars in the worst case scenario. It is difficult to accurately calculate damage from windstorms, but the damage will likely fall into the following categories:

- Falling trees or blowing debris cause most fatalities and cause severe damage to buildings and vehicles.
- Power pole and line damage cause widespread power outages.
- Failure of roof cover and structures can lead to additional damage and entry of wind and rain into a home or business.
- Garage doors are the weakest point in the outer structure of a house.
- Exterior, load-bearing walls of buildings can fail resulting in collapse of the roof.
- Weathered, loose window frames are exceptionally vulnerable during severe windstorms.
- Light metal buildings can totally collapse. Less sturdy shelters, such as bus stop shelters, are vulnerable and are probably not safe for taking cover.
- While a structure may be generally sound, broken windows can cause injures inside and outside the building and extensive damage to building contents.

Assessing Vulnerability: Analyzing Development Trends

There is no human behavior or activity that can modify the area affected by high winds, thus high winds will always be capable of affecting the entire planning area. Any structural growth which occurs within the area in the future will be vulnerable to the losses sustained from high winds.

Windstorms usually occur each fall and winter season, producing strong winds to 60 mph and causing power outages and property damage. Approximately once every 10 years, storms with winds of 70 mph or more pound the region and cause significant damage. These storms last an average of three to six hours of prolonged winds in one area before the storm moves on. Because a storm with winds in excess of 70 mph can happen often, preparedness and awareness are needed to avoid its disastrous effects.

See each respective 'participant section' for more information on the future vulnerability and losses of each jurisdiction within the planning area.

Resources

- Office of the Washington State Climatologist, www.climate.washington.edu
- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Severe_Storm_Hazard%20profile.pdf Accessed May 16, 2015.

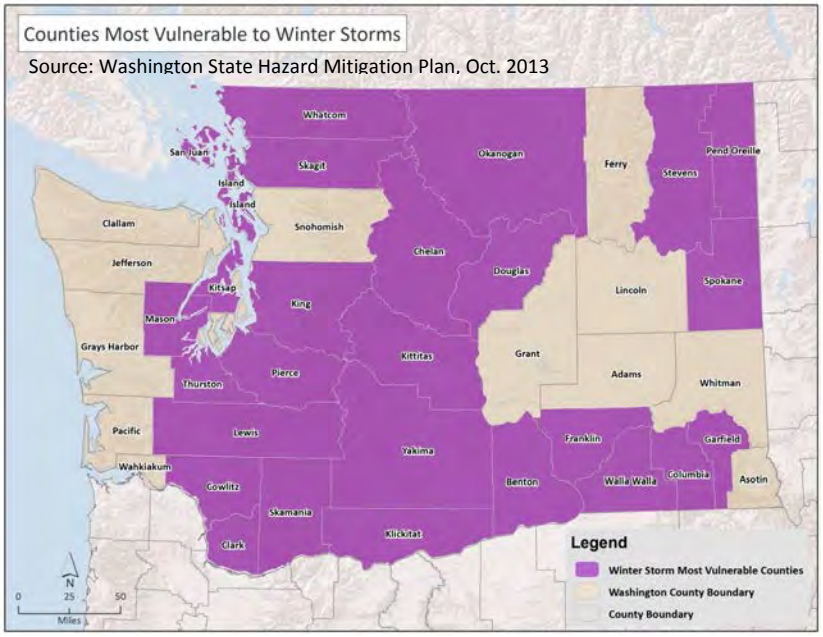
4.2.10 Severe Winter Storm

Hazard Profile

The National Weather Service defines a Severe Winter Storm as having 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 inches or more 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.

Areas most vulnerable to winter storms are those affected by convergence of dry, cold air from the interior of the North American continent, and warm, moist air off the Pacific Ocean. Typically, significant winter storms occur during the transition between cold and warm periods.

Counties considered most vulnerable to winter storm are 1) those most affected by conditions that lead to such storms, as described above, and 2) those with a recurrence rate of 50 percent, meaning the county experiences at least one damaging winter storm event every two years. (Source: Kerry Jones, Warning Coordination Meteorologist, National Weather Service – Spokane; Washington State Hazard Mitigation Plan, Nov. 2007).



According to the standards listed in the *Washington State Hazard Mitigation Plan*, Lewis County is not listed as one of the most vulnerable to severe winter storms. However, Lewis County has experienced severe winter storms and the plan participants have identified severe winter storms as a potential hazard.

It was deemed, by both the public input and factual research, that the planning area as a whole has had previous occurrences of severe winter storm events. There is no area in the planning area that is void from the effects of a winter storms. A winter storm can have the capability to affect the entire planning area during and after the event. The entire infrastructure, including critical facilities, is vulnerable and is at risk of being damaged or affected by severe winter storms. Winter storms can cause damage to structures, damage to pipes, downed power lines, loss of electricity, obstruct traffic flow, and significantly damage trees. A loss of electricity in combination with cold weather can pose a significant threat to human life.

The unique characteristics of different jurisdictions allow winter storms to impact them differently. Cities and utility districts are vulnerable in that their power, cable and telephone lines can accrue ice during a winter storm and break. Heavy snow buildup can cause structural damage to residential, commercial and public structures as well as critical facilities. Snow and ice can also endanger residents that travel on the roads. Residents in the rural areas of the county can be affected by severe winter

storms as snow and ice can greatly hinder travel. Also power can be cut off to residents in unincorporated areas for days and sometimes weeks.

Historical Occurrences

- The January 2012 Pacific Northwest snowstorm was a large extratropical cyclone that brought record snowfall to the Pacific Northwest. Interstate 5 near Centralia, Washington, was closed temporarily due to power lines brought down by snowfall; the standard detour route was also blocked by trees and power lines.
- January 6-16, 2009, Severe Winter Storm, Landslides, Mudslides, and Flooding: FEMA-1817-DR
- December 12, 2008 to January 5, 2009, Severe Winter Storm and Record and Near Record Snow: FEMA-1825-DR
- December 14-15, 2006, Severe Winter Storm, Landslides, and Mudslides: FEMA 1671
- January 1997, Severe Winter Storms/Flooding: FEMA 1159
- January 1997, Severe Ice and Snow Storms: FEMA 1152

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with severe winter storms. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Winter Storm Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Likely	Severe
City of Centralia	Yes	Yes	Likely	Limited
City of Chehalis	No	No	Possible	Severe
City of Morton	Yes	Yes	Likely	Limited
City of Mossyrock	Yes	Yes	Likely	Severe
City of Napavine	Yes	Yes	Possible	Limited
City of Toledo	Yes	Yes	Possible	Limited
City of Vader	Yes	Yes	Highly Likely	Limited
City of Winlock	Yes	Yes	Likely	Severe
Town of Pe Ell	Yes	Yes	Likely	Limited

Probability:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See the Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

Assessing Vulnerability: Estimating Potential Losses

It is difficult to determine the amount of damage and losses created by a winter storm event. A number of factors that would need to be considered include: structural damage due to snow and ice, displacement, functional downtime, economic loss, or loss of life and injury. Data limitations prevented detailed estimates of these losses. A loss of electricity due to downed power lines can cripple any jurisdiction's economy, cause loss of power to critical facilities, and pose a threat to human life.

Assessing Vulnerability: Analyzing Development Trends

There is no human behavior or activity that can modify the area affected by winter storms, thus winter storms will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from winter storms. Building standards including load bearing regulations may reduce vulnerability to structural losses.

See each respective 'participant section' for more information on the future vulnerability and losses of each jurisdiction within the planning area.

Resources

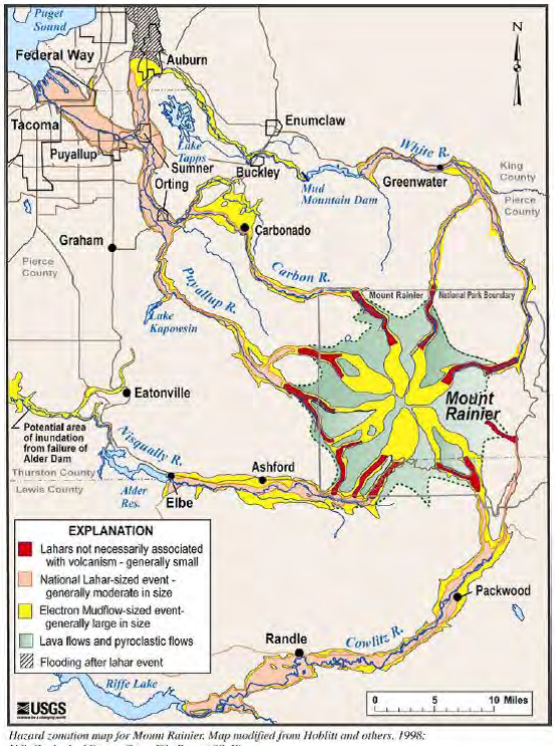
- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Severe_Storm_Hazard%20profile.pdf Accessed May 16, 2015.

4.2.11 Volcano

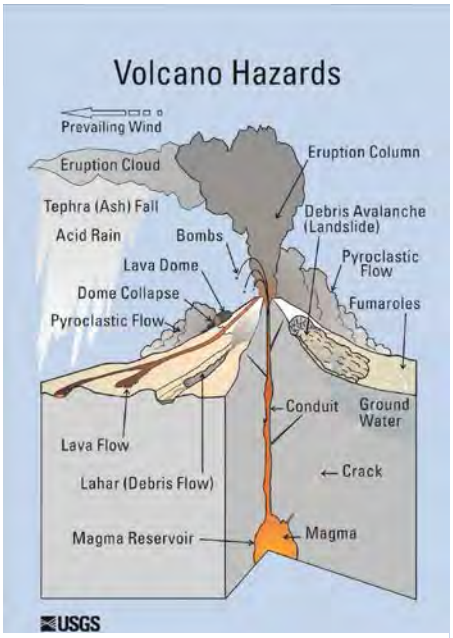
Hazard Profile

Lewis County is located in an area where volcanic events have occurred in both the ancient and recent past. Volcanoes produce a wide variety of hazards that can cause personal harm and destroy property. Large explosive eruptions can endanger people and property hundreds of miles away and even affect global climate. Some of the volcano hazards, such as landslides, can occur even when a volcano is not erupting. Volcano hazards include:

1. Eruption columns and clouds;
2. Volcanic ash;
3. Volcanic gases;
4. Lava flows and domes - lava erupts from vents that can form lava flows or steep-sided lava domes
5. Pyroclastic flows - a high-speed avalanches of hot ash, rock fragments, and gas;
6. Debris avalanches - a type of landslide consisting of rock, glacial ice, snow, and other debris;
7. Lahars - a flowing mixture of rock debris and water;
8. Volcano landslides - landslide consisting of rock, glacial ice, snow, and other debris;
9. Tephra falls - produced by explosive eruptions that blast fragments of rock and ash into the air.



Hazard zonation map for Mount Rainier. Map modified from Hoblitt and others, 1998; U.S. Geological Survey Open-File Report 98-48.



Washington State Hazard Mitigation Plan, Oct. 2013

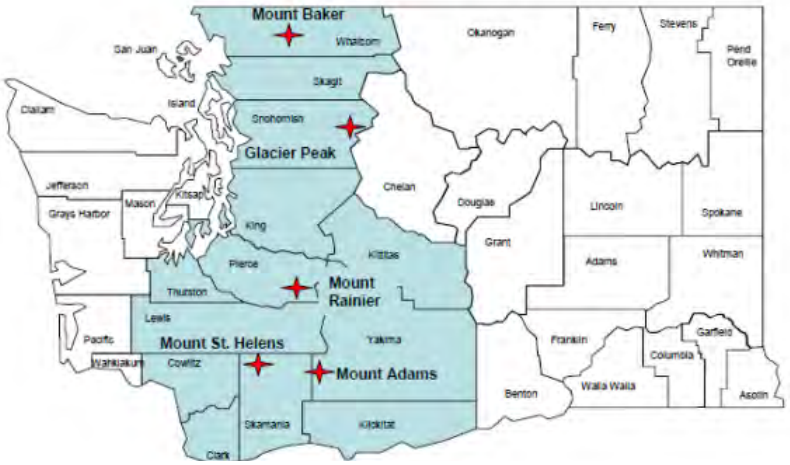
If there is a volcanic event within Lewis County it would more than likely be from Mount St. Helens or Mt. Rainer. Mount St. Helens is one of a group of high volcanic peaks that dominate the Cascade Range between northern California and southern British Columbia. The distribution of these volcanic peaks in a broad band that roughly parallels the coastline is typical of the so-called "Ring of Fire," a roughly circular array of volcanoes located on islands, peninsulas, and the margins of continents that rim the Pacific Ocean.

A major issue following an eruption would be dealing with the large amounts of volcanic ash. Volcanic ash is pulverized rock ejected from a volcano. Unlike wood ash, newly ejected volcanic ash is sharp and abrasive. It can damage car finishes and scratch eyes. It can clog machinery, vents, and pipes, and can cause respiratory discomfort. In large enough quantities, its weight can be enough to collapse roofs, especially if it gets wet.

Even before it began its recent active eruption phase, Mount St. Helens, and at least six other volcanoes

in the Cascade Range, were known to be "active" - that is, to have erupted at least once during historical time. Few major Cascade volcanoes are known to have been inactive long enough to be considered "extinct" or incapable of further eruption. Most display some evidence of residual volcanic heat, such as fumaroles, hot springs, or hot ground where snow melt is unusually rapid.

Counties Most Vulnerable to Volcanic Lahar, Ash Fall



Source: Washington State Hazard Mitigation Plan, 2007 Accessed: 7/2009.

Historical Occurrences

The catastrophic eruption on May 18, 1980 was preceded by 2 months of intense activity that included more than 10,000 earthquakes, hundreds of small phreatic (steam blast) explosions, and the outward growth of the volcano's entire north flank by more than 80 meters. A magnitude 5.1 earthquake struck beneath the volcano at 8:32 a.m. on May 18, setting in motion the devastating eruption.

Within seconds of the earthquake, the volcano's bulging north flank slid away in the largest landslide in recorded history, triggering a destructive, lethal lateral blast of hot gas, steam, and rock debris that swept across the landscape as fast as 1,100 kilometers per hour. The lateral blast, which lasted only the first few minutes of a 9-hour continuous eruption, devastated more than 150 square miles of forest and recreation area, killed countless animals, and left about 60 persons dead or missing.

Temperatures within the blast reached as high as 300 degrees Celsius. Snow and ice on the volcano melted, forming torrents of water and rock debris that swept down river valleys leading from the volcano. Within minutes, a massive plume of ash thrust 15 miles into the sky, where the prevailing wind carried about 490 tons of ash across 57,000 square kilometers of the Western United States.

The 9-hour eruption, the huge debris avalanche that immediately preceded it, and intermittent eruptions during the following 3 days removed about 4 billion cubic yards (0.7 cubic mile) of new magmatic material and of the upper and northern parts of the mountain, including about 170 million cubic yards (0.03 cubic mile) of glacial snow and ice. The eruption caused pyroclastic flows and mudflows, the largest of which produced deposits so extensive and voluminous that they reached and blocked the shipping channel of the Columbia River about 70 river miles from the volcano.

Following the 1980 explosive eruption, more than a dozen extrusions of thick, pasty lava built a mound-shaped lava dome in the new crater. The dome is about 1,100 meters in diameter and 250 meters tall.

The eastern side of Lewis County is at-risk to ash fall. Areas in Lewis County as shown on the map below have a 1 in 1,000 chance of receiving 10 centimeters (4 inches) of ash fall each year on the map to the right.

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan dealing with a volcanic eruptions. According to the Washington State Enhanced Hazard Mitigation Plan and the U.S. Geological Survey hazard reports Lewis County should expect lahars and ash dust to be the main volcanic hazards to expect. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Volcano Eruption Composite Hazard Identification Table

Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County	Yes	Yes	Likely	Catastrophic
City of Centralia	Yes	Yes	Likely	Limited
City of Chehalis	Yes	No	Possible	Severe
City of Morton	Yes	Yes	Likely	Catastrophic
City of Mossyrock	Yes	Yes	Likely	Limited
City of Napavine	Yes	Yes	Possible	Limited
City of Toledo	Yes	Yes	Possible	Limited
City of Vader	Yes	Yes	Possible	Severe
City of Winlock	Yes	Yes	Possible	Catastrophic
Town of Pe Ell	Yes	Yes	Likely	Limited

Probability:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

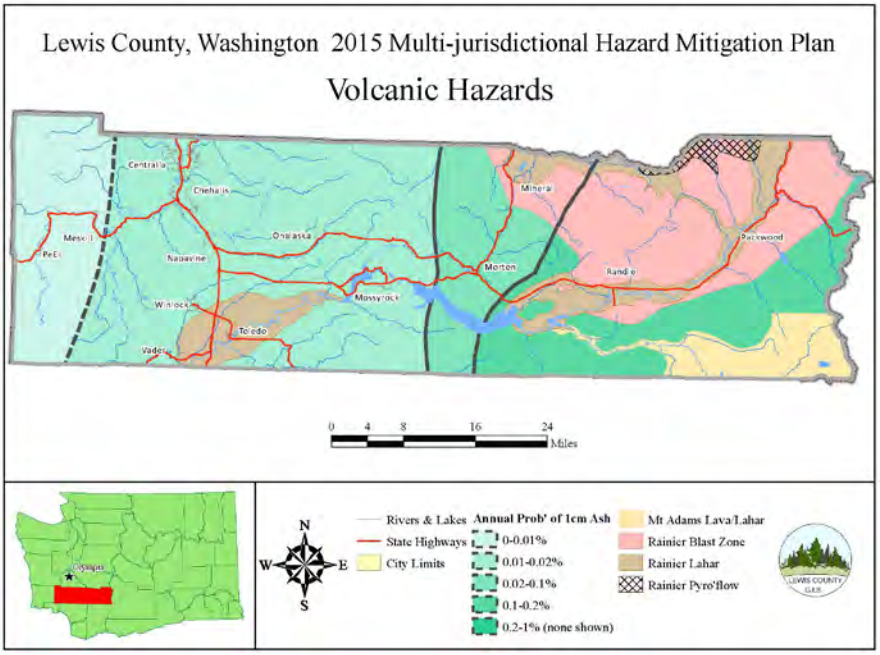
Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See the Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.

Assessing Vulnerability: Estimating Potential Losses

The loss from a volcanic disaster is largely dependent on the point of origin of the volcanic event, the direction of the eruption, and the prevailing wind pattern. Potential losses include: loss of life, loss of timber, loss of structures, loss of machinery and vehicles due to ash damage, and loss of agriculture due to ashfall. Volcanic disasters can also affect commerce and transportation. Other major disasters such

as flooding, debris flow, and earthquakes often occur in conjunction with volcanic disasters which increases the potential loss. For specific loss estimates, see the participant sections.



Assessing Vulnerability: Analyzing Development Trends

Preparedness and land use planning are important for mitigation of volcanic hazards. Reducing population growth in paths of lahars, implementing warning systems, and planning and practicing evacuations can lower the potential loss of life and property during future eruptions. These actions can reduce the risk from lahars and provide a measure of safety for those living, working, and recreating in valleys surrounding volcanic mountains.

Resources

- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/HAZ%20MIT%20PLAN/Volcano_Hazard_Profile.pdf Accessed June 2015.
- Washington State Department of Natural Resources, Geology and Earth Resources Division; http://www.wa.gov/dnr/htdocs/ger/index.html Accessed May 2015.
- University of Washington, Geophysics Program; http://www.geophys.washington.edu/
- United States Department of Agriculture; http://www.wsda.gov/ Accessed May 2015.
- United States Forest Service; http://www.fs.fed.us/ Accessed May 2015.
- National Weather Service; http://www.nws.noaa.gov/ Accessed May 2015.
- United States Department of Justice; http://www.usdoj.gov/ Accessed May 2015.
- United States Geological Survey, David A. Johnston Cascade Volcano Observatory; http://vulcan.wr.usgs.gov/ Accessed May 2015.

4.2.12 Wildfire

Hazard Profile

Wildfire is a general term for an uncontrolled fire that often occurs in wildland areas, but can consume agricultural resources and houses as well. Wildland areas include, but are not limited to, grasslands, agricultural land, and forests. The causes of wildfires vary, but most often include lightning, human carelessness, and arson.

According to FEMA, dry conditions during various times of the year greatly increase the potential for wildland fires; therefore drought is a major contributor to extreme wildfires. The USGS notes that wildfires are a growing natural hazard in most regions of the United States. These fires, on average, burn 4.3 million acres in the U.S. annually, causing the federal government to spend roughly $1 billion per year on fire suppression. Although fire is a natural occurrence that can be a beneficial process, the large buildup of vegetation used for fire suppression can act as extra fuel and increases the intensity and devastation of these fires.

FEMA stated, there are three different classes of wildland fires:

- A **surface fire** is the most common type, and burns along the floor of a forest, moving slowly and killing or damaging trees;
- A **ground fire** is usually started by lightning and burns on or below the forest floor, and
- A **crown fire** spreads rapidly by wind and moves quickly by jumping along the tops of trees.

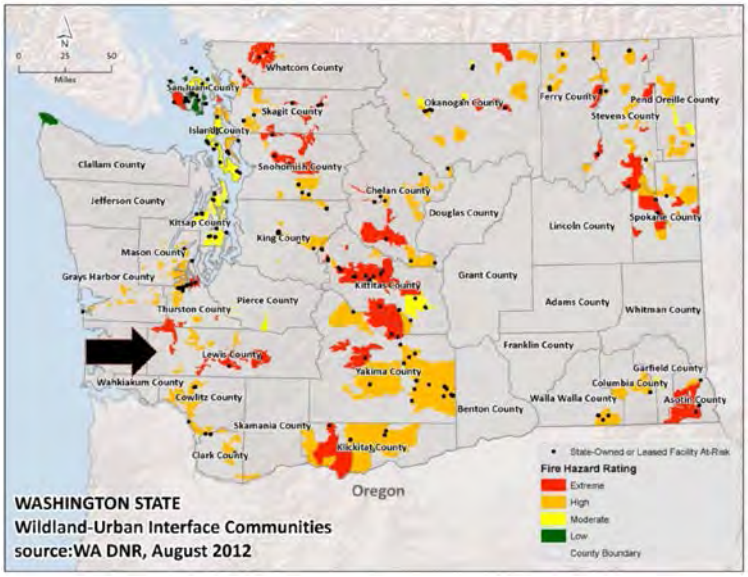
Wildfires generally occur in areas where climates are sufficiently moist to allow the growth of trees and vegetation, but also have long, dry, and hot periods. These hot periods allow branches and leaves to fall, and material to dry out, leaving highly flammable material to accumulate. During a severe drought, wildfires are common in grasslands and scrublands. During windy days, grassland fires can spread rapidly and become uncontrollable.

In recent years, the areas where wildlands border developing areas, wildfires have become more dangerous as they pose a threat to suburban homes located in transitions zones between rural and urban areas. In some extreme occasions, wildfires have caused numerous deaths and extensive damage as fires rapidly sweep through urban-fringe communities. The damage caused by wildfires goes beyond just smoldering piles of ash and includes the effects of erosion, landslides, the introduction of invasive species, and changes in water quality.

Lewis County's fire season runs from approximately mid-May through October. Dry periods can extend the throughout 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 Washington, wildland fires start most often in lawns, fields, open areas, transportation areas, and wooded wildland areas. They are usually extinguished with less than one acre damaged, but can spread to over 100,000 acres and may require thousands of firefighters several weeks to extinguish. Wildland fire protection can be provided by federal, state, county, city, and private fire protection agencies.

The agencies responding to wildland fires depend on the location of the fire. If the fire is located in an area where human activity is the likely cause the fires are responded to by city and county fire departments if they are usually 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 cigarettes. Loss per incident for debris fires is three times higher than any other fire cause.



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. According to the Washington State Hazard Mitigation Plan 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.

Historical Occurrences

Lewis County Wildfires 2008-2013													
2008 Fires	2008 Acres	2009 Fires	2009 Acres	2010 Fires	2010 Acres	2011 Fires	2011 Acres	2012 Fires	2012 Acres	2013 Fires	2013 Acres	Total County Fires	Total Acres Burned
19	37.74	29	15	11	7.46	15	7.22	34	41.11	25	105.45	133	213.69
The data was provided by Washington Department of Natural Resources and located in Washington State Enhanced Hazard Mitigation Plan, October 2013.													

Assessing Vulnerability: Overview

Below is the Composite Hazard Identification Table for Lewis County and the municipalities participating in this plan for wildfires. The table addresses previous occurrences, whether or not the hazard is likely to occur, probability of occurrence, and the extent of damage that may occur for each participating jurisdiction. Differences in probability and extent are described further in the individual participant sections.

Wildfire Composite Hazard Identification Table				
Jurisdiction	Previous Occurrence (Yes or No)	Whether or Not Likely to Occur (Yes or No)	Probability Highly Likely/ Likely/Possible/ Unlikely	Extent Catastrophic/ Severe/Limited/ None
Lewis County				
City of Centralia	No	No	Possible	Limited
City of Chehalis	No	No	Possible	Limited
City of Morton	No	Yes	Possible	Severe
City of Mossyrock	No	No	Unlikely	Limited
City of Napavine	No	No	Unlikely	None
City of Toledo	No	No	Unlikely	None
City of Vader	No	No	Likely	Catastrophic
City of Winlock	No	No	Unlikely	None
Town of Pe Ell	Yes	Yes	Possible	Limited

Probability:

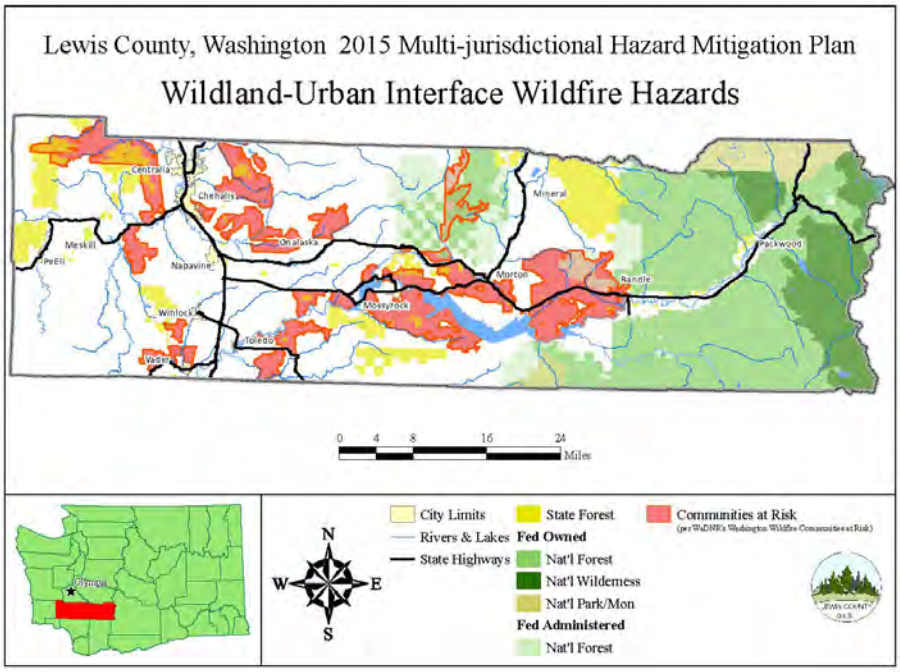
- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities

See the Participant Sections to review the Asset Inventory Worksheet 2A, Asset Inventory Worksheet 2B, and Asset Inventory Worksheet 2C for detailed information on the structures, infrastructure, and critical facilities, as well as the potential losses to each community and the estimated dollar amount of damages from this hazard if it affected any of the participants.



Assessing Vulnerability: Estimating Potential Losses

The monetary loss of a wildfire varies greatly with the location and severity of the event and could change depending on the specific areas are included in the estimate. Potential losses could include timber and rangeland or structures, depending on the location of the fire. If a wildfire were to occur when the grasses and undergrowth are drier like in July-September, the losses could be greater. For these reasons, it would be appropriate to say losses could range from thousands to millions of dollars.

Assessing Vulnerability: Analyzing Development Trends

The likelihood of wildfires occurring in the future will decrease as land management gets better. 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 Washington State and in Lewis 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

- Originally published in *Federal Register*, Volume 66, Number 100, pages 43432-43433, August 17, 2001, and updated by the Washington Department of Natural Resources in *A Progress Report on The National Fire Plan in Washington,* 2002. List Revised, 2004.
- Washington State Enhanced Hazard Mitigation Plan, October 2013. Washington State Military Department. Available at: http://mil.wa.gov/uploads/pdf/wildland_fire_hazard_profile_2014-update.pdf Accessed May 15, 2015.

5.0 Mitigation Strategy

The primary focus of the mitigation strategy is to establish goals, objectives, and mitigation "action" items. These action items identify the activities and projects that are designed to reduce the effects of hazards on existing infrastructure and property in a cost effective and technically feasible manner. The development of the goals and objectives presented in this Plan was completed as part of the Adopted 2005 Plan and reviewed as part of the 2010 plan and then reviewed and amended as part this 2015 update.

5.1 Local Hazard Mitigation Goals

While the plan was prepared in response to the requirements of the Disaster Mitigation Act, its primary purpose is to reduce potential impacts to the health, safety, and welfare of Lewis County residents from natural disasters. Within this context, the planning team responsible for guiding plan development has defined the following specific plan goals and objectives.

Goals and objectives provide specific direction for the participating agencies for reducing future hazard related losses. Goals are general guidelines that portray what the jurisdiction is striving to achieve. They are global and general ideas. Objectives are more specific in that they identify strategies and implementation steps that are required to achieve goals.

On July 15, 2009, the Planning Team held a meeting to review the goals and objectives and recommended making no changes. On July 29th and 30th, the Stakeholders and general public were invited to two meetings to review and discuss the goals and objectives as well as recommend mitigation strategies for the participating agencies. No changes were recommended by the Stakeholders or the general public.

On May 27, 2015, the Planning Team met and reviewed the goals and objectives that were recommend by the Stakeholders at their May meetings held on May 4th and 6th. After considerable discussion about the proposed changes in the priorities, the Planning Team approved the following Goals and Objectives for the Multi-Jurisdictional Hazard Mitigation Plan:

Goal 1: Reduce the vulnerability of Lewis County communities to natural disasters

Objective 1: Plan participants will develop, implement and maintain reasonable and cost-effective activities or programs to:

1. Maintain and update hazard and disaster data.
2. Reduce the impact to existing development, infrastructure, and facilities from natural hazards.
3. Reduce repetitive losses.
4. Reduce the vulnerability of new development to natural hazards (e.g., through comprehensive land use planning etc.).
5. Educate citizens as well as private and public sector organizations regarding:
    - Natural hazards.
    - Techniques to reduce vulnerability to those hazards.
    - Resources available to assist in implementing potential hazard mitigation measures.
    - Public outreach on disaster preparedness
6. Monitor the effectiveness of natural hazard mitigation activities/programs
7. Regularly update activities/programs based on new information and lessons learned.

Goal 2: Optimize allocation of hazard mitigation resources and sharing of information

Objective 2: *Plan* participants will coordinate local and regional activities/programs as appropriate to cost-effectively reduce disaster vulnerability for Lewis County communities.

Goal 3: Ensure that our community is capable ~~to~~ of initiating and sustaining emergency response operations during and after disasters

Objective 3: Plan participants will strive to:

1. Develop and maintain the capability of emergency services organizations to detect emergency situations and promptly initiate emergency response operations.
2. Cost-effectively protect critical public facilities from natural hazard impacts.
3. Ensure that emergency services facilities and their associated utility and communications systems are capable of providing critical services.
4. Ensure access to key health care facilities and designated evacuation routes and shelters remain open and operable before, during, and after disaster events.
5. Retrofit and/or relocate shelters or structures for vehicles and equipment needed for emergency services operation to withstand disaster impacts.

Goal 4: Maintain continuity of public services during and after disasters

Objective 4: Plan participants will strive to:

1. Prepare and maintain plans to guide decision-making, resource allocation, and re- establishment of operations before, during, and after a disaster.
2. Protect important records, documents, and information systems from the impacts of disasters.
3. Reduce the disaster vulnerability of buildings and facilities used for routine operations.

Goal 5: Maximize available resources for hazard mitigation activities and disaster recovery

Objective 5: Plan participants will:

1. Comply with state and federal requirements to ensure continued eligibility of participating jurisdictions for federal pre-disaster and disaster-relief funding.
2. Work co-operatively to identify and pursue hazard mitigation grant and funding opportunities.
3. Share and disseminate information regarding hazard mitigation grant and funding opportunities with public agencies, not-for-profit organizations, businesses and industry.
4. Participants will develop community “neighborhood” preparedness plans.

5.2 Identification and Analysis of Mitigation Actions

After reviewing the goals and objectives, mitigation strategies or action items were prioritized. This list of strategies included each idea that was originally mentioned during the planning process as well as reviewing former strategies. In addition, each participant was provided with a preliminary list of mitigation alternatives to be used as a starting point. These alternatives were which was organized by hazard type. Each participant was asked to individually prioritize the list of potential mitigation alternatives. The prioritized list of alternatives will help participants determine which actions will best assist their respective jurisdiction in alleviating damages in the event of a hazard occurrence. The listed priority does not indicate which actions will be implemented first, but will serve as a guide in determining what an appropriate action may be and when it should be implemented.

The participants were instructed that each strategy must be directly related to the goals and objectives. Strategies must also be specific activities that are concise and can be implemented. Each goal, objective, and corresponding action item is arranged by a numbering system.

Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

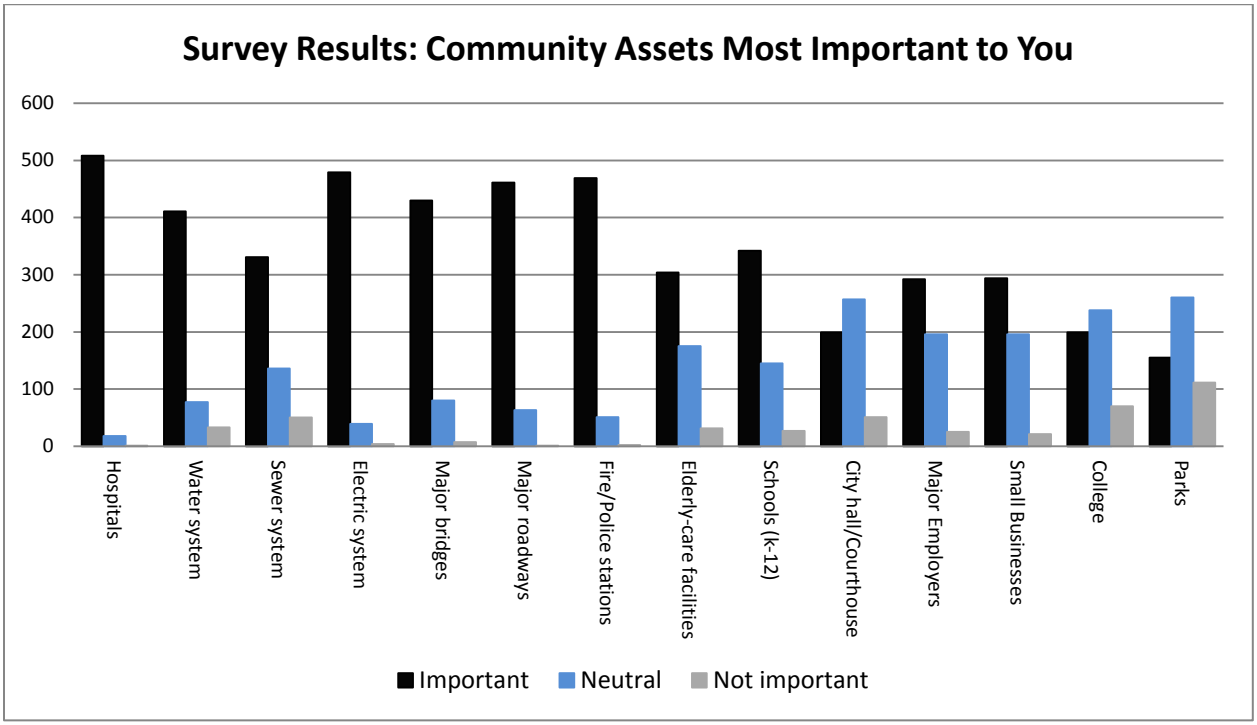
Element

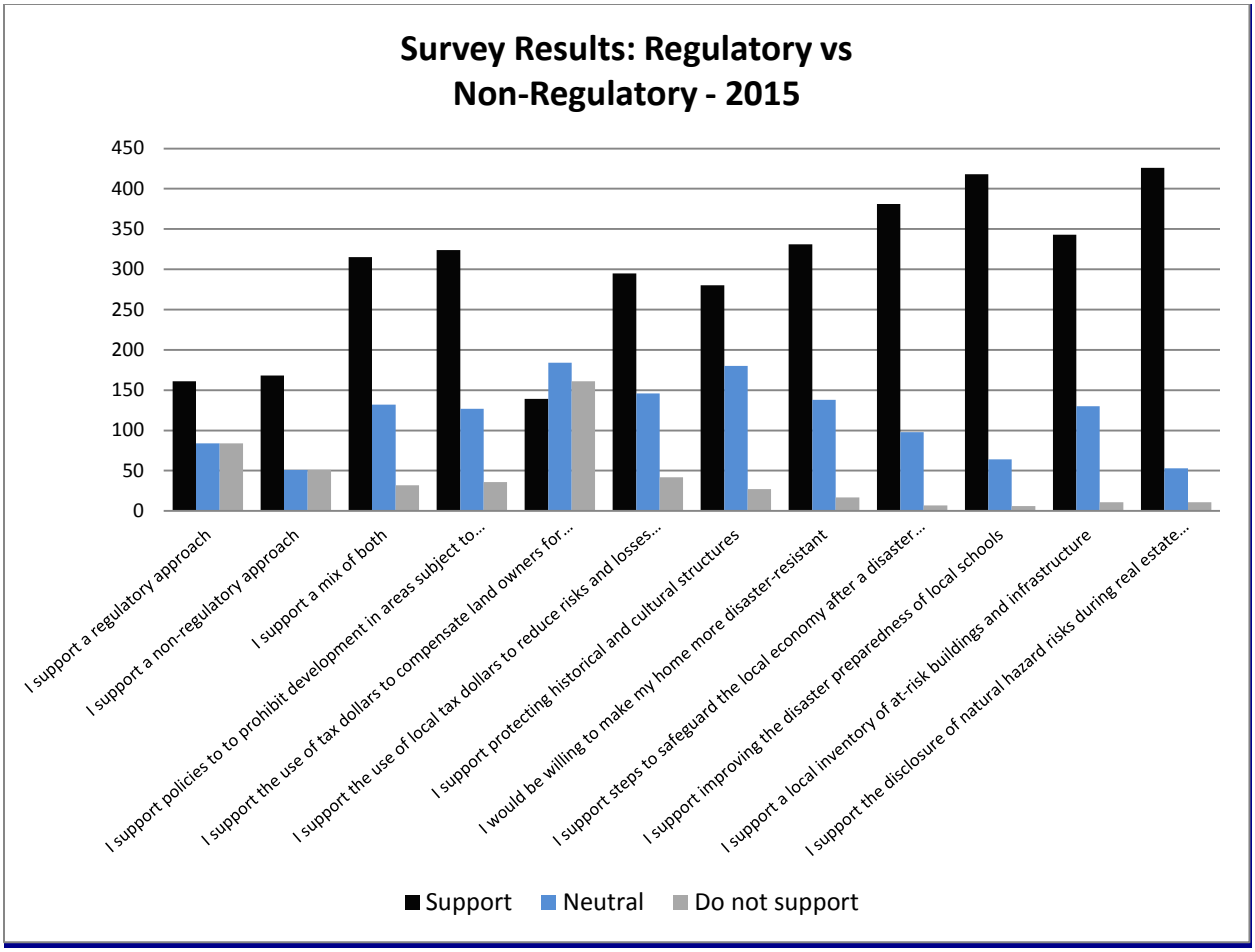
- Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?

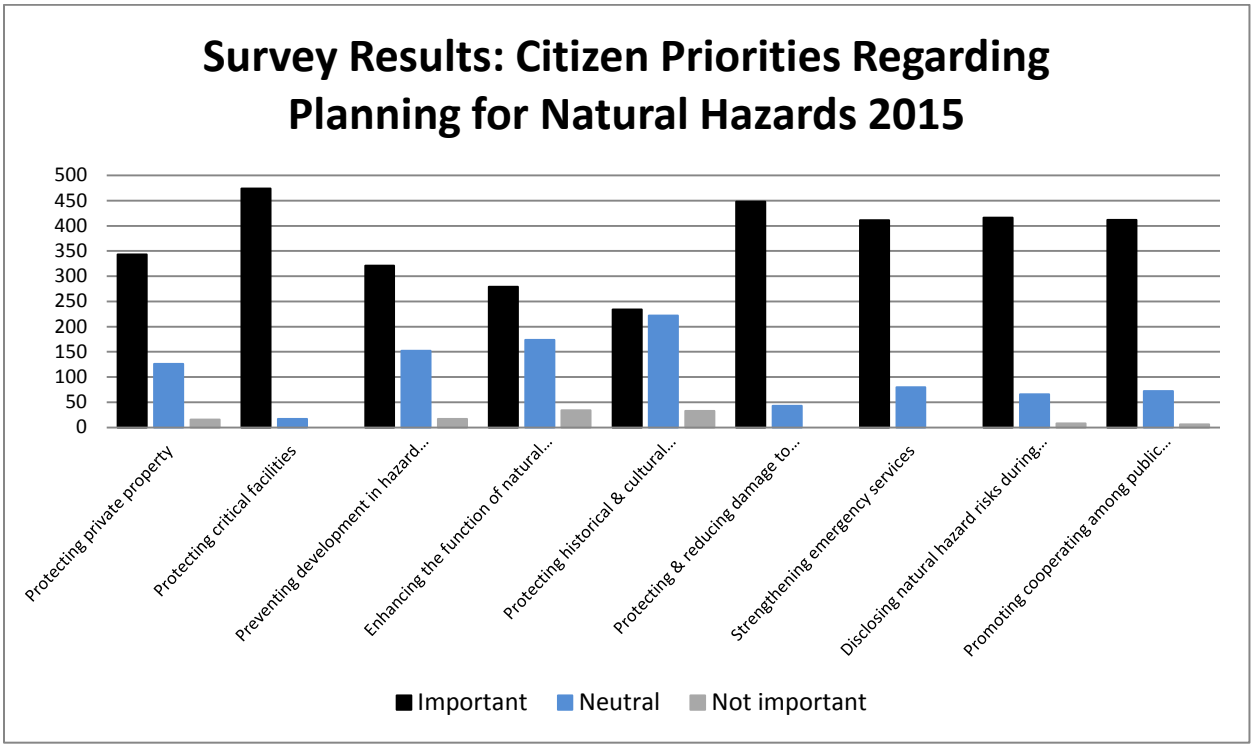
Source: FEMA, 2008

2015 Survey Results

To assist us in identify features or resources that maybe impacted by natural hazards we asked residents of the County to let us know which ones were most important to them. With over 600 responses we received a valuable resource in assisting us develop mitigation approaches that could be utilized.




Survey Results: Regulatory vs Non-Regulatory - 2015
450
400
350
300
250
200
150
100
50
0
I support a regulatory approach
I support a non-regulatory approach
I support a mix of both
I support policies to to prohibit development in areas subject to...
I support the use of tax dollars to compensate land owners for...
I support the use of local tax dollars to reduce risks and losses...
I support protecting historical and cultural structures
I would be willing to make my home more disaster-resistant
I support steps to safeguard the local economy after a disaster...
I support improving the disaster preparedness of local schools
I support a local inventory of at-risk buildings and infrastructure
I support the disclosure of natural hazard risks during real estate...
Support
Neutral
Do not support


Survey Results: Citizen Priorities Regarding Planning for Natural Hazards 2015
500
450
400
350
300
250
200
150
100
50
0
Protecting private property
Protecting critical facilities
Preventing development in hazard...
Enhancing the function of natural...
Protecting historical & cultural...
Protecting & reducing damage to...
Strengthening emergency services
Disclosing natural hazard risks during...
Promoting cooperating among public...
Important
Neutral
Not important

5.2.1 Ranking, Evaluation of Mitigation Strategies

Mitigation strategies usually fall into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects.

The Mitigation strategies were evaluated using FEMA's recommended STAPLEE process. This process addresses all major factors when weighing the costs and benefits of implementing one action over another. Important factors to be considered when ranking the strategies include the prohibitive costs, the community's resource capabilities, the community's desires and concerns, and the overall feasibility of the action.

Implementation of Mitigation Actions
Requirement: §201.6(c) (3) (iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c) (3) (ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
Element

- Does the mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?)
- Does the mitigation strategy address how the actions will be implemented and administered? (For example, does it identify the responsible department, existing and potential resources, and timeframe?)
- Does the prioritization process include an emphasis on the use of a cost-benefit review (see page 3-36 of *Multi-Hazard Mitigation Planning Guidance*) to maximize benefits?
- Does the mitigation strategy emphasize cost-effective and technically feasible mitigation actions?

Source: FEMA, 2008

STAPLEE criteria were used to evaluate the potential benefits of the each participant's listing of mitigation alternatives or actions. The STAPLEE evaluation includes consideration of the social, technical, administrative, political, legal, economic and environmental benefits of the mitigation actions, which are summarized below.

S – Social: Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.
T – Technical: Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative: Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political: Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.
L – Legal: It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economical: Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.
E – Environmental: Sustainable mitigation actions that do not have an adverse effect on the environment, comply with Federal, State, and local environmental regulations, and are consistent with the community's environmental goals provide mitigation benefits while being environmentally sound.

Participants received a worksheet to assist them in scoring the priority of each strategy. Most participants took additional worksheets back to their communities. The key personnel and members

attending the public meetings were asked to take into account all of the STAPLEE criteria and to come up with a cumulative priority ranking that maximizes the benefits of each alternative.

The projects with the greatest benefits and lowest relative costs as determined by the STAPLEE criteria were assigned a high priority, while alternatives with lower benefits and relatively higher costs were assigned a low priority. Other strategies with varying degrees of benefits and costs were assigned a medium priority.

In the future, a more detailed and formal formulation of the costs and benefits of each mitigation strategy could be established to better prioritize the participant action items. A final list of strategies, or actions, was established including information on the associated hazard mitigated and a description of the action, responsible party, priority, cost estimate, potential funding sources and timeline. This information was established through input from participants and assistance from the City of Centralia.

Mitigation Strategy – Identification of Multi-Jurisdictional Mitigation Actions
Identification of Multi-Jurisdictional Mitigation Actions Requirement §201.6(c) (3) (iv): For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.
Element

- Does the plan include at least one identifiable action item for each jurisdiction requesting FEMA approval of the plan?

Source: FEMA, 2008

It is important to note that not all of the mitigation actions identified may ultimately be included in the participant's individual plan due to limited capabilities, prohibitive costs, low benefit / cost ratio, or other concerns. Even though there are cost estimates, priority scores, and responsible agencies identified, participants have not necessarily committed to undertaking any of the activities. This information will serve as a guide for the participants to assist in hazard mitigation for the future.

The following, are specific actions listed by participants of the Lewis County Multi-Jurisdictional Hazard Mitigation Plan intended to be utilized in the implementation of mitigation alternatives. Each action is described by the following:

- Category
- Description/Action Items (Mitigation Strategy) – general summary of the action item.
- Hazard Addressed - which hazard the mitigation action aims to address (flood, earthquake, wind, winter, landslide, etc.).
- Task Completion in 2005 and 2010 Plan
- Mitigation Identification - prevention, property protection, public education and awareness, natural resource protection, structural protection.
- Cost-Benefit and Prioritization – relative cost (high-1, medium-2, low-3), relative effectiveness (low-1, medium-2, high-3), priority rating (low, medium, high).
- Implementation – timeline, potential funding, cost estimate, administrative responsibility.

5.2.2 Mitigation Strategies Matrices

The Mitigation Strategies for the Multi-Jurisdictional Hazard Mitigation Plan has six objectives.

- **Preventive Activities:** These activities, which include planning and zoning, open space preservation, and stormwater management, are meant to keep problems from getting worse.

- **Property Protection:** Action taken by property owners on a building by building basis. Types of activities include relocation and building elevation.
- **Natural Resource Protection**: Efforts to preserve and restore natural areas. Wetland protection and erosion and sediment control are two ways to achieve this objective.
- **Emergency Services:** Measures taken during the crisis to minimize its impact. These measures may include hazard warning, hazard response and critical facilities protection.
- **Structural Projects:** Projects such as levees or reservoirs are meant to keep floodwaters away from and area. Diversion methods and storm sewers are two other examples of structural projects.
- **Public Information Activities:** Actions taken to advise property owners, potential property owners and visitors about the hazards, how to protect themselves and the natural and beneficial functions of local floodplains. This objective can be met outreach projects, real estate disclosures, the local library, maps, technical assistance and environmental education.

5.3 Multi-Jurisdictional Mitigation Actions

In the individual participant sections is the mitigation worksheets that identify each mitigation strategy including: describing how the mitigation strategies (actions) identified will be prioritized, implemented, and administrated by the participant.

The following tables list the updated 2015 Multi-jurisdictional goals, objectives, matched up with the new 2015 mitigation strategies from the County and municipalities. The other participant mitigation strategies can be found in the participant sections.

Goal 1	**Reduce the vulnerability of Lewis County communities to natural disasters**		
Objective	Plan participants will develop, implement and maintain reasonable and cost-effective activities or programs to: 1. Maintain and update hazard and disaster data. 2. Reduce the impact to existing development, infrastructure, and facilities from natural hazards. 3. Reduce repetitive losses. 4. Reduce the vulnerability of new development to natural hazards (e.g., through comprehensive land use planning etc.). 5. Educate citizens as well as private and public sector organizations regarding: • Natural hazards. • Techniques to reduce vulnerability to those hazards. • Resources available to assist in implementing potential hazard mitigation measures. • Public outreach on disaster preparedness 6. Monitor the effectiveness of natural hazard mitigation activities/programs 7. Regularly update activities/programs based on new information and lessons learned.		
Jurisdiction	**Mitigation Strategies**	**Hazard Addressed**	**Mitigation Identification (**Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)
Lewis County	Incorporate early warning procedures in local ERPs	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Create prioritized plans for road/street clearance	Severe winter storm	Prevention
Lewis County	Define evacuation routes for areas of high volcanic probability	Volcano Activity	Prevention, Property Protection, Public Education & Awareness
Lewis County	Continue to enforce the flood damage prevention code.	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Evaluate potential benefits of HMGP Home	Flood	Prevention, Property Protection, Public

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
	Elevation program		Education & Awareness
Lewis County	Update road addressing and incorporate into addressing ordinance	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Explore the feasibility of creating wildfire zones for incorporation into critical areas ordinance	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Incorporate the channel migration zones in the critical areas ordinance. Do necessary studies for mapping other river basins; utilize public process through Planning Commission to incorporate CMZ into critical areas ordinance	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review critical areas ordinance to update flood zones, seismic zones, and landslides	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	High Winds	Prevention, property protection
Lewis County	Keep building codes current as per Washington State requirements	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Conduct annual review of the mitigation strategies	Earthquake, Flood, Volcano	Public Education & Awareness
Lewis County	Improve NOAA radio coverage for East County	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public on what to do before, after, and during an emergency • Use MRC at public events to distribute preparedness information • Increase online preparedness content • Develop social media presence for preparedness information and emergency messaging • Develop scripts for Call Center, staff with MRC • Participate in ad hoc County PIO group	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public about need to create buffer zones between home and timber	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review Annex #2 "Drought" discuss any needed revisions and additions to plan. Finalize plan and train staff appropriately	Drought	Prevention, Property Protection, Public Education & Awareness
Lewis County	Create a Plan for debris removal of solid waste material	Earthquake, flood, volcano	Prevention
Lewis County	Update Emergency Action Plan including testing Code Red, conducting earthquake and fire drills, and educate staff accordingly	Earthquake, flood, volcano	Prevention
Lewis County	Monitor flooding and take action to move equipment in event	Flood, Earthquake, Volcano	Prevention
Lewis County	Develop a plan to keep airport facilities operational – Mt. St. Helens and Mt. Rainer	Volcano	Prevention
Lewis County	Assess airport buildings for seismic and ash fall capabilities	Earthquake/volcanic	Prevention, Property Protection
Lewis County	Create EAP Plan for each building and train employees on use	Earthquake	Prevention
Lewis County	Coordinate warning system for potential break with other stakeholders	Flood	Prevention
Lewis County	Ensure bridges have a high priority for inspection and retrofit	Earthquake, flood, volcano	Prevention
Centralia	Inspect Skookumchuck/Harrison bridge after flood events	Flood	Prevention, Property Protection
Centralia	Raise height of Skookumchuck Dam to increase holding capacity for flood control	Flood	Prevention, Property Protection
Centralia	Perform an engineering review of Skookumchuck dam's seismic stability	Earthquake, flood, volcano	Prevention, Property Protection
Centralia	Improve area-wide alarm system working with all government agencies	All hazards	Prevention, Property Protection, Public Education & Awareness

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events	All hazards	Prevention, Property Protection, Structural project
Centralia	Maintain in the police, wastewater treatment, stormwater, water, and electrical facilities with the most current technology and standards to ensure operations during hazard events	All hazards	Prevention, Property Protection
Centralia	Provide emergency generators or secondary power capabilities for all pump stations	All hazards	Prevention, Property Protection
Centralia	Upgrade the construction at all pump stations with the latest seismic and wind standards	Earthquake, wind	Prevention, Property Protection
Centralia	Implement Centralia/Chehalis/Lewis County flood control projects	Flood	Prevention, Property Protection, Structural projects
Centralia	Consider multiple flood projects throughout the city and county including upstream water storage	Flood	Prevention, Property Protection, structural projects
Centralia	The Floodway, the Special Flood Risk Zone and the 100-year Floodplain shall be regulated to protect human life, property and the public health and safety of the citizens of Centralia; minimize the expenditure of public money; and maintain the city's flood insurance eligibility while avoiding regulations which are unnecessarily restrictive or difficult to administer.	Flood	Prevention, Property Protection
Centralia	Frequently flooded areas; It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in the floodplain and the floodway according to the provisions established under the Floodplain Ordinance.	Flood	Prevention, Property Protection
Centralia	Manage stormwater runoff to improve drainage, control stormwater quantity, prevent localized flooding of streets and private property during high water table and rainy conditions, and protect and enhance water quality through using Stormwater Management Manual for Western Washington, Best Management Practices, and Best Available Science as established by the Department of Ecology.	Flood	Prevention, Property Protection
Centralia	The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	Flood	Prevention, Property Protection
Centralia	Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	Flood	Prevention, Property Protection
Centralia	Restrict development in the 100 year floodplain that potentially increases flood hazard unless it complies Zoning Ordinance, International Building Code and the Critical Areas Ordinance (CAO). The impacts of floodplain shall be addressed by one of the following means: The CAO shall prohibit structural flood control measures for new development that would potentially increase the risk of flooding, considerably alter the course, speed or flow of the waterway, reduce flood storage capacity, or increase flood heights on unprotected property; or CAO or Shoreline Plan shall be established and implemented to retain or restore natural conditions of shorelines associated with frequently flooded areas. Develop a program for operation and maintenance of storm drains, detention systems, ditches and culverts.	Flood	Prevention, Property Protection

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
Centralia	Provide protection of geologically hazards areas which are areas susceptible to the effects of erosion, sliding, earthquake, steep slopes, flooding, wetlands, or other geologic events through the City's adopted Critical Areas Ordinance or Shoreline Plan.	Flood, Landslide, Earthquake	Prevention, Property Protection
Centralia	Centralia will continue to meet the requirements of the state municipal stormwater permit program, called NPDES Phase II. This program includes a number of components such as water quality monitoring, annual stormwater inspections, and public education, all of which the city is already engaged in to some extent.	Flood, Landslide, Earthquake	Prevention, Property Protection
Centralia	Utilize the latest adopted building code to ensure adequate protection in construction as per the building code for earthquakes, severe storms, and other natural disasters	Earthquake, Severe Storm, Fire, Land Movement	Prevention, Property Protection
Centralia	Nonstructural solutions to flood hazards shall be encouraged including restricting development in flood-prone areas, storm water runoff management, up-stream watershed vegetation management.	Flood	Prevention, Property Protection, Natural Resources Protection
Centralia	Ensure that standards for flood control measures protect and enhance the biological systems and public access opportunities of the shoreline and adjacent uplands.	Flood	Prevention, Property Protection, Natural Resources Protection
Centralia	The Building Official will continue to require and maintain elevation certificates for permitted development within the floodplain. Elevation certificates are maintained by address.	Flood	Prevention, Property Protection
Centralia	Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	Earthquake, Severe Storm, Landslide	Prevention, Property Protection
Centralia	Plan the stormwater management system to be consistent with policies regarding flooding, wetlands, and land use and water quality.	Flood	Prevention, Property Protection, Natural Resources Protection
Centralia	Develop an integrated program for quantity and quality control that recognizes the unique situation faced by the City within its location in the 100 year floodplain and its needs for flood control in larger storm events, while at the same time needing to control the effects of smaller storms in terms of both quantity and quality of runoff.	Flood	Prevention, Property Protection
Centralia	Apply best management practices to reduce pollutant loading and minimize the effects of contaminated sediments on the city's waterways. Increase preservation of the open space and drainage corridor through easements, deeding land to city, improve water quality, eliminate failed septic systems, fence out livestock, improve wildlife habitat, do restoration planting projects, increase regulations such as greater setbacks where applicable, implement specialized best management practices to minimize problems in the long run.	Flood	Prevention, Property Protection, Natural Resources Protection
Centralia	Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. Integrate these concepts with natural functions such as drainage, agriculture and topographic features	Flood, Earthquake, Landslide, Fire, Severe Storm	Prevention, Property Protection, Natural Resources Protection

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
Centralia	Encourage residents to sign up for the Lewis County's Code Red System	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Prevention, Property Protection
Centralia	Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	The City shall provide on-going public education about flooding. Outreach efforts shall include but are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	Flood	Prevention, Property Protection
Centralia	The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Prevention, Property Protection
Centralia	Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Expand the Public Information program to address other natural hazards where additional public information will be helpful, such as seismic retrofits for homes and other hazard related topics	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Improve communication and public awareness of natural hazards to residents and businesses before, during and following emergencies	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Continue annual bridge inspections	Flood	Prevention, Property Protection
Centralia	Operate Incident Command Post in time of emergency	All	Prevention, Property Protection
Centralia	Isolate utilities in damaged areas	All	Prevention, Property Protection, Structural projects
Centralia	Continue and enhance annual fire inspections for	All	Prevention, Property Protection

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
	life safety		
Centralia	Require engineered foundation systems and geotechnical reports for buildings in critical areas	Landslide	Prevention, Property Protection
	Maintain map of landslide areas in Community Development office	Landslide	Prevention, property protection
Centralia	Coordinate with Lewis County for growth in critical areas	All	Prevention, Property Protection
Centralia	City light tree maintenance program to trim trees around power lines	Wind, Winter	Prevention, Property Protection
Centralia	Retrofit existing overhead lines to underground as time and budget allows	Wind, Winter Storm	Prevention, Property Protection
Chehalis	Continue contract with Lewis County to provide statutory emergency services.	All	Prevention, Property Protection
Chehalis	Operate incident command post during event	All	Prevention, Property Protection
Chehalis	Continue annual bridge inspections	All	Prevention, Property Protection
Chehalis	Continue update of critical areas ordinance	All	Prevention, Property Protection
Chehalis	Adopt new earthquake hazard maps (when available from DNR)	Earthquake	Prevention, Property Protection
Chehalis	Maintain mapping of critical areas for public information	All	Prevention, Property Protection
Chehalis	Continue using 'Statement of Restrictions' form for notice to public	Flooding	Prevention, Property Protection
Chehalis	Continue requiring engineered foundations in critical slope or vicinity of fault line areas	Earthquake	Prevention, Property Protection
Chehalis	Continue using SEPA authority to mitigate identified hazards	All	Prevention, Property Protection
Chehalis	Continue annual fire inspections of existing business occupancies	All	Prevention, Property Protection
Chehalis	Continue participation in the Community Rating System (CRS) program	Flooding	Prevention, Property Protection
Chehalis	Continue participation in the Chehalis River Basin Flood Authority (the Flood Authority)	Flooding	Prevention, Property Protection
Chehalis	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All (primarily flooding)	Prevention, Property Protection
Chehalis	Continue annual levee inspection/maintenance	Flooding	Prevention, Property Protection
Chehalis	Continue requirements for undergrounding utilities in new subdivisions	All	Prevention, Property Protection
Chehalis	Relocate Fire station (first responders)	All	Prevention, Property Protection
Chehalis	Continue updates to utility plans (water, wastewater and stormwater systems)	All	Prevention, Property Protection
Morton	Continue to enforce the flood ordinance.	Flood	Prevention, Property Protection
Morton	Train Planning Commission, Elected Officials and staff when sessions are available	Flood	Prevention, Property Protection
Morton	Make information available to the public	Flood	Prevention, Property Protection
Morton	Contract with Lewis County for emergency services	All	Prevention, Property Protection
Morton	Upgrade radio communications	All	Prevention, Property Protection
Morton	Operate Incident Command Post in time of emergency	All	Prevention, Property Protection
Morton	Continuing education	All	Prevention, Property Protection
Morton	Continue coordination with Lewis County for managing development in UGAs to address critical areas concerns	All	Prevention, Property Protection
Morton	Maintain map of critical and hazard areas in City Hall	All	Prevention, Property Protection
Morton	Continue to require water & sewer locates for new developments, new construction and other utility pole or underground placement	All	Prevention, Property Protection
Morton	Continue inspection of manholes and storm drain facilities	All	Prevention, Property Protection

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
Morton	Continue routine maintenance & repairs/replacement of backup generators & inspections of water reservoirs	All	Prevention, Property Protection
Morton	Keep ditches clean and infringing trees removed from water and wastewater treatment plants, reservoirs and water intake	All	Prevention, Property Protection
Morton	Routinely do structural assessments of all critical utility facilities	All	Prevention, Property Protection
Morton	Continue using SEPA authority to ensure large projects provide for hazard mitigation	All	Prevention, Property Protection
Morton	Continue following guidelines in Morton's Zoning & Development Regulations	All	Prevention, Property Protection
Morton	WWTP: Assess building for structural integrity to determine strength in withstanding an earthquake, volcanic ash and snow loading on roof	Earthquake, volcanic eruption, winter storms (wind & snow)	Prevention, Property Protection
Morton	WWTP: Inspection to evaluate structural integrity to withstand earthquake, ash and snow loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms	Prevention, Property Protection
Morton	WWTP: Culvert cleanout, storm drain and outfall line inspection as protection from flooding.	Flooding,	Prevention, Property Protection
Morton	WWTP: Replacement of backup generator.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, Property Protection
Morton	Fire Department: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, property protection
Morton	Fire Department: Routine maintenance on backup generator.	All hazards	Prevention, Property Protection
Morton	Fire Department: Dependable Water supply	Earthquake, volcanic activity, rain storms, fire	Prevention, Property Protection
Morton	City Hall/Police Station: Purchase of backup power supply	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, Property Protection
Morton	City Hall/Police Station: Upgrade radio communications, training, office protective measures.	Earthquake, Volcanic Activity, Winter snow, wind & rain storms, fire	Prevention, Property Protection
Morton	City Hall/Police Station: Inspection to evaluate structural integrity to withstand earthquake and snow or ash loading on roof	Earthquake, Volcanic Activity, Winter snow	Prevention, Property Protection
Morton	Water Reservoir: Removal of surrounding trees	Earthquake, Landslide, wind, snow and rain storms	Prevention, Property Protection
Morton	Water Reservoir: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof	Earthquake, Landslide, wind, snow and rain storms	Prevention, Property Protection
Morton	Water System Intake: Install Chemical additive pumps at City's back-up emergency well.	Earthquake, Landslides, Flooding	Prevention, Property Protection
Morton	Water System Intake: Routine maintenance on structure.	Earthquake, Landslide, wind,	Prevention, Property Protection

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
		snow and rain storms	
Morton	Water System Intake: Roads graded and ditches cleaned. Bridge is a more recent concern	Snow and rain storms	Prevention, Property Protection
Mossyrock	Purchase generator and set at site, sandbags for floor control (Lift Station #1)	All	Prevention
Mossyrock	Purchase generator and set at site, sandbags for flood control (Lift Station #2)	All	Prevention
Mossyrock	Assess building for seismic/ash load capabilities (City Hall)	Earthquake, Volcanic	Prevention, Property Protection, Structural Projects
Mossyrock	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Resvr. #1 & #2)	All	Prevention
Mossyrock	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #3)	All	Prevention
Mossyrock	Portable generator to run radio base station. Purchase satellite phone (PD)	All	Prevention
Mossyrock	Grade and sandbags for flood control. Purchase video camera system. (Wastewater Treatment Plant)	Flood	Prevention
Mossyrock	Sandbags for flood control, have gravel at site, purchase generator, alarm system for unauthorized entry. (Well)	Flood	Prevention
Mossyrock	Access existing generator to power lift station. (Lift #1)	All	Prevention
Mossyrock	Access existing generator to power lift station (Lift #2)	All	Prevention
Mossyrock	Elevate above flood level (Lift #2)	Flood	Prevention, Property Protection, Structural Projects
Mossyrock	Have sandbags available during flood event (Lift #2)	Flood	Prevention
Mossyrock	Assess well and determine if a generator can run it. Have sandbags on hand in case of hazard (Wells)	All	Prevention
Napavine	Assess building and infrastructure for structural integrity (Booster Pump Station)	Earthquake	Prevention, property protection
Napavine	Assess building for structural damage (City Hall)	Earthquake	Prevention, property protection
Napavine	Assess structure for integral damage (Rush Road Bridge)	Flooding	Prevention property protection, structural projects
Napavine	Assess buildings and infrastructure for damage (Sewer Pump Stations #1-#5)	Earthquake	Prevention property protection
Napavine	Assess buildings and infrastructure for damage (Water Wells #1-#5)	Earthquake	Prevention property protection
Napavine	Keep equipment and emergency vehicles available for likely occurrences	Earthquake	Prevention property protection
Pe Ell	Town Hall, Sewer Treatment Plant, Water Plant: Develop an earthquake response plan for facility personnel	Earthquake	Prevention, Property protection
Pe Ell	Town Hall, Water Plant: Inspect and evaluate building's ability to withstand volcanic ash fall out.	Volcanic	Prevention, property protection
Pe Ell	Town Hall, Sewer Treatment Plant, Water Plant: Secure contents to prevent injury to occupants	Earthquake	Prevention, Property Protection
Pe Ell	Town Hall: Develop a plan/procedure for flood damage control, including temporary protection of facility	Flood	Prevention, Property Protection
Pe Ell	Town Hall: Educate employees of flood risk for facility and components.	Flood	Prevention, Property Protection
Pe Ell	Sewer Treatment and water treatment plants: Evaluate adequacy of hazardous materials storage locations at facility (STP)	All	Prevention, Property Protection
Pe Ell	Assisted Care Center develop a hazard response plan	All	Prevention, Property Protection
Pe Ell	Flood Mgmt.: Continue to enforce the flood ordinances and building codes to reduce flood	Flood	Prevention, Property Protection

Goal 1	Reduce the vulnerability of Lewis County communities to natural disasters		
	damages		
Toledo	Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Prevention, Property Protection
Toledo	Continue to updates and enforcement of Critical Areas Ordinance	All	Prevention, Property Protection
Toledo	Continue Development Reviews	All	Prevention, Property Protection
Toledo	Continue working with/contracting with Lewis County Emergency Management	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Inspect and evaluate building annually (City Hall)	All	Prevention, Property Protection
Toledo	Backup Generator for emergencies (WWTP)	All	Prevention, Property Protection
Toledo	Coordinate with other agencies (WWTP)	All	Prevention, Property Protection
Toledo	Continue to require and maintain elevation certificates for permitted development within the floodplain	Flood	Prevention, Property Protection, Public Education & Awareness
Toledo	Contract with Lewis County to provide emergency services	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Maintain map of Critical Areas in permit application office	All	Prevention, Property Protection, Public Education, & Awareness, Natural Resource Protection
Toledo	Continue using SEPA authority to ensure large projects provide for Hazard Mitigation	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Remove hazardous dead trees from City Park	Winter/Wind	Prevention, Property Protection, Natural Resource Protection
Toledo	Continue to enforce the SMP and SMP Ordinance	All	Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection
Toledo	Inspect and evaluate building annually (City Hall, WWTP)	All	Prevention, Property Protection
Vader	Continue to enforce the flood ordinance and building codes to reduce flood damages	Flood	Prevention, Prop. Protection, Public Education & Awareness
Vader	Elevate water intake structure	Flood	Prevention, Property Protection
Vader	Develop plan for flood damage control. Train employees in flood plan for facility component protection. Develop post flood clean-up plan	Flood	Prevention, Property Protection, Public Education & Awareness
Vader	Develop a plan for emergency communications among city staff during an event.(updated)	Earthquake, severe wind & winter storms,	Prevention, Property Protection, Public Education & Awareness
Vader	Develop a plan for alternate facility to provide City Hall services	Earthquake, severe wind & winter storms	Prevention
Vader	Develop a plan for regular evaluation of trees and cause pruning or removal (WWTP)	Severe Wind & Winter Storms	Prevention, property protection
Vader	Purchase portable generators for emergency power outages	Earthquake, severe wind & winter storms, volcano	Prevention, property protection
Vader	Evaluate needs to anchor Outfall pipe at WWTP	Flood	Prevention, property protection

Goal 2	Optimize allocation of hazard mitigation resources and sharing of information		
Objective	Plan participants will coordinate local and regional activities/programs as appropriate to cost-effectively reduce disaster vulnerability for Lewis County communities.		
Jurisdiction	**Mitigation Strategies**	**Hazard Addressed**	**Mitigation Identification (**Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)
Lewis County	Incorporate early warning procedures in local ERPs	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Continue to enforce the flood damage prevention	Flooding	Prevention, Property Protection, Public Education

Goal 2	Optimize allocation of hazard mitigation resources and sharing of information		
	code.		& Awareness
Lewis County	Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Explore the feasibility of creating wildfire zones for incorporation into critical areas ordinance	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Incorporate the channel migration zones in the critical areas ordinance. Do necessary studies for mapping other river basins; utilize public process through Planning Commission to incorporate CMZ into critical areas ordinance	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review critical areas ordinance to update flood zones, seismic zones, and landslides	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	High Winds	Prevention, property protection
Lewis County	Keep building codes current as per Washington State requirements	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Conduct annual review of the mitigation strategies	Earthquake, Flood, Volcano	Public Education & Awareness
Lewis County	Educate public on what to do before, after, and during an emergency	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public about need to create buffer zones between home and timber	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review Annex #2 "Drought" discuss any needed revisions and additions to plan. Finalize plan and train staff appropriately	Drought	Prevention, Property Protection, Public Education & Awareness
Lewis County	Update Emergency Action Plan and educate staff	Earthquake, flood, volcano	Prevention
Lewis County	Coordinate warning system for potential break with other stakeholders	Flood	Prevention
Centralia	Inspect Skookumchuck/Harrison bridge after flood events	Flood	Prevention, Property Protection
Centralia	Improve area-wide alarm system working with all government agencies	All hazards	Prevention, Property Protection, Public Education & Awareness
Centralia	Consider multiple flood projects throughout the city and county including upstream water storage	Flood	Prevention, Property Protection, structural projects
Centralia	Centralia will continue to meet the requirements of the state municipal stormwater permit program, called NPDES Phase II. This program includes a number of components such as water quality monitoring, annual stormwater inspections, and public education, all of which the city is already engaged in to some extent.	Flood, Landslide, Earthquake	Prevention, Property Protection
Centralia	Encourage residents to sign up for the Lewis County's Code Red System	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Prevention, Property Protection
Centralia	Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	The City shall provide on-going public education about flooding. Outreach efforts shall include but	Flood	Prevention, Property Protection, Public Education & Awareness

Goal 2	Optimize allocation of hazard mitigation resources and sharing of information		
	are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.		
Centralia	Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	Flood	Prevention, Property Protection
Centralia	The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Prevention, Property Protection
Centralia	Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Expand the Public Information program to address other natural hazards where additional public information will be helpful, such as seismic retrofits for homes and other hazard related topics	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Improve communication and public awareness of natural hazards to residents and businesses before, during and following emergencies	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Require engineered foundation systems and geotechnical reports for buildings in critical areas	Landslide	Prevention, Property Protection
	Maintain map of landslide areas in Community Development office	Landslide	Prevention, property protection
Centralia	Coordinate with Lewis County for growth in critical areas	All	Prevention, Property Protection
Chehalis	Continue update of critical areas ordinance	All	Prevention, Property Protection
Chehalis	Adopt new earthquake hazard maps (when available from DNR)	Earthquake	Prevention, Property Protection
Chehalis	Maintain mapping of critical areas for public information	All	Prevention, Property Protection
Chehalis	Continue requiring engineered foundations in critical slope or vicinity of fault line areas	Earthquake	Prevention, Property Protection
Chehalis	Continue using SEPA authority to mitigate identified hazards	All	Prevention, Property Protection
Chehalis	Continue annual fire inspections of existing business occupancies	All	Prevention, Property Protection
Chehalis	Continue participation in the Community Rating System (CRS) program	Flooding	Prevention, Property Protection
Chehalis	Continue participation in the Chehalis River Basin Flood Authority (the Flood Authority)	Flooding	Prevention, Property Protection
Chehalis	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All (primarily flooding)	Prevention, Property Protection

Goal 2	Optimize allocation of hazard mitigation resources and sharing of information		
Chehalis	Relocate Fire station (first responders)	All	Prevention, Property Protection
Morton	Continue to enforce the flood ordinance.	Flood	Prevention, Property Protection
Morton	Make information available to the public	Flood	Prevention, Property Protection
Morton	Contract with Lewis County for emergency services	All	Prevention, Property Protection
Morton	Continue coordination with Lewis County for managing development in UGAs to address critical areas concerns	All	Prevention, Property Protection
Morton	Maintain map of critical and hazard areas in City Hall	All	Prevention, Property Protection
Morton	Continue using SEPA authority to ensure large projects provide for hazard mitigation	All	Prevention, Property Protection
Morton	Continue following guidelines in Morton's Zoning & Development Regulations	All	Prevention, Property Protection
Pe Ell	Flood Mgmt.: Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Prevention, Property Protection
Toledo	Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Prevention, Property Protection
Toledo	Continue to updates and enforcement of Critical Areas Ordinance	All	Prevention, Property Protection
Toledo	Continue working with/contracting with Lewis County Emergency Management	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Coordinate with other agencies (WWTP)	All	Prevention, Property Protection
Toledo	Continue to require and maintain elevation certificates for permitted development within the floodplain	Flood	Prevention, Property Protection, Public Education & Awareness
Toledo	Maintain map of Critical Areas in permit application office	All	Prevention, Property Protection, Public Education, & Awareness, Natural Resource Protection
Toledo	Continue using SEPA authority to ensure large projects provide for Hazard Mitigation	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Continue to enforce the SMP and SMP Ordinance	All	Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection
Vader	Continue to enforce the flood ordinance and building codes to reduce flood damages	Flood	Prevention, Prop. Protection, Public Education & Awareness
Vader	Elevate water intake structure	Flood	Prevention, Property Protection
Vader	Develop plan for flood damage control. Train employees in flood plan for facility component protection. Develop post flood clean-up plan	Flood	Prevention, Property Protection, Public Education & Awareness
Vader	Develop a plan for emergency communications among city staff during an event.(updated)	Earthquake, severe wind & winter storms,	Prevention, Property Protection, Public Education & Awareness

Goal 3	Ensure the community is capable of initiating and sustaining emergency response operations during and after disasters		
Objective	Plan participants will strive to: 1. Develop and maintain the capability of emergency services organizations to detect emergency situations and promptly initiate emergency response operations. 2. Cost-effectively protect critical public facilities from natural hazard impacts. 3. Ensure that emergency services facilities and their associated utility and communications systems are capable of providing critical services. 4. Ensure access to key health care facilities and designated evacuation routes and shelters remain open and operable before, during, and after disaster events. 5. Retrofit and/or relocate shelters or structures for vehicles and equipment needed for emergency services operation to withstand disaster impacts.		
Jurisdiction	**Mitigation Strategies**	**Hazard Addressed**	**Mitigation Identification (**Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)

Goal 3	Ensure the community is capable of initiating and sustaining emergency response operations during and after disasters		
Lewis County	Incorporate early warning procedures in local ERPs	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Continue to enforce the flood damage prevention code.	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review critical areas ordinance to update flood zones, seismic zones, and landslides	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public on what to do before, after, and during an emergency	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public about need to create buffer zones between home and timber	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review Annex #2 "Drought" discuss any needed revisions and additions to plan. Finalize plan and train staff appropriately	Drought	Prevention, Property Protection, Public Education & Awareness
Lewis County	Coordinate warning system for potential break with other stakeholders	Flood	Prevention
Lewis County	Review adequacy of existing mutual aid agreements	Earthquake, flood, volcano	Prevention
Lewis County	Create prioritized plans for road/street clearance	Severe winter storm	Prevention
Lewis County	Define evacuation routes for areas of high volcanic probability	Volcano Activity	Prevention, Property Protection, Public Education & Awareness
Lewis County	Update road addressing and incorporate into addressing ordinance	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Improve NOAA radio coverage for East County	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Monitor flooding and take action to move equipment in event	Flood, Earthquake, Volcano	Prevention
Lewis County	Ensure bridges have a high priority for inspection and retrofit	Earthquake, flood, volcano	Prevention
Centralia	Inspect Skookumchuck/Harrison bridge after flood events	Flood	Prevention, Property Protection
Centralia	Improve area-wide alarm system working with all government agencies	All hazards	Prevention, Property Protection, Public Education & Awareness
Centralia	Consider multiple flood projects throughout the city and county including upstream water storage	Flood	Prevention, Property Protection, structural projects
Centralia	Encourage residents to sign up for the Lewis County's Code Red System	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Prevention, Property Protection
Centralia	Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	The City shall provide on-going public education about flooding. Outreach efforts shall include but are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.	Flood	Prevention, Property Protection, Public Education & Awareness

Goal 3	Ensure the community is capable of initiating and sustaining emergency response operations during and after disasters		
Centralia	Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Improve communication and public awareness of natural hazards to residents and businesses before, during and following emergencies	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Require engineered foundation systems and geotechnical reports for buildings in critical areas	Landslide	Prevention, Property Protection
Centralia	Raise height of Skookumchuck Dam to increase holding capacity for flood control	Flood	Prevention, Property Protection
Centralia	Perform an engineering review of Skookumchuck dam's seismic stability	Earthquake, flood, volcano	Prevention, Property Protection
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events	All hazards	Prevention, Property Protection, Structural project
Centralia	Maintain in the police, wastewater treatment, stormwater, water, and electrical facilities with the most current technology and standards to ensure operations during hazard events	All hazards	Prevention, Property Protection
Centralia	Provide emergency generators or secondary power capabilities for all pump stations	All hazards	Prevention, Property Protection
Centralia	Upgrade the construction at all pump stations with the latest seismic and wind standards	Earthquake, wind	Prevention, Property Protection
Centralia	Implement Centralia/Chehalis/Lewis County flood control projects	Flood	Prevention, Property Protection, Structural projects
Centralia	Utilize the latest adopted building code to ensure adequate protection in construction as per the building code for earthquakes, severe storms, and other natural disasters	Earthquake, Severe Storm, Fire, Land Movement	Prevention, Property Protection
Centralia	Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	Earthquake, Severe Storm, Landslide	Prevention, Property Protection
Centralia	Continue annual bridge inspections	Flood	Prevention, Property Protection
Centralia	Operate Incident Command Post in time of emergency	All	Prevention, Property Protection
Centralia	City light tree maintenance program to trim trees around power lines	Wind, Winter	Prevention, Property Protection
Centralia	Retrofit existing overhead lines to underground as time and budget allows	Wind, Winter Storm	Prevention, Property Protection
Chehalis	Continue update of critical areas ordinance	All	Prevention, Property Protection
Chehalis	Continue participation in the Community Rating System (CRS) program	Flooding	Prevention, Property Protection
Chehalis	Continue participation in the Chehalis River Basin Flood Authority (the Flood Authority)	Flooding	Prevention, Property Protection
Chehalis	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All (primarily flooding)	Prevention, Property Protection
Chehalis	Relocate Fire station (first responders)	All	Prevention, Property Protection
Chehalis	Continue contract with Lewis County to provide statutory emergency services.	All	Prevention, Property Protection
Chehalis	Operate incident command post during event	All	Prevention, Property Protection
Chehalis	Continue annual bridge inspections	All	Prevention, Property Protection
Chehalis	Continue annual levee inspection/maintenance	Flooding	Prevention, Property Protection
Chehalis	Continue requirements for undergrounding utilities in new subdivisions	All	Prevention, Property Protection
Morton	Contract with Lewis County for emergency services	All	Prevention, Property Protection
Morton	Upgrade radio communications	All	Prevention, Property Protection

Goal 3	Ensure the community is capable of initiating and sustaining emergency response operations during and after disasters		
Morton	Operate Incident Command Post in time of emergency	All	Prevention, Property Protection
Morton	Continue routine maintenance & repairs/replacement of backup generators & inspections of water reservoirs	All	Prevention, Property Protection
Morton	WWTP: Assess building for structural integrity to determine strength in withstanding an earthquake, volcanic ash and snow loading on roof	Earthquake, volcanic eruption, winter storms (wind & snow)	Prevention, Property Protection
Morton	WWTP: Inspection to evaluate structural integrity to withstand earthquake, ash and snow loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms	Prevention, Property Protection
Morton	Fire Department: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, property protection
Morton	Water System Intake: Install Chemical additive pumps at City's back-up emergency well.	Earthquake, Landslides, Flooding	Prevention, Property Protection
Mossyrock	Purchase generator and set at site, sandbags for floor control (Lift Station #1)	All	Prevention, Property Protection
Mossyrock	Purchase generator and set at site, sandbags for flood control (Lift Station #2)	All	Prevention, Property Protection
Mossyrock	Assess building for seismic/ash load capabilities (City Hall)	Earthquake, Volcanic	Prevention, Property Protection
Mossyrock	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Resvr. #1 & #2)	All	Prevention, Property Protection
Mossyrock	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #3)	All	Prevention, Property Protection
Mossyrock	Portable generator to run radio base station. Purchase satellite phone (PD)	All	Prevention, Property Protection
Mossyrock	Grave and sandbags for flood control. Purchase video camera system. (Wastewater Treatment Plant)	Flood	Prevention, Property Protection
Mossyrock	Sandbags for flood control, have gravel at site, purchase generator, alarm system for unauthorized entry. (Well)	Flood	Prevention, Property Protection
Mossyrock	Assess existing generator to power lift station. (Lift #1)	All	Prevention, Property Protection
Mossyrock	Assess existing generator to power lift station (Lift #2)	All	Prevention, Property Protection
Mossyrock	Elevate above flood level (Lift #2)	Flood	Prevention, Property Protection, Structural Projects
Mossyrock	Have sandbags available during flood event (Lift #2)	Flood	Prevention, Property Protection
Mossyrock	Assess well and determine if a generator can run it. Have sandbags on hand in case of hazard (Wells)	All	Prevention, Property Protection
Napavine	Assess building and infrastructure for structural integrity (Booster Pump Station)	Earthquake	Prevention, property protection
Napavine	Assess building for structural damage (City Hall)	Earthquake	Prevention, property protection
Napavine	Assess structure for integral damage (Rush Road Bridge)	Flooding	Prevention property protection, structural projects
Napavine	Assess buildings and infrastructure for damage	Earthquake	Prevention property protection

Goal 3	Ensure the community is capable of initiating and sustaining emergency response operations during and after disasters		
	(Sewer Pump Stations #1-#5)		
Napavine	Assess buildings and infrastructure for damage (Water Wells #1-#5)	Earthquake	Prevention property protection
Napavine	Keep equipment and emergency vehicles available for likely occurrences	Earthquake	Prevention property protection
Napavine	Assess building and infrastructure for structural integrity	Earthquake	Prevention property protection
Pe Ell	Flood Mgmt.: Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Prevention, Property Protection
Toledo	Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Prevention, Property Protection
Toledo	Continue to updates and enforcement of Critical Areas Ordinance	All	Prevention, Property Protection
Toledo	Continue working with/contracting with Lewis County Emergency Management	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Backup Generator for emergencies (WWTP)	All	Prevention, Property Protection
Vader	Develop plan for flood damage control. Train employees in flood plan for facility component protection. Develop post flood clean-up plan	Flood	Prevention, Property Protection, Public Education & Awareness
	Maintain map of landslide areas in Community Development office	Landslide	Prevention, property protection

Goal 4	Maintain continuity of public services during and after disasters		
Objective	Plan participants will strive to: 1. Prepare and maintain plans to guide decision-making, resource allocation, and re- establishment of operations before, during, and after a disaster. 2. Protect important records, documents, and information systems from the impacts of disasters. 3. Reduce the disaster vulnerability of buildings and facilities used for routine operations.		
Jurisdiction	**Mitigation Strategies**	**Hazard Addressed**	**Mitigation Identification (**Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)
Lewis County	Continue to enforce the flood damage prevention code.	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public on what to do before, after, and during an emergency	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public about need to create buffer zones between home and timber	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Coordinate warning system for potential break with other stakeholders	Flood	Prevention
Lewis County	Review adequacy of existing mutual aid agreements	Earthquake, flood, volcano	Prevention
Lewis County	Create prioritized plans for road/street clearance	Severe winter storm	Prevention
Lewis County	Define evacuation routes for areas of high volcanic probability	Volcano Activity	Prevention, Property Protection, Public Education & Awareness
Lewis County	Monitor flooding and take action to move equipment in event	Flood, Earthquake, Volcano	Prevention
Lewis County	Ensure bridges have a high priority for inspection and retrofit	Earthquake, flood, volcano	Prevention
Lewis County	Update Emergency Action Plan and educate staff	Earthquake, flood, volcano	Prevention
Lewis County	Retrofit new development overhead lines to underground as practicable and where time/budge allows	Severe Winter Storms	Structural Projects

Goal 4	Maintain continuity of public services during and after disasters		
Lewis County	Create plan for debris removal of solid waste material	Earthquake, flood, volcano	Prevention
Lewis County	Maintenance staff monitor for any damage to facility	Earthquake, volcano	Prevention
Centralia	Inspect Skookumchuck/Harrison bridge after flood events	Flood	Prevention, Property Protection
Centralia	Improve area-wide alarm system working with all government agencies	All hazards	Prevention, Property Protection, Public Education & Awareness
Centralia	Consider multiple flood projects throughout the city and county including upstream water storage	Flood	Prevention, Property Protection, structural projects
Centralia	Encourage residents to sign up for the Lewis County's Code Red System	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Prevention, Property Protection
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events	All hazards	Prevention, Property Protection, Structural project
Centralia	Maintain in the police, wastewater treatment, stormwater, water, and electrical facilities with the most current technology and standards to ensure operations during hazard events	All hazards	Prevention, Property Protection
Centralia	Provide emergency generators or secondary power capabilities for all pump stations	All hazards	Prevention, Property Protection
Centralia	Upgrade the construction at all pump stations with the latest seismic and wind standards	Earthquake, wind	Prevention, Property Protection
Centralia	Implement Centralia/Chehalis/Lewis County flood control projects	Flood	Prevention, Property Protection, Structural projects
Centralia	Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	Earthquake, Severe Storm, Landslide	Prevention, Property Protection
Centralia	Continue annual bridge inspections	Flood	Prevention, Property Protection
Centralia	Operate Incident Command Post in time of emergency	All	Prevention, Property Protection
Centralia	City light tree maintenance program to trim trees around power lines	Wind, Winter	Prevention, Property Protection
Centralia	Retrofit existing overhead lines to underground as time and budget allows	Wind, Winter Storm	Prevention, Property Protection
Centralia	The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	Flood	Prevention, Property Protection
Centralia	The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Prevention, Property Protection
Chehalis	Continue update of critical areas ordinance	All	Prevention, Property Protection
Chehalis	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All (primarily flooding)	Prevention, Property Protection
Chehalis	Relocate Fire station (first responders)	All	Prevention, Property Protection

Goal 4	Maintain continuity of public services during and after disasters		
Chehalis	Continue contract with Lewis County to provide statutory emergency services.	All	Prevention, Property Protection
Chehalis	Operate incident command post during event	All	Prevention, Property Protection
Chehalis	Continue annual bridge inspections	All	Prevention, Property Protection
Chehalis	Continue annual levee inspection/maintenance	Flooding	Prevention, Property Protection
Morton	Contract with Lewis County for emergency services	All	Prevention, Property Protection
Morton	Upgrade radio communications	All	Prevention, Property Protection
Morton	Operate Incident Command Post in time of emergency	All	Prevention, Property Protection
Morton	Continue routine maintenance & repairs/replacement of backup generators & inspections of water reservoirs	All	Prevention, Property Protection
Morton	WWTP: Assess building for structural integrity to determine strength in withstanding an earthquake, volcanic ash and snow loading on roof	Earthquake, volcanic eruption, winter storms (wind & snow)	Prevention, Property Protection
Morton	WWTP: Inspection to evaluate structural integrity to withstand earthquake, ash and snow loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms	Prevention, Property Protection
Morton	Fire Department: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, property protection
Morton	Water System Intake: Install Chemical additive pumps at City's back-up emergency well.	Earthquake, Landslides, Flooding	Prevention, Property Protection
Morton	Keep ditches clean and infringing trees removed from water and wastewater treatment plants, reservoirs and water intake	All	Prevention, Property Protection
Morton	Routinely do structural assessments of all critical utility facilities	All	Prevention, Property Protection
Morton	WWTP: Replacement of backup generator.	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, Property Protection
Morton	Fire Department: Routine maintenance on backup generator.	All hazards	Prevention, Property Protection
Morton	City Hall/Police Station: Purchase of backup power supply	Earthquake, flooding, volcanic activity, winter snow and wind storms, fire	Prevention, Property Protection
Morton	City Hall/Police Station: Inspection to evaluate structural integrity to withstand earthquake and snow or ash loading on roof	Earthquake, Volcanic Activity, Winter snow	Prevention, Property Protection
Mossyrock	Assess building for seismic/ash load capabilities (City Hall)	Earthquake, Volcanic	Prevention
Mossyrock	Portable generator to run radio base station. Purchase satellite phone (PD)	All	Prevention
Pe Ell	Town Hall, Sewer Treatment Plant, Water Plant: Develop an earthquake response plan for facility personnel	Earthquake	Prevention, Property protection

Goal 4	Maintain continuity of public services during and after disasters		
Pe Ell	Town Hall, Water Plant: Inspect and evaluate building's ability to withstand volcanic ash fall out.	Volcanic	Prevention, property protection
Pe Ell	Town Hall: Develop a plan/procedure for flood damage control, including temporary protection of facility	Flood	Prevention, Property Protection
Pe Ell	Town Hall: Educate employees of flood risk for facility and components.	Flood	Prevention, Property Protection
Toledo	Continue working with/contracting with Lewis County Emergency Management	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Backup Generator for emergencies (WWTP)	All	Prevention, Property Protection
Vader	Elevate water intake structure	Flood	Prevention, Property Protection
Vader	Develop a plan for emergency communications among city staff during an event.(updated)	Earthquake, severe wind & winter storms,	Prevention, Property Protection, Public Education & Awareness
Vader	Develop a plan for alternate facility to provide City Hall services	Earthquake, severe wind & winter storms	Prevention
Vader	Develop a plan for regular evaluation of trees and cause pruning or removal (WWTP)	Severe Wind & Winter Storms	Prevention, property protection
Vader	Purchase portable generators for emergency power outages	Earthquake, severe wind & winter storms, volcano	Prevention, property protection
Vader	Evaluate needs to anchor Outfall pipe at WWTP	Flood	Prevention, property protection

Goal 5	Maximize available resources for hazard mitigation activities and disaster recovery		
Objective	Plan participants will: 1. Comply with state and federal requirements to ensure continued eligibility of participating jurisdictions for federal pre-disaster and disaster-relief funding. 2. Work co-operatively to identify and pursue hazard mitigation grant and funding opportunities. 3. Share and disseminate information regarding hazard mitigation grant and funding opportunities with public agencies, not-for-profit organizations, businesses and industry. 4. Participants will develop community “neighborhood” preparedness plans.		
Jurisdiction	**Mitigation Strategies**	**Hazard Addressed**	**Mitigation Identification (**Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)
Lewis County	Continue to enforce the flood damage prevention code.	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public on what to do before, after, and during an emergency	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Educate public about need to create buffer zones between home and timber	Fire	Prevention, Property Protection, Public Education & Awareness
Lewis County	Coordinate warning system for potential break with other stakeholders	Flood	Prevention
Lewis County	Retrofit new development overhead lines to underground as practicable and where time/budge allows	Severe Winter Storms	Structural Projects
Lewis County	Create plan for debris removal of solid waste material	Earthquake, flood, volcano	Prevention
Lewis County	Continue participation and implementation of project recommended by the Chehalis River Basin Flood Authority	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Review Annex #2 "Drought" discuss any needed revisions and additions to plan. Finalize plan and train staff appropriately	Drought	Prevention, Property Protection, Public Education & Awareness
Lewis County	Improve NOAA radio coverage for East County	Earthquake, Flood, Volcano	Prevention, Property Protection, Public Education & Awareness

Goal 5	Maximize available resources for hazard mitigation activities and disaster recovery		
Lewis County	Keep building codes current as per Washington State requirements	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Conduct annual review of the mitigation strategies	Earthquake, Flood, Volcano	Public Education & Awareness
Lewis County	Evaluate potential benefits of HMGP Home Elevation program	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Inspect Skookumchuck/Harrison bridge after flood events	Flood	Prevention, Property Protection
Centralia	Improve area-wide alarm system working with all government agencies	All hazards	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Upgrade all city owned critical facilities to ensure continued operations during hazard events.	All	Prevention, Property Protection
Centralia	The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	Flood	Prevention, Property Protection
Centralia	Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	Flood	Prevention, Property Protection
Chehalis	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation, home buyout, and other similar type mitigation projects.	All (primarily flooding)	Prevention, Property Protection
Chehalis	Relocate Fire station (first responders)	All	Prevention, Property Protection
Chehalis	Continue annual levee inspection/maintenance	Flooding	Prevention, Property Protection
Chehalis	Continue updates to utility plans (water, wastewater and stormwater systems)	All	Prevention, Property Protection
Morton	Contract with Lewis County for emergency services	All	Prevention, Property Protection
Morton	Continue to enforce the flood ordinance.	Flood	Prevention, Property Protection
Pe Ell	Flood Mgmt.: Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Prevention, Property Protection
Toledo	Continue working with/contracting with Lewis County Emergency Management	All	Prevention, Property Protection, Public Education & Awareness
Toledo	Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Prevention, Property Protection
Toledo	Continue to updates and enforcement of Critical Areas Ordinance	All	Prevention, Property Protection
Toledo	Continue to require and maintain elevation certificates for permitted development within the floodplain	Flood	Prevention, Property Protection, Public Education & Awareness
Vader	Continue to enforce the flood ordinance and building codes to reduce flood damages	Flood	Prevention, Prop. Protection, Public Education & Awareness

5.4 Identification and Analysis of Mitigation Actions: NFIP Compliance

The National Flood Insurance Program (NFIP) was established in 1968 to reduce flood losses and disaster relief costs by guiding future development away from flood hazard areas where practicable; by requiring flood resistant design and construction practices; and by transferring the costs of flood losses to the residents of floodplains through flood insurance premiums.

Implementation of National Flood Insurance Program (NFIP) Requirement §201.6(c) (4) (iii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

In return for availability of federally backed flood insurance, communities applying to join the NFIP must agree to adopt and enforce minimum flood loss reduction standards to regulate proposed development in special flood hazard areas as defined by the Federal Emergency Management Agency's (FEMA) flood maps. One of the strengths of the program has been keeping people away from flooding rather than keeping the flooding away from people - through historically expensive flood control projects.

The Community Rating System (CRS) is a program of the NFIP. It was created as an incentive mechanism aimed at recognizing and encouraging exemplary community floodplain management that exceeds minimum NFIP standards. Flood insurance premium rates are adjusted to reflect reduced risk resulting from community activities that meet the three goals of the CRS: reducing flood losses; facilitating accurate insurance rating; and promoting the awareness of flood insurance.

The NFIP has been successful in requiring new buildings to be protected from damage by the 100-year flood. The CRS provides an incentive for communities to do more than regulate construction of new buildings to the minimum national standards. Under the CRS, flood insurance premium rates are adjusted to reflect community activities designed to reduce flood damage to existing buildings, to manage development in areas not mapped by the NFIP, to protect new buildings beyond minimum NFIP protection level, to help insurance agents obtain flood data, and to help people obtain flood insurance. Currently, policyholders in CRS participating communities can receive discounts from their policy premiums ranging from 5 percent to 45 percent.

Each jurisdiction's participation in NFIP is listed in Section 4.2.6 Flooding and a discussion on the repetitive loss program of the County and the cities of Centralia and Chehalis. This Lewis County Multi-Jurisdictional Hazard Mitigation Plan recommends and encourages each participant community to remain in good standing with this program and continue to be involved as a participant with NFIP. Compliance with the NFIP should remain a top priority for each participating community.

Goals, Objectives, and Mitigation Strategies Supporting the National Flood Insurance Program (NFIP)	
Goal 1	**Reduce the vulnerability of Lewis County communities to natural disasters**
Objective	Plan participants will develop, implement and maintain reasonable and cost-effective activities or programs to: 1. Maintain and update hazard and disaster data. 2. Reduce the impact to existing development, infrastructure, and facilities from natural hazards. 3. Reduce repetitive losses. 4. Reduce the vulnerability of new development to natural hazards (e.g., through comprehensive land use planning etc.). 5. Educate citizens as well as private and public sector organizations regarding: • Natural hazards.

Goals, Objectives, and Mitigation Strategies Supporting the National Flood Insurance Program (NFIP)			
Goal 1	**Reduce the vulnerability of Lewis County communities to natural disasters**		
	• Techniques to reduce vulnerability to those hazards. • Resources available to assist in implementing potential hazard mitigation measures. • Public outreach on disaster preparedness 6. Monitor the effectiveness of natural hazard mitigation activities/programs 7. Regularly update activities/programs based on new information and lessons learned.		
Goal 2	**Optimize allocation of hazard mitigation resources and sharing of information**		
Objective	Plan participants will coordinate local and regional activities/programs as appropriate to cost-effectively reduce disaster vulnerability for Lewis County communities.		
Goal 4	**Maintain continuity of public services during and after disasters**		
Objective	Plan participants will strive to: 1. Prepare and maintain plans to guide decision-making, resource allocation, and re- establishment of operations before, during, and after a disaster. 2. Protect important records, documents, and information systems from the impacts of disasters. 3. Reduce the disaster vulnerability of buildings and facilities used for routine operations.		
Goal 5	**Maximize available resources for hazard mitigation activities and disaster recovery**		
Objective	Plan participants will: 1. Comply with state and federal requirements to ensure continued eligibility of participating jurisdictions for federal pre-disaster and disaster-relief funding. 2. Work co-operatively to identify and pursue hazard mitigation grant and funding opportunities. 3. Share and disseminate information regarding hazard mitigation grant and funding opportunities with public agencies, not-for-profit organizations, businesses and industry. 4. Participants will develop community "neighborhood" preparedness plans.		
Jurisdiction	**Mitigation Strategies**	**Hazard Addressed**	**Mitigation Identification (**Prevention, Property Protection, Public Education & Awareness, Natural Resource Protection, Structural Projects)
Lewis County	Continue to enforce the flood damage prevention code.	Flooding	Prevention, Property Protection, Public Education & Awareness
Lewis County	Keep building codes current as per Washington State requirements	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Lewis County	Conduct annual review of the mitigation strategies	Earthquake, Flood, Volcano	Public Education & Awareness
Lewis County	Evaluate potential benefits of HMGP Home Elevation program	Flood	Prevention, Property Protection, Public Education & Awareness
Lewis County	Monitor flooding and take action to move equipment in event	Flood, Earthquake, Volcano	Prevention
Lewis County	Review critical areas ordinance to update flood zones, seismic zones, and landslides	Earthquake, flood, volcano	Prevention, Property Protection, Public Education & Awareness
Centralia	The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	Flood	Prevention, Property Protection
Centralia	Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	Flood	Prevention, Property Protection
Centralia	Consider multiple flood projects throughout the city and county including upstream water storage	Flood	Prevention, Property Protection, structural projects
Centralia	The Community Development Department and Building Official will	Flood	Prevention, Property Protection

Goals, Objectives, and Mitigation Strategies Supporting the National Flood Insurance Program (NFIP)			
Goal 1	**Reduce the vulnerability of Lewis County communities to natural disasters**		
	continue to make flood map determinations in response to public inquiry.		
Centralia	The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Prevention, Property Protection
Centralia	Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	The City shall provide on-going public education about flooding. Outreach efforts shall include but are not limited to: newsletter, special targeted mailings to realtors, insurance agents and lenders, training sessions at neighborhood meetings, the public library, and any other means identified.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	Provide on-going public education aimed at residents, businesses, and industries about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	All	Prevention, Property Protection, Public Education & Awareness
Centralia	Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Flood	Prevention, Property Protection, Public Education & Awareness
Centralia	The Floodway, the Special Flood Risk Zone and the 100-year Floodplain shall be regulated to protect human life, property and the public health and safety of the citizens of Centralia;	Flood	Prevention, Property Protection

Goals, Objectives, and Mitigation Strategies Supporting the National Flood Insurance Program (NFIP)			
Goal 1	**Reduce the vulnerability of Lewis County communities to natural disasters**		
	minimize the expenditure of public money; and maintain the city's flood insurance eligibility while avoiding regulations which are unnecessarily restrictive or difficult to administer.		
Centralia	Frequently flooded areas; It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in the floodplain and the floodway according to the provisions established under the Floodplain Ordinance.	Flood	Prevention, Property Protection
Centralia	Manage stormwater runoff to improve drainage, control stormwater quantity, prevent localized flooding of streets and private property during high water table and rainy conditions, and protect and enhance water quality through using Stormwater Management Manual for Western Washington, Best Management Practices, and Best Available Science as established by the Department of Ecology.	Flood	Prevention, Property Protection
Centralia	Restrict development in the 100 year floodplain that potentially increases flood hazard unless it complies Zoning Ordinance, International Building Code and the Critical Areas Ordinance (CAO). The impacts of floodplain shall be addressed by one of the following means: The CAO shall prohibit structural flood control measures for new development that would potentially increase the risk of flooding, considerably alter the course, speed or flow of the waterway, reduce flood storage capacity, or increase flood heights on unprotected property; or CAO or Shoreline Plan shall be established and implemented to retain or restore natural conditions of shorelines associated with frequently flooded areas. Develop a program for operation and maintenance of storm drains, detention systems, ditches and culverts.	Flood	Prevention, Property Protection
Centralia	Ensure that standards for flood control measures protect and enhance the biological systems and public access opportunities of the shoreline and adjacent uplands.	Flood	Prevention, Property Protection, Natural Resources Protection
Centralia	The Building Official will continue to require and maintain elevation certificates for permitted development within the floodplain. Elevation certificates are maintained by address.	Flood	Prevention, Property Protection
Chehalis	Continue applications for Hazard Mitigation Grant funding when available for vent retrofitting, home elevation,	All (primarily flooding)	Prevention, Property Protection

Goals, Objectives, and Mitigation Strategies Supporting the National Flood Insurance Program (NFIP)			
Goal 1	**Reduce the vulnerability of Lewis County communities to natural disasters**		
	home buyout, and other similar type mitigation projects.		
Chehalis	Continue participation in the Community Rating System (CRS) program	Flooding	Prevention, Property Protection
Morton	Continue to enforce the flood ordinance.	Flood	Prevention, Property Protection
Pe Ell	Flood Mgmt.: Continue to enforce the flood ordinances and building codes to reduce flood damages	Flood	Prevention, Property Protection
Toledo	Continue to enforce the flood ordinance which is based on NFIP Model	Flood	Prevention, Property Protection
Toledo	Continue to require and maintain elevation certificates for permitted development within the floodplain	Flood	Prevention, Property Protection, Public Education & Awareness
Vader	Continue to enforce the flood ordinance and building codes to reduce flood damages	Flood	Prevention, Property Protection, Public Education & Awareness

5.5 Implementation of Previous Mitigation Actions

Previous Mitigation Alternatives

Participants were asked to list any past mitigation activities. The following table displays a summary of all 2010 mitigation actions for the planning area that were completed.

2010 Plan Mitigation Alternatives Table

Hazard Addressed: 1. Avalanche, 2. Dam Failure, 3. Debris Flow, 4. Drought, 5. Earthquake, 6. Expansive Soils, 7. Extreme Heat, 8. Flooding, 9. Hailstorm, 10. Hurricane, 11. Land Subsidence, 12. Landslide, 13. Levee Failure, 14. Severe Thunder Storm, 15. Severe Wind Storm, 16. Severe Winter Storm, 17. Tornado, 18. Volcano, 19. Wildfire

Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
Lewis County	Incorporate early warning procedures in local ERPs	5,8,18	Yes	X			Yes	
Lewis County	Create prioritized plans for road/street clearance	16	Yes	X			Yes	
Lewis County	Review adequacy of existing mutual aid agreements	5,8,18	Yes	X			Yes	Reviewed and ratified every 5-yrs
Lewis County	Define evacuation routes for areas of high volcanic probability	18	Yes	X			No	
Lewis County	Create a plan to guide equipping County vehicles to function during volcanic ash fall	18	Yes	X				Revised by Planning Team
Lewis County	Update Lewis County Code to include recommendations of the Comprehensive Flood Control Hazard Plan	8	Yes	X	X			
Lewis County	Updating comprehensive flood control hazard plan; including CMZs and continue to encourage other jurisdictions to join in plan development	8	Yes	X	X			
Lewis County	Evaluate potential benefits of HMGP Home Elevation program	8	Yes	X			Yes	Financial
Lewis County	Include a compensatory storage element (storage in floodplain) and ensure consistency with County floodplain ordinances	8	Yes	X			Yes	
Lewis County	Update road addressing of private roads off public roads and incorporate into road ordinance by soliciting public involvement	19	Yes	X			No	Revised by Planning Team
Lewis County	Lewis County PUD tree maintenance program trims trees around power lines	16	Yes			X		Transferred to Lewis County PUD M.S.
Lewis County	Retrofit existing overhead lines to underground as practicable and where time/budge allows	16	Yes	X				Revised by Planning Team
Lewis County	Explore the feasibility of creating wildfire zones for incorporation into critical areas ordinance	19	Yes	X				
Lewis County	Incorporate the channel migration zones in the critical areas ordinance. Do necessary studies for mapping other river basins; utilize public process through planning commission to incorporate CMZ into critical areas ordinance	8	Yes	X				Revised by Planning Team and CAO update 2017
Lewis County	Review critical areas ordinance to update flood zones, seismic zones, and landslides	5,8,18	Yes	X			X	CAO update 2017
Lewis County	Evaluate feasibility of creating high wind zones for incorporation into critical areas ordinance	15	Yes			X		Dropped by Planning Team
Lewis County	Ensure wind ratings in building code are adequate and consistent	15	Yes			X		Dropped by Planning Team
Lewis County	Explore feasibility of considering volcanic evacuation in determining building occupancy limits	18	Yes			X		Dropped by Planning Team
Lewis County	Continue to maintain concurrency with all building, plumbing, electrical and other codes that reduce vulnerability of new structures to natural hazards	5,8,18	Yes				X	IBC. Revised by the Planning Team
Lewis	Maintain/update HMP Mitigation 20/20 database	5,8,18	Yes			X		Dropped by

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
County								Planning Team
Lewis County	Coordinate annual participation of Opt-ins in HMP review/update	5,8,18	Yes	X			X	Revised by Planning Team
Lewis County	Improve NOAA radio coverage for East County	5,8,18	Yes	X		X		Financial
Lewis County	Apply for Hazard Mitigation grants to purchase and distribute NOAA radios with EAS to public. See Neighborhood Mitigation Strategies for "Priority" neighborhoods	5,8,18	Yes			X	X	Completed
Lewis County	Lobby Federal Government to fully implement EAS technology in consumer electronics	5,8,18	Yes			X		
Lewis County	Educate public on what to do before, after, and during an emergency	5,8,18	Yes	X				Revised/reworded by Public Health & Social Services
Lewis County	Educate public about need to create buffer zones between home and timber	19	Yes	X		X		
Lewis County	Develop system to monitor amount of settlement	6	Yes	X				Revised by Planning Team
Lewis County	Update EAP plan for dumping of damaged materials	5,8,18	Yes	X				Reworded in 2015 Plan
Lewis County	Update Emergency Action Plan and educate staff	5,8,18	Yes	X				Reworded in2015 Plan
Lewis County	Update agreements with other agencies to hold prisoners in the event of damage to local facility	5,18	Yes	X			X	Reviewed and ratified every 5-years.
Lewis County	Monitor flooding and take action to move equipment in event	5,8,18	Yes	X				
Lewis County	Create EAP plan for building and train employees on use	5,18	Yes			X		Reworded to 2015 Plan
Lewis County	Maintenance staff monitor for any damage to facility	5,18	Yes	X			X	Part of annual CIP
Lewis County	Create EAP plan for building and train employees on use	5,18	Yes		X			Revised for clarity
Lewis County	Maintenance staff monitor for any damage to facility	5,18	Yes		X			Revised for clarity
Lewis County	Develop a plan to keep facility operations – Mt. St. Helens	18	Yes		X			Revised for clarity
Lewis County	Develop a plan to keep facility operations – Mt. St. Rainier	18	Yes		X			Revised for clarity
Lewis County	Create EAP Plan for building and train employees on use	5	Yes		X			Revised for clarity
Lewis County	Maintenance staff monitor for any damage to facility	5	Yes					Part of annual CIP
Lewis County	Create EAP Plan for building and train employees on use	5	Yes		X			Revised for clarity
Lewis County	Maintenance staff monitor for any damage to facility	5	Yes		X			Revised for clarity
Lewis County	Create EAP Plan for building and train employees on use	5	Yes		X			Revised for clarity
Lewis County	Maintenance staff monitor for any damage to facility	5	Yes	X				Part of annual CIP
Lewis County	Coordinate warning system for potential break with other stakeholders	8	Yes	X				On-going
Lewis County	Ensure bridges associated to the neighborhood has a high priority for inspection and retrofit	5,8,18	Yes	X			X	Part of annual CIP
Centralia	The Floodway, the Special Flood Risk Zone and the 100-year Floodplain shall be regulated to protect human life, property and the public health and safety of the citizens of Centralia; minimize the expenditure of public money; and	8	Yes	X			X	

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	maintain the city's flood insurance eligibility while avoiding regulations which are unnecessarily restrictive or difficult to administer.							
Centralia	Frequently flooded areas; It is the purpose of this section to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in the floodplain and the floodway according to the provisions established under the City's Floodplain Management Ordinance.	8	Yes	X			X	
Centralia	Manage stormwater runoff to improve drainage, control stormwater quantity, prevent localized flooding of streets and private property during high water table and rainy conditions, and protect and enhance water quality through using Stormwater Management Manual for Western Washington, Best Management Practices, and Best Available Science as established by the Department of Ecology.	8	Yes	X			X	
Centralia	The City shall participate in the Community Rating System to obtain the maximum possible reduction in Flood Insurance Rates from the Federal Emergency Management Agency (FEMA).	8	Yes	X			X	
Centralia	Consider other regulations and programs associated with flood hazard management. Where there is a conflict, the more stringent in terms of long-term management of the ecological resource and natural geohydrological systems shall take precedence.	8	Yes	X				
Centralia	Restrict development in the 100 year floodplain that potentially increases flood hazard unless it complies with the Comprehensive Flood Management and Natural Hazard Mitigation Plan, Zoning Ordinance, International Building Code and the Critical Areas Ordinance (CAO). The impacts of floodplain shall be addressed by one of the following means: - The CAO or the Floodplain Management Ordinance shall prohibit structural flood control measures for new development that would potentially increase the risk of flooding, considerably alter the course, speed or flow of the waterway, reduce flood storage capacity, or increase flood heights on unprotected property; or - The CAO or the Floodplain Management Ordinance shall set standards for flood control measures for new development based on recommendations from the Comprehensive Flood Management and Natural Hazard Mitigation Plan. - CAO or the Floodplain Management Ordinance policies and regulations shall be established and implemented to retain or restore natural conditions of shorelines associated with frequently flooded areas. - Make investigations and corrective actions of problem storm drains, including sampling. - Develop a program for operation and maintenance of storm drains, detention systems, ditches and culverts.	8	Yes	X				
Centralia	Utilize Best Available Science (BAS) to develop the Critical Areas Ordinance, the provisions of this title shall be liberally construed to accomplish its remedial purposes, which are: Protect, to the greatest extent practical, life, property and the environment from loss, injury and damage by	5,8,12	Yes			X		Part of CAO,

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	pollution, erosion, flooding, landslides, strong ground motion, soil liquefaction, accelerated soil creep, settlement and subsidence, and other potential hazards, whether from natural cause or from human activity; - Protect the public interest in drainage and related functions of drainage basins, watercourses and shoreline areas; - Protect surface waters and receiving waters from pollution, mechanical damage, excessive flows and other conditions in their drainage basins which will increase the rate of down cutting, streambank erosion, and/or the degree of turbidity, situation and other forms of pollution, or which will reduce their low flows or low levels to levels which degrade the environment, reduce recharging and ground water, or endanger aquatic and benthic life within these surface waters and receiving water of the state; - Meet the requirements of state and federal law and comply with regulatory standards for the city's municipal storm water; and - Fulfill the responsibility of the city as trustee of the environment for future generations.							
Centralia	Geologically hazardous areas; geologically hazardous areas include areas susceptible to the effects of erosion, sliding, earthquake, or other geologic events. They pose a threat to the health and safety of citizens when incompatible residential, commercial, industrial, or infrastructure development is sited in areas of a hazard. Geologic hazards pose a risk to life, property, and resources when steep slopes are destabilized by inappropriate activities and development or when structures or facilities are sited in area susceptible to natural or human caused geologic events. Some geologic hazards can be reduced or mitigated by engineering, design, or modified construction practices so that risks to health and safety are acceptable. When technology cannot reduce risks to acceptable levels, building and other construction within identified geologically hazardous areas shall be prohibited.	5,8,12	Yes			X		Part of CAO, kept but reworded
Centralia	Coordinate with Lewis County through arrangements such as interlocal agreements, joint programs, consistent standards, or regional boards or committees.	5,8,12	Yes			X	X	
Centralia	Public Utilities will implement stormwater utility including improved maintenance and operations, a rate structure and public education element.	5,8,12	Yes	X		X		
Centralia	Centralia is subject to a state municipal stormwater permit program, called NPDES Phase II. This program includes a number of components such as water quality monitoring, annual stormwater inspections, and public education, all of which the city is already engaged in to some extent.	5,8,12	Yes	X				Reworded
Centralia	Utilize the latest adopted building code to ensure adequate protection in construction against earthquakes in Seismic Zone 3, severe storms with Wind Exposure B, fire with Fire Resistive Construction Standards, and land movement with Grading Standards	5,12,15,16	Yes	X		X	X	Part of IBC

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
Centralia	Utilize the latest adopted fire code to ensure adequate protection against fire in construction with standards for fire flow and through the annual inspection of commercial structures.	5,12,15,16	Yes			X	X	Part of IBC
Centralia	Nonstructural solutions to flood hazards shall be encouraged including restricting development in flood-prone areas, storm water runoff management, up-stream watershed vegetation management.	8	Yes	X			X	
Centralia	Ensure that standards for flood control measures protect and enhance the biological systems and public access opportunities of the shoreline and adjacent uplands.	8	Yes	X			X	
Centralia	The Building Official will continue to require and maintain elevation certificates for permitted development within the floodplain. Elevation certificates are maintained by address.	8	Yes	X			X	
Centralia	Provide emergency generator or secondary power capability for all pump stations; upgrade construction at all pump stations to latest seismic and wind standards.	5,12,15,16	Yes	X				
Centralia	Provide protection of steep slopes according to standards in the Critical Areas Ordinance and as generally identified in these policies.	5,12,15,16	Yes	X		X	X	Part of CAO
Centralia	To the extent practicable, fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	All	Yes			X		
Centralia	Protect and restore critical areas; plan for flood hazard mitigation, surface water management and pollution control, establishment and maintenance of greenbelts and conservation areas and coordinate with adjoining jurisdictions.	Flood	Yes			X	X	Part of CAO
Centralia	Provide habitat for wildlife species, food-fish, and freshwater fish in close proximity to an urban area.	Flood	Yes			X	X	Part of CAO
Centralia	Protect and restore wetlands to optimize water quality, habitat, best management practices and ensure that adjacent land use patterns are compatible with the protection and enhancement of the wetlands and take advantage of the unique attributes of the site, and comply with the city's Critical Areas Ordinance.	Flood	Yes			X	X	Part of CAO
Centralia	Allow limited use of the Chehalis River, Skookumchuck River, Scammon Creek, China Creek, Salzer Creek, Hayes Lake and Plummer Lake and the associate shorelines in a manner that is compatible with the dike system and the regulatory constraints of the floodway and Special Flood Risk Zone, including transportation, levee improvement, utilities and outfall structures, public access and recreation, open space and agriculture and similar uses.	Flood	Yes			X		Part of CAO, Shoreline Plan
Centralia	Plan the stormwater management system to be consistent with policies regarding flooding, wetlands, land use and water quality.	8	Yes	X				
Centralia	Develop an integrated program for quantity and quality control that recognizes the unique situation faced by the City within its location in the 100 year floodplain and its needs for flood control in larger storm events, while at the same time needing to control the effects of smaller storms in terms of both quantity and quality of runoff.	8	Yes	X				
Centralia	Apply best management practices to reduce pollutant loading and minimize the effects of contaminated sediments on the city's waterways.	8	Yes	X				

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	Increase preservation of the open space and drainage corridor through easements, deeding land to city, improve water quality, eliminate failed septic systems, fence out livestock, improve wildlife habitat, do restoration planting projects, increase regulations such as greater setbacks where applicable, implement specialized best management practices to minimize problems in the long run.							
Centralia	Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks. Integrate these concepts with natural functions such as drainage, agriculture and topographic features	5,8,12,15, 16	Yes	X				
Centralia	Develop and maintain a specific flood warning and evacuation program for the City including a regional calling list (Reverse 911)	All	Yes			X		Reworded
Centralia	The transportation plan is designed to ensure the continued ability of the transportation system to function at a reasonable level of service throughout the urban service area and coordinate the links to the regional transportation system. The County has an adopted Lewis County I-5 Detour Plan	All	Yes			X		Reworded
Centralia	Maintain the police, fire, wastewater treatment, stormwater, water and electrical facilities with the most current technology and standards to ensure operation during hazard events.	All	Yes			X		Reworded
Centralia	Encourage all critical facilities including nursing homes, chemical storage facilities, schools, electric and telephone substations have a working emergency plan in place and that contacts are up-to-date.	All	Yes	X				
Centralia	Adopt the HIVA that includes earthquakes, volcanoes, and severe storms as the major natural hazards. Fire is covered by the Riverside Fire Authority and construction standards and landslides are covered by the grading policies and the Critical Areas Ordinance.	All	Yes	X		X	X	Required
Centralia	Maintain the emergency operations center (EOC) and have training on a regular basis pertaining to flooding and all hazards.	All	Yes	X				
Centralia	The Six Year Transportation Plan and the transportation element of the annually updated City of Centralia Capital Improvement Plan shall be coordinated with the land use, utilities and other relevant plan elements to ensure a balanced program that is adequately funded and responsive to community interest.	All	Yes			X		
Centralia	Upgrade all city owned critical facilities to ensure continued operations during identified hazard events.	All	Yes	X				
Centralia	Provide on-going public education at all levels, from the renter to the homeowner, regarding residential, commercial and industrial best management practice issues, flood hazard mitigation, water quality, and related local issues.	8	Yes			X		Reworded
Centralia	The City shall provide on-going public education about flooding and shall adopt a flood hazard reduction plan, consistent and compatible with any countywide efforts and plans. Outreach efforts shall include but are not limited to: community newsletter, special targeted mailings to realtors, insurance agents and lenders, training	8	Yes	X				

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	sessions at neighborhood meetings, the public library, and any other means identified.							
Centralia	Provide on-going public education aimed at residents, businesses, and industries in the urban area to inform citizens about stormwater and its effects on water quality, flooding, fish/wildlife habitat and to discourage dumping of waste material or pollutants into storm drains.	All	Yes	X				
Centralia	The Community Development Department and Building Official will continue to make flood map determinations in response to public inquiry.	8	Yes	X				
Centralia	The Community Development Department will maintain the Flood Protection information and add updated materials as needed at the Centralia Public Library. Information in this collection includes but is not limited to: natural and beneficial functions of floodplains, flood plan, floodplain map, local early warning and evacuation routes and updated local, state and federal materials.	8	Yes	X				
Centralia	Maintain updated maps and continue to work on automated base maps and overlays, leading to a planning level geographic information system. Continue data collection and data entry as new information and data sources become accessible.	All	Yes	X				
Centralia	Use improved citizen involvement and public education to establish a solid work program for improving maintenance of the drainage system.	All	Yes			X		Reworded
Centralia	Maintain and update on a regular basis the City's flood website to provide information and encourage public education about how to reduce flood impacts.	Flood	Yes	X				
Centralia	Expand the Public Information program to address other natural hazards where additional public information will be helpful, such as seismic retrofits for homes, how to make your home firewise and other hazard related topics	All	Yes	X				
Centralia	Develop and update on a regular basis a hazard website that provides information and encourage public education about how to be prepared for all potential hazards that could affect the City.	All	Yes	X				
Centralia	Update the city comprehensive emergency management plan on a regular basis.	All	Yes			x		Required
Centralia	Improve communication to residents and businesses during and following emergencies	All	Yes			X		Reworded
Centralia	Increase public awareness of vulnerability to hazards	All	Yes			X		Reworded
Centralia	Continue annual bridge inspections	Flood	Yes	X				
Centralia	Operate Incident Command Post in time of emergency	All	Yes	X				
Centralia	Isolate utilities in damaged areas	All	Yes	X				
Centralia	Continue and enhance annual fire inspections for life safety	All	Yes	X				
Centralia	Update critical areas ordinance utilizing best available science	All	Yes			X	X	Completed
Centralia	Require engineered foundation systems and geotechnical reports for building in critical areas	12	Yes	X			X	
Centralia	Maintain map of landslide areas in permit application office	12	Yes	X			X	
Centralia	Continue to coordinate with Lewis County for growth in critical areas	All	Yes			X		Interlocal Agreement
Centralia	Continue public education on building maintenance related to seismic activity and supplement with information on façade	5	Yes			X		IBC

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	improvement program							
Centralia	Continue façade improvement through grant program	5	Yes			X		Dropped
Centralia	Continue annual levy inspection	8	Yes			X		Required
Centralia	Continue flood proofing utilities in flood prone areas (electrical power)	8	Yes			X		Reworded
Centralia	Continue tree maintenance program for street trees	15,16	Yes			X		Reworded
Centralia	City light tree maintenance program to trim trees around power lines	15,16	Yes	X				
Centralia	Retrofit existing overhead lines to underground as time and budget allows	15,16	Yes	X				
Centralia	Continue current City Light practice of burying new utility lines as appropriate	15,16	Yes	X				
Chehalis	Continue contract with Lewis County to provide statutory emergency services.	All	Yes	X				
Chehalis	Operate incident command post during event	All	Yes	X				
Chehalis	Continue annual bridge inspections	All	Yes	X				
Chehalis	Continue update of critical areas ordinance	All	Yes	X				
Chehalis	Adopt new earthquake hazard maps (when available from DNR)	5	Yes			X		
Chehalis	Maintain mapping of critical areas for public information	All	Yes	X			X	
Chehalis	Continue using '*Statement of Restrictions*' form for notice to public	8	Yes	X			X	
Chehalis	Continue requiring engineered foundations in critical slope or vicinity of fault line areas	5	Yes	X			X	
Chehalis	Continue using SEPA authority to mitigate identified hazards	All	Yes	X			X	
Chehalis	Continue annual fire inspections of existing business occupancies	All	Yes	X			X	
Chehalis	Continue participation in the Community Rating System (CRS) program	8	Yes	x			X	
Chehalis	Continue participation in the Chehalis River Basin Flood Authority (the Flood Authority)	8	Yes	X			X	
Chehalis	Continue applications for Hazard Mitigation Grant funding when available	All	Yes	X			X	Reworded
Chehalis	Continue annual levee inspection/maintenance	8	Yes	X				
Chehalis	Continue requirements for undergrounding utilities in new subdivisions	All	Yes	X				
Chehalis	Relocate Fire station (first responders)	All	Yes	X				
Chehalis	Continue updates to utility plans (water, wastewater and stormwater systems)	All	Yes	X				
Chehalis	Obtain seismic analysis for water reservoir	5	Yes			X		
Chehalis	Replace Chamber Way Bridge	5	Yes	X				
Morton	Continue to enforce the flood ordinance.	8	Yes	X			X	
Morton	Train Planning Commission, Elected Officials and staff when sessions are available	8	Yes	X				
Morton	Make information available to the public	8	Yes	X				
Morton	Contract with Lewis County for emergency services	All	Yes	X			X	
Morton	Upgrade radio communications	All	Yes	X				
Morton	Operate Incident Command Post in time of emergency	All	Yes	X				
Morton	Continuing education	All	Yes	X			X	
Morton	Continue coordination with Lewis County for managing development in UGAs to address critical areas concerns	All	Yes	X			X	
Morton	Maintain map of critical and hazard areas in City Hall	All	Yes	X			X	
Morton	Continuing education for Planning Commission	All	Yes	X			X	
Morton	Continue to require water & sewer locates for new developments, new construction and other utility pole or underground placement	All	Yes	X			X	

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Morton	Continue inspection of manholes and storm drain facilities	All	Yes	X			X	
Morton	Continue routine maintenance & repairs/replacement of backup generators & inspections of water reservoirs	All	Yes	X			X	
Morton	Keep ditches clean and infringing trees removed from water and wastewater treatment plants, reservoirs and water intake	All	Yes	X			X	
Morton	Routinely do structural assessments of all critical utility facilities	All	Yes	X			X	
Morton	Continue using SEPA authority to ensure large projects provide for hazard mitigation	All	Yes	X			X	
Morton	Continue following guidelines in Morton's Zoning & Development Regulations	All	Yes	X			X	
Morton	WWTP: Assess building for structural integrity to determine strength in withstanding an earthquake, volcanic ash and snow loading on roof	5,15,16,18	Yes	X	X			
Morton	WWTP: Inspection to evaluate structural integrity to withstand earthquake, ash and snow loading on roof.	5,15,16,18	Yes	X	X			
Morton	WWTP: Culvert cleanout, storm drain and outfall line inspection as protection from flooding.	8	Yes	X	X			
Morton	WWTP: Replacement of backup generator.	5,15,16,18	Yes	X	X			
Morton	Fire Department: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof.	5,15,16,18	Yes	X	X			
Morton	Fire Department: Routine maintenance on backup generator.	5,8,15,16,18	Yes	X	X			
Morton	Fire Department: Dependable Water supply	5,15,16,18	Yes	X	X			
Morton	City Hall/Police Station: Purchase of backup power supply	5,8,15,16,18	Yes	X	X			
Morton	City Hall/Police Station: Upgrade radio communications, training, office protective measures.	5,15,16,18,19	Yes	X	X			
Morton	City Hall/Police Station: Inspection to evaluate structural integrity to withstand earthquake and snow or ash loading on roof	5,15,16,18	Yes	X	X			
Morton	Water Reservoir: Removal of surrounding trees	5,8,12,15,16	Yes	X	X			
Morton	Water Reservoir: Inspections to evaluate structural integrity to withstand earthquake and snow/ash loading on roof	5,12,15,16	Yes	X	x			
Morton	Water System Intake: Install Chemical additive pumps at City's back-up emergency well.	5,8,12	Yes	X	X			
Morton	Water System Intake: Routine maintenance on structure.	5,8,12,15,16	Yes	X			X	
Morton	Water System Intake: Roads graded and ditches cleaned. Bridge is a more recent concern	5,8,16	Yes	X				
Mossyrock	Lift Station #1: Purchase generator and set at site, sandbags for floor control (Lift Station #1)	All	Yes		X			Financial
Mossyrock	Purchase generator and set at site, sandbags for flood control (Lift Station #2)	All	Yes		X			Financial
Mossyrock	Access building for seismic/ash load capabilities (City Hall)	18	Yes		X			Financial
Mossyrock	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #1 & #2)	All	Yes		X			Financial
Mossyrock	Video camera system, alarm for unauthorized entry, assessment for structural retrofit (Reservoir #3)	All	Yes		X			Financial
Mossyrock	Police Department: Portable generator to run	All	Yes		X			Financial

2010 Plan Mitigation Alternatives Table

Hazard Addressed: 1. Avalanche, 2. Dam Failure, 3. Debris Flow, 4. Drought, 5. Earthquake, 6. Expansive Soils, 7. Extreme Heat, 8. Flooding, 9. Hailstorm, 10. Hurricane, 11. Land Subsidence, 12. Landslide, 13. Levee Failure, 14. Severe Thunder Storm, 15. Severe Wind Storm, 16. Severe Winter Storm, 17. Tornado, 18. Volcano, 19. Wildfire

Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	radio base station. Purchase satellite phone (PD)							
Mossyrock	Gravel and sandbags for flood control. Purchase video camera system. (Wastewater Treatment Plant)	8	Yes		X			Financial
Mossyrock	Sandbags for flood control, have gravel at site, purchase generator, alarm system for unauthorized entry. (Well)	8	Yes		X			Financial
Mossyrock	Access existing generator to power lift station. (Lift #1)	All	Yes		X			Financial
Mossyrock	Access existing generator to power lift station (Lift #2)	All	Yes		X			Financial
Mossyrock	Elevate above flood level (Lift #2)	8	Yes		X			Financial
Mossyrock	Have sandbags available during flood event (Lift #2)	8	Yes		X			Financial
Mossyrock	Access well and determine if a generator can run it. Have sandbags on hand in case of hazard (Wells)	All	Yes		X			Financial
Napavine	Continue to evaluate large trees and high wind hazards and upkeep of control equipment	15	Yes		X			
Napavine	Continue to monitor flood ways at Exit 72 in flood area and keeping free of blockage and debris	8	Yes		X			
Napavine	Keep equipment and emergency vehicles available for likely occurrences	5	Yes		X			
Napavine	Booster Pump Station: Assess building and infrastructure for structural integrity	5	Yes		X			
Napavine	City Hall: Assess building for structural damage	5	Yes		X			
Napavine	Rush Road Bridge: Assess structure for integral damage	8	Yes		X			
Napavine	Sewer Pump Stations #1-5: Assess buildings and infrastructure for damage	5	Yes		X			
Napavine	Water Wells #1-5: Assess buildings and infrastructure for damage	5	Yes		X			
Napavine	Continue to enforce the CAO's	8	Yes	X				
Napavine	Continue to enforce Shorelines' Management Plan	8	Yes	X				
Pe Ell	Develop an earthquake response plan for facility personnel (City Hall)		Yes	X	X			Reworded
Pe Ell	Inspect and evaluate building's ability to withstand volcanic ash fall out. (City Hall)		Yes	X	X			Reworded
Pe Ell	Secure contents to prevent injury to occupants (City Hall)		Yes	X	X			Reworded
Pe Ell	Develop a plan/procedure for flood damage control, including temporary protection of facility. (City Hall)		Yes	X	x			Reworded
Pe Ell	Educate employees of flood risk for facility and components.		Yes	X	X			Reworded
Pe Ell	Develop an earthquake response plan for facility personnel (STP)		Yes	X	X			Reworded
Pe Ell	Evaluate adequacy of hazardous materials storage locations at facility (STP)		Yes	X	X			Reworded
Pe Ell	Secure contents to prevent injury to occupants (STP)		Yes	X	X			Reworded
Pe Ell	Develop a plan/procedure for flood damage control, including temporary protection of facility. (STP)		Yes	X	X			Reworded
Pe Ell	Educate employees of flood risk for facility and components. (STP)		Yes	X	X			Reworded
Pe Ell	Develop an earthquake response plan for facility personnel (Water plant)		Yes	X	X			Reworded
Pe Ell	Inspect and evaluate building's ability to withstand volcanic ash fall out. (Water plant)		Yes	X	X			Reworded
Pe Ell	Secure contents to prevent injury to occupants (Water plant)		Yes	X	X			Reworded
Pe Ell	Develop a plan/procedure for flood damage control, including temporary protection of		Yes	X	X			Reworded

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	facility. (Water plant)							
Pe Ell	Educate employees of flood risk for facility and components. (Water plant)		Yes	X	X			Reworded
Pe Ell	Continue to enforce the flood ordinances and building codes to reduce flood damages	8	Yes	X			X	
Pe Ell	Continue to enforce the flood ordinance which is based on NFIP model	8	Yes	X			X	
Pe Ell	Develop a plan/procedure (Community Center)	5,8,15	Yes			X		Not City's
Pe Ell	Develop a plan/procedure (Schools)	5,8,15	Yes			X		School has own
Pe Ell	Develop a plan/procedure (Clinic)	5,8,15	Yes			X		Not City's
Pe Ell	Develop a plan/procedure (Elderly Center)	5,8,15	Yes		X			
Pe Ell	Develop a plan/procedure (Stores)	5,8,15	Yes			X		Not City's
Toledo	Continue to enforce the flood ordinance which is based on NFIP model	8	Yes	X			X	
Toledo	Continue updates and enforcement of Critical Areas Ordinance	All	Yes	X			X	
Toledo	Continue Development Reviews	All						
Toledo	Continue working with/contracting with Lewis County Emergency Management	All	Yes	X			X	
Toledo	Maintain map of Critical Areas in permit Application office	All	Yes	X			X	
Toledo	Continue using SEPA authority to ensure large projects provide for hazard mitigation	All	Yes	X			X	
Toledo	Inspect and evaluate Building Annually (City Hall)	All	Yes		X			
Toledo	Backup Generator for emergencies (WWTP)	All	Yes			X		Financial
Toledo	Coordinate with other agencies (WWTP)	All	Yes			X		Reworded
Toledo	Coordinate with other agencies, Backup Generator for emergencies (Water)	All	Yes		X			
Toledo	Continue to require and maintain elevation certificates for permitted development within the floodplain.	8	Yes	X				
Vader	Elevate water intake structure	Flood	Yes			X		Financial
Vader	Develop plan for flood damage control. Train employees in flood plan for facility component protection. Develop post flood cleanup plan.	Flood	Yes		X			
Vader	Negotiate contracts for rental of portable generators	5,15,16,18	Yes			X		Financial, purchase
Vader	Develop a plan for alternate means for employees to receive information	5,15,16,18	Yes	X				Reworded
Vader	Construct or prepare plan for alternate facility to provide City Hall services	5,15,16,18	Yes	X	X			
Vader	Evacuation plan for a flood	8	Yes					
Vader	Develop and implement tree-pruning program to minimize threat to life and damage to property and public infrastructure during windstorm events.	15	Yes	X	X			
Vader	Continue floodplain regulations for current and future development	8	Yes	X	X		X	
Winlock	STORM DRAIN MAINTENANCE	8	Yes	X	X			Reworded
Winlock	City Hall: SIESMIC RETROFITTING	5	Yes	X	X			Reworded
Winlock	Comm Bldg. SLOPE EROSION GEOTECH	12	Yes	X	X			Reworded
Winlock	STP: REVETMANT MANAGEMENT	8	Yes			X		Not a priority
Winlock	Continue to enforce the flood ordinances and building codes to reduce flood damages	8	Yes	X	X			
Winlock	Continue to enforce the flood ordinance which is based on NFIP model	8	Yes	X	X			
Winlock	STP: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	5,18	Yes	X	X			Reworded
Winlock	WELLHEADS: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	5,18	Yes	X	X			Reworded
Winlock	P.W.: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	5,18	Yes	X	X			Reworded
Winlock	WELLHEADS: ASSESS BLDG FOR INTEGRITY TO	5,18	Yes	X	X			Reworded

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	WITHSTAND EARTHQUAKE							
Winlock	P.W. ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	5,18	Yes	X	X			Reworded
Winlock	Sewer Plant: ASSESS REVETMENT DIKE	8	Yes	X	X			Reworded
Winlock	LIBRARY: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	5,18	Yes	X	X			Reworded
Winlock	Library: ASSESS PEREIMTER FOR LANDSLIDE	12	Yes	X	X			Reworded
Winlock	MUSEUM: ASSESS BLDG FOR INTEGRITY TO WITHSTAND EARTHQUAKE	5,18	Yes	X	X			Reworded
Winlock	Museum: ASSESS PEREIMTER FOR LANDSLIDE	12	Yes	X	x			Reworded
Cemetery District 4	Well Houses: Assess buildings for structural integrity to determine strength in withstanding an earthquake,	5,8,12,15, 16,18,19	Yes	X				
Cemetery District 4	Grave Sites: Assess graves site to determine the effects of natural hazards	5,8,12,15, 16,18,19	Yes	X				
Cemetery District 4	Underground Sprinkler System: Assess the sprinkler system to determine the effects of natural hazards	5,8,12	Yes	X				
Cemetery District 5	Continue to watch all buildings and trees	5,12,15	Yes	X				
Cemetery District 5	Dist. 5 Cemetery – Lone Hill: Assess buildings determine structural integrity	5,12,15	Yes	X				
Cemetery District 5	Cemetery: Assess buildings to determine structural integrity	5,12,15	Yes	X				
Cemetery District 7	Analyze the wooded areas around cemetery to determine where damage could occur to the small utility buildings and grave markers in a wind storm.	15	Yes	X			X	
Cemetery District 7	Monitor hillside to make sure it remains stable	5,12	Yes	X			X	
Centralia College	Identify and then apply for earthquake mitigation grants from state and federal sources	5	Yes	X				
Centralia College	Purchase emergency alert radios and develop campus evacuation plan	Spill Events	Yes			X		Not natural hazard
Centralia College	Install new campus-wide addressable fire alarm system	19	Yes	X				
Centralia College	Inspection of all roof flashings and any loose guy wires	15	Yes	X				
Centralia College	Put together an emergency response kit with dust masks, goggles, work gloves and shovels to address ash fallout issues	Volcanic Activity	Yes			X		Financial
Centralia College	Install surge pond to add storage capacity to China Creek which runs through campus	5	Yes			X	X	Completed
Centralia College	Install emergency campus notification system	All	Yes	X	x			
Centralia SD	Upgrade building emergency radio for communications with local police, sheriff, fire dept. and state patrol, and make portable for use outside; develop a plan to maintain the flow of public information under disaster conditions and an alternate means for employees to receive information. (For all CSD Schools)	5,15,18	Yes	X	X			
Centralia SD	Provide emergency portable radios for site to include communications with local emergency radios for site to include communications with local emergency agencies. (For all CSD Schools)	5,15,18	Yes	X	X			
Centralia SD	Upgrade building telephone system with emergency power sources for 2 hour back-up (UPS) (For all CSD Schools)	5,15,18	Yes	X	X			
Centralia SD	Assess use of cell phones as a backup system to hard-line phone system. (For Centralia Middle School, Edison	5,15,18	Yes	X	X			

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	Elementary, Ford's Prairie Elementary, Jefferson- Lincoln Elementary, Oakview Elementary, & Washington Elementary)							
Centralia SD	Install emergency generator for back-up power to telephones and essential systems. For Centralia High School, Edison Elementary, & Centralia Middle School)	5,15,18	Yes	X	X			
Centralia SD	Remove, relocate, & elevate the structure to flood safe area. (For Washington Elementary, Transportation, Jefferson Lincoln)	5,15,18	Yes	X	X			
Centralia SD	Assess buildings for seismic / ash capabilities. (For all CSD Schools)	5,15,18	Yes	X	X			
Centralia SD	Secure facility to protect occupants. (For all CSD Schools)	Lockdown	Yes	X	X			
Centralia SD	Build Flood retaining panels for building openings-Transportation, Washington, Jefferson	8	Yes	x	X			
Chehalis SD	Assess the vulnerability of public education facilities to damage in natural disasters and make recommendations for appropriate mitigation	5,8,15,16, 18	Yes	X	x			
Chehalis SD	Maintain safety plans in each of the buildings	5,8,15,16, 18	Yes	X	x			
Chehalis SD	Work cooperatively to ensure that school district personnel are trained to care for students during/after a disaster.	5,8,15,16, 18	Yes	X	x			
Chehalis SD	Offer on-site first aid and CPR classes to staff	5,8,15,16, 18	Yes	X	x			
Chehalis SD	Work cooperatively with the American Red Cross, cities, counties and non-profits to use education facilities as emergency shelters following disasters	5,8,15,16, 18	Yes	X	x			
Chehalis SD	Cascade Elementary, R.E. Bennett Elementary, Olympic Elementary, Chehalis Middle School, W.F. West High School: Assess possibility to install and wire facility with permanent generator with fuel storage, equip for standby power capabilities, or relocate critical operations to another facility equipped with generator.	Power Outage	Yes	X	x			
Chehalis SD	Cascade Elementary, R.E. Bennett Elementary, Olympic Elementary, Chehalis Middle School, W.F. West High School: Develop a plan/procedure for a temporary relocation of operations, negotiate contract with water supplier for emergency services, develop plan for minimum water operations. Close School.	Water Outage	Yes	X	x			
Chehalis SD	Cascade Elementary, R.E. Bennett Elementary, Olympic Elementary, Chehalis Middle School, W.F. West High School: Develop a plan/procedure for temporary relocation of operations, negotiate contract for emergency delivery of portable toilets.	Sewer Outage	Yes	X	x			
Chehalis SD	Cascade Elementary, R.E. Bennett Elementary, Olympic Elementary, Chehalis Middle School, W.F. West High School: Repair and replace as needed.	5,8,15,16, 18	Yes	X	x			
Cowlitz Tribe	Develop shelter in place strategy for residents and staff	5	Yes	X	X			
Cowlitz Tribe	Develop shelter in place strategy for residents and staff	16	Yes	X	X			
Cowlitz Tribe	Develop shelter in place strategy for residents and staff	15	Yes	X	X			
Cowlitz Tribe	Get CERT training for residents and staff	All Hazards	Yes	x	X			
LCFD 1	Equip specific facility operations with standby power capabilities. Purchase and install batteries,	Power Outage	Yes		X			

2010 Plan Mitigation Alternatives Table

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	UPS or alternate energy source for critical operations.							
LCFD1	Assess building for structural integrity to determine strength in withstanding an earthquake, or volcanic ash fallout on roof	5,18	Yes		X			
LCFD3	Search out grants or bonds or aid to build new fire station or adequate size.	All	Yes		X			
LCFD 10	Recruit and train members of the community to assist with health and fire safety issues in the community.	8	YEs	X				
LCFD10	Educate the community citizens on emergency preparedness.	8	Yes	X				
LCFD10	Establish relationship with NOAA radio to provide early warning systems for citizens in the Cowlitz drainage.	5,12,15,18	Yes		X			
LCFD10	Identify possible evacuation routes for Lahars.	5,18	Yes	X	X			
LCFD11	Seismic reinforcement	18	Yes	X	X			
LCFD11	Ensure egress from gravel drive.	8	Yes	x	X			
LCFD11	Control Vegetation	19	Yes	X	X			
LCFD11	Control trees within reach of station and confirm wind resistive construction of station	15	Yes	X	X			
LCFD13	FS1:Seismic reinforcement	18	Yes	X	X			$
LCFD13	FS2:Seismic Reinforcement	18	Yes	X	X			$
LCFD13	FS3:Seismic Reinforcement	18	Yes	X	X			$
LCFD13	FS1Control Tall Trees within reach and Reinforce Structure	15	Yes	X	X			$
LCFD13	FS2:Control Tall Trees within reach and Reinforce Structure	15	Yes	X	X			$
LCFD13	FS3:Maintain Control of Tall Trees and grass within reach and Reinforce Structure	15	Yes	X	X			$
LCFD13	FS1Control Vegetation and add fire resistive siding	19	Yes	X	X			$
LCFD13	FS2:Control Vegetation and add fire resistive siding	19	Yes	X	X			$$
LCFD13	FS3:Control Vegetation and add fire resistive siding	19	Yes	X	X			$
LCFD14	Secure tipping hazards	5	Yes	X				
LCFD14	Replace Sta. 1 out of flood plain	8	Yes	X	X			$$$
LCFD14	Continued Response training	15	Yes	X				
LCFD14	Compile & maintain a list of volunteers with ATV/snowmobiles	16	Yes	X				
LCFD14	Develop & Maintain a snow plan	16	Yes	X				
LCFD14	Maintain stock of extra filters	18	Yes	X			X	
LCFD14	Maintain a stock of N95 masks	18	Yes	X				
LCFD14	Maintain defensible space around FD facilities	19	Yes	X			X	
LCFD14	Maintain Response readiness	19	Yes	X				
LCFD15	Conduct detailed study of vulnerability – ALL STATIONS	ALL	Yes	X				$$
LCFD15	Develop a plan for temporary communications – ALL STATIONS	ALL	Yes	X	X			
LCFD15	Develop a plan for post-disaster resource protection – ALL STATIONS	ALL	Yes	X	X			
LCFD15	Assess all buildings for all hazards vulnerability	ALL	Yes	X	X			
LCFD 16	FS1:Seismic reinforcement	18	Yes	X	X			
LCFD 16	FS2:Seismic Reinforcement	18	Yes	X	X			
LCFD 16	FS3:Seismic Reinforcement	18	Yes	X	X			
LCFD 16	FS1Control Tall Trees within reach and Reinforce Structure	15	Yes	X	X			
LCFD 16	FS2:Control Tall Trees within reach and Reinforce	15	Yes	X	X			

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
	Structure							
LCFD 16	FS3:Maintain Control of Tall Trees and grass within reach and Reinforce Structure	15	Yes	X	X			
LCFD 16	FS1Control Vegetation and add fire resistive siding	19	Yes	X	X			
LCFD 16	FS2:Control Vegetation and add fire resistive siding	19	Yes	X	X			
LCFD 16	FS3:Control Vegetation and add fire resistive siding	19	Yes	X	X			
LCFD 17	Have station building to assess the amount of snow if can hold.	16	Yes	X	X			
LCFD 17	Assess snow clearing	16	Yes				Yes	
LCFD 17	Assess tree that could fall on building and their removal.	15,16	Yes	x	X			
LCFD 17	Assess history of creek that flows near building	8	Yes	X	X			
LCFD 17	Assess if the fire station can hold up to a 7.0 earthquake	5	Yes	X			X	
LCFD 17	Develop strategies to provide necessary services in the event of flooding	8	Yes	X			X	
LCFD 17	Secure loose items in building to reduce earthquake damage.	5	Yes		X			
LCFD 17	Keep vegetation cut back from building.	19	Yes	X			X	
LCFD 17	Increase public awareness of vulnerability of hazards.	5,8,18	Yes	X			X	
LCFD 17	Assess treats from an eruption of Mt. Rainier and ash fall on the community.	18	Yes	X			X	
LCFD 17	Assess lahars threats to the community.	18	Yes	X			X	
Morton General	Expand services to meet the needs of our community.	All	Yes	X	X			
Morton General	Identify key personnel and how to contact. Have verbal or written agreements with other hospitals to ship out patients. Have access to other buildings for emergency use.	All	Yes	X				
Morton General	Staff Training, Isolation Room, Decontamination Unit.	Pandemic	Yes	X				
Morton General	Stay Current with G.E.T.S. program, Have current names for HAM Radio Operators. Have 2-way radios and Cell phones readily available. Test WHEERS & HEARS Radios regularly.	ALL	Yes	X				
Morton General	Improve the evacuation plan. And identify existing community shelter possibilities.	ALL	Yes	X				
Pe Ell SD	Anchoring items w/in the building	5	Yes	X				
Pe Ell SD	Increase awareness of hazards to the school	All	Yes			X		
Pe Ell SD	Emergency snow plan,	16	Yes			X		
Pe Ell SD	Increase awareness of hazards to the school.	15	Yes			X		
Pe Ell SD	Identify alternate routes and options for students to return home	8	Yes			X		
Port of Chehalis	Flow diversions/drainage improvements and maintenance	8	Yes	X	X			
Port of Chehalis	Port Offices: Assess surrounding area for flood protection	8	Yes	X	X			
Port of Chehalis	McBride Court: Assess surrounding area for flood protection	8	Yes	X	X			
Port of Chehalis	Curtis Rail Lines: Culverts and drainage	8	Yes	X	X			
Port of Chehalis	Port Rail Spurs: Culverts and drainage	8	Yes	X	X			
Providence Hospital	Complete elevation survey in cooperation with Army Corp of Eng. & community partners	8	Yes	X			Yes	
Providence Hospital	Assess recently acquired buildings for disaster readiness (CMC, Cancer Center)	5,15,16,18	Yes	X			Yes	
Providence Hospital	Monitor and cutback or remove dead trees from property	5,8,15	Yes	X			Yes	
Providence	Maintain and exercise redundant communication	5,8,15,16,	Yes	X			Yes	

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Jurisdiction	Mitigation Measures	Hazard(s)	Task in 2010 Plan	M.S. on-going	M.S. Deferred	M.S. Dropped	M.S. Completed 2010 Plan	Reason: financial, not priority, etc..
Hospital	systems with community and regional partners	18						
Providence Hospital	Weigh pros/cons of PCH becoming part of "Code Red" county alert system	5,8,18	Yes	X			Yes	
Providence Hospital	Construct central plant utilities at a location separate from the hospital.	5,18	Yes	X			Yes	
Providence Hospital	Place supports beneath pharmacy shelving	5	Yes	X			Yes	
Providence Hospital	Replace hot water booster with gas unit and strap down	5	Yes	X			Yes	
Providence Hospital	Replaced valves on 2nd flood of A building for manual shut-off of HVAC	5,18	Yes	X			Yes	
Providence Hospital	New chillers installed to meet seismic recommendation	5	Yes	X			Yes	
Providence Hospital	Seismic shut off for natural gas line completed	5	Yes	X			Yes	
Providence Hospital	Removed cement around water line into hospital	5	Yes	X			Yes	
Providence Hospital	Modified water lines hookups to allow tanker truck to hook into hospital water	5,18	Yes	X			Yes	
Providence Hospital	Develop exhaust system to outside air allowing current rehab area to be used as an isolation ward	Biological event	Yes	X			Yes	
Providence Hospital	Develop isolation room into the renovation plans for the emergency department	Biological or Hazmat Event	Yes	X			Yes	
Providence Hospital	Work with city on redundant re-distribution of electricity	All	Yes	X			Yes	
Providence Hospital	Expansion of water and sewer capabilities to the hospital	All	Yes	X			Yes	
Providence Hospital	Upgraded generator to meet seismic requirements	5,8,15,16	Yes	X			Yes	
Providence Hospital	Stockpile items needed for community care during long-term event	Major events	Yes	X			Yes	
Providence Hospital	Attend community partner meetings and exercise plans	Major events	Yes	X			Yes	
Providence Hospital	Contract with a structural engineer to be a first responder to the hospital	5	Yes	X			Yes	
Providence Hospital	Contract with hazmat company to respond to hazmat event	Hazmat event	Yes	X			Yes	
Providence Hospital	Maintain contract for snow & ice removal	16	Yes	X			Yes	
Riverside Fire Dist.	FS1, FS2, FS3, FS4: FS5, FS6, FS7, FS8: Conduct detailed study of vulnerability	All Hazards	Yes		X			Financial
Riverside Fire Dist.	FS1, FS2, FS3, FS4: FS5, FS6, FS7, FS8: Develop a plan for temporary communications	All Hazards	Yes		X			Financial
Riverside Fire Dist.	FS1, FS2, FS3, FS4: FS5, FS6, FS7, FS8: Conduct a study of potential impact	All Hazards	Yes		X			Financial
Riverside Fire Dist.	FS1, FS2, FS3, FS4: FS5, FS6, FS7, FS8: Develop a plan for alternative services	All Hazards	Yes		X			Financial
Riverside Fire Dist.	FS1, FS2, FS3, FS4: FS5, FS6, FS7, FS8: Develop a plan for post-disaster resources protection	All Hazards	Yes		X			Financial
Winlock SD	Storm drain maintenance	8	Yes	X				
WSD	Trim trees and keep area clean	15	Yes	X				
Winlock SD	Secure contents to prevent injury to occupants	5	Yes	X				
Winlock SD	Conduct earthquake drills	5	Yes	X				
Winlock SD	Develop a hazard education program for students, staff and parents	5,8,15,16, 18	Yes	X				
Winlock SD	Review and conduct training for Emergency Action Plan annually	5,8,15,16, 18	Yes	X				
Winlock SD	Erosion control for buildings	8	Yes	X				
Winlock SD	Develop a snow and ice removal program for roofs and sidewalks	16	Yes	X				

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6.0 Plan Maintenance Process

A plan means little if it is not implemented. To be successful, the plan must be implemented by the combined efforts of individuals, neighborhoods, civic groups, and local government. Many of the plan's goals and policies reflect this shared responsibility. Participants in this plan will be responsible for monitoring, evaluating, and updating the plan. Hazard mitigation projects were prioritized by each participant's governing body with support and suggestions from the public, as well as property and business owners.

Governments have the primary responsibility to implement the Multi-Jurisdictional Hazard Mitigation Plan. The two main implementation activities are regulating and managing development, and funding improvements.

Funding

Funding for the plan implementation is integrated in the different participating agencies. They may be located in Capital Facilities Plans and in the individual budgets of each participating agency to implement their individual mitigation strategies.

Land Use Regulations

The County and other plan participants must create and/or update regulations to ensure that new and existing developments are consistent with the values and goals as expressed in this plan. These regulations include shoreline master plan requirements, critical areas ordinance, zoning, subdivision, building, environmental codes, stormwater regulations, and design review guidelines and standards.

6.1 Monitoring, Evaluating, and Updating the Plan

The framers of the Lewis County Multi-Jurisdictional Hazards Mitigation Plan recognize that the environment changes, sometimes rapidly, and that plans, procedures, and policies must also change. The objective of the plan is to produce an on-going program of activities that will best tackle the region's vulnerability to natural hazards and meet other community needs.

Monitoring, Evaluating and Updating the Plan
Requirement §201.6(c)(4)(i): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
Element

- Does the plan describe the method and schedule for monitoring the plan?
- Does the plan describe the method and schedule for evaluating the plan?
- Does the plan describe the method and schedule for updating the plan within the five-year cycle?

All possible activities have been reviewed and implemented so that the most appropriate solutions are used to address this hazard. The activities are coordinated with each other and with other goals, objectives, and activities, preventing conflicts and reducing the costs of implementing individual activities. Residents are involved in continuing public education about the hazards, loss reduction measures, and the natural and beneficial functions of planning ahead for natural disasters. Public and political support is strong for projects that prevent new problems, and reduce losses.

1. An annual evaluation report on progress towards plan implementation needs to be prepared
    a. Lewis County, Centralia, and Chehalis need to complete the evaluation report prior to their annual CRS recertification.
2. The County will be responsible to organize all Steering Committee meetings and be overall lead agency.
3. The Steering Committee will meet every 3 months to discuss the Plan and process that is being made toward achieving the mitigation strategies.
    a. Lewis County, Centralia, invite Chehalis
    b. Plan for the 2x yearly Planning Team meetings
    c. The County will contact all members of the Steering Committee and the members of the Planning Team to review the hazard profiles and set meetings dates with the stakeholders.
    d. Organize meeting agendas, time, location, and take minutes
4. The Planning Team members will come together to review the Plan and review the mitigation strategies
    a. Hold meetings 2x a year
    b. Reviews the evaluation report completed by the stakeholders
    c. Review the evaluation report from the CRS communities
    d. Submitting the report to Lewis County, Centralia, and Chehalis who will releases their evaluation reports to the media and makes it available to the public
5. The Stakeholders will be asked once a year to evaluate their progress towards completing their mitigation strategies
    a. Steering committee will organize this effort
    b. At the request of the Stakeholders, meetings maybe be held at two locations
    c. The Stakeholder will have an opportunity to review the hazard profiles and the adding or amending of the mitigation strategies.
6. Lewis County and the cities of Centralia and Chehalis complete an evaluation report that needs to be submitted to the governing body, released to the media, and made available to the public
    a. Each agency will be responsible for their own reporting
    b. Submit report for Planning Team to review
7. The Steering Committee will coordinate the 2020 Plan update and any amendments and ensure all changes will be officially adopted by the all participating agencies.
    a. The plan will be monitored and evaluation should be periodically conducted no less than every five (5) years.
    b. All updates will assess the effectiveness of the goals and objectives and mitigation strategies, and to identify new practices or ideas that may need to be added in order to produce a result consistent with the community's visions and values, and changing needs and priorities.

The Steering Committee consists of the following entities:

- Lewis County Emergency Management Supervisor (Lead Agency)
- Lewis County Emergency Management, Planner
- Lewis County Community Development Director
- City of Centralia Community Development Director

The Planning Team will consist of the following or individuals with similar backgrounds:

- Lewis County Commissioner
- Lewis County Emergency Management
- Lewis County Community Development Department
- Lewis County Building Department
- Lewis County CRS Coordinator
- Lewis County Public Works Department
- Lewis County GIS
- Lewis County Public Health and Social Services Department
- City of Centralia Community Development Department
- City of Centralia Building Department
- City of Chehalis Community Development Department
- City of Chehalis Public Works Department
- Town of Pe Ell Public Safety
- City of Mossyrock Representative
- City of Morton Representative
- City of Napavine Representative
- City of Toledo Representative
- City of Vader Representative
- City of Winlock Representative
- Washington State Department of Ecology
- Representative of United Way of Lewis County
- Representative of Insurance industry
- Representative of real estate industry
- Representative of media industry

Schedule Reviews

Lewis County will continue as the lead agency and will lead the annual reviews of the plan. The annual updates will happen yearly on or before the following dates:

- August/September 2016;
- August/September 2017;
- August/September 2018; and
- August/September 2019 will start the 5-year update or at least 1-year prior to plan expiration.

Special Reviews

This process of evaluation will also take place after any hazard that has taken place within the County. The following list of people and/or agencies will be expected to participate or send a representative to the Lewis County Multi-Jurisdictional Hazard Mitigation Plan updates.

6.2 Incorporation into Existing Planning Mechanisms

The governing body will be responsible for ensuring that the plan goals and objectives are incorporated into applicable revisions of each participant's adopted comprehensive plan and any new planning projects undertaken by the participant. The plan may be adopted as part of each participant's comprehensive development plan. This would enable the mitigation component of the comprehensive plan to be consistently revisited and reviewed. In addition, the plan should also take into account any changes in the comprehensive plan, and incorporate the information accordingly during its next update. However, care must be taken so that this mitigation portion is reviewed and updated every five years, as the evaluation and updating of the comprehensive plan is currently typically done on a 7-year basis.

Incorporation into Existing Planning Mechanisms
Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
Element

- Does the plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan?
- Does the plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?

Lewis County and the cities of Centralia, Chehalis, Morton, Mossyrock, Napavine, Town of Pe Ell, Toledo, and Winlock should looks for ways to incorporate their mitigation strategies into their respective comprehensive plans and capital facilities plans, emergency management plans, and budget documents. The other participating agencies should identify other planning documents or mechanisms to incorporate and focus on their hazard mitigation strategies (ex. emergency management plans, master plans)

6.3 Continued Public Involvement (Public Participation Plan)

To ensure continued plan support and suggestions from the public, property owners, and business owners, public involvement should remain a top priority for each participant of the Plan. To encourage participation among the broadest cross-section of the community, including the involvement of groups not previously involve, the following program for citizen participation will be followed:

Continued Public Involvement
Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.
Element

- Does the plan explain how continued public participation will be obtained? (For example, will there be public notices, an ongoing mitigation plan committee, or annual review meetings with stakeholders?)

1. Planning Process-This process provides citizens an opportunity to establish a framework and context upon which the plan will be based. Stakeholder meetings will provide the forum for the initial community visioning process. The final "Plan" will be established at the conclusion of the planning process as a result of community participation.
2. Planning Team. The Planning Team will play a key role in establishing the dialogue with the community members, hosting a series of meetings and workshops during the development of the Plan. The Planning Team will evaluate information provided by the community and develop recommendations.

3. Citizen Survey. The Steering Commission and Planning Team will conduct a statistically valid survey of the citizens of the County. Survey questions will address specific issues of the plan that will provide staff, the Planning Team, Stakeholders and adoption agencies with meaningful input for development of the plan.
4. Public Meetings. Conduct a series of public meetings hosted by the Steering Commission and Planning Team on the preliminary draft plan. This ensures that the agencies will meet the requirement for "early and continuous" public participation in the planning process.
5. Public Hearings. A series of Public Hearings/Meetings will be held before the adoption agencies to discuss the draft plan.
6. Public Notice. The cities and County will provide notice of all meetings and hearings pursuant to the requirements of RCW 36.70A.020, .035 and .140.
7. Written Comment. The public will be invited to submit written comments as the Plan is developed and as part of any workshops or community meetings. Comments will be specifically solicited from County residents, special interest organizations and business interests. Comments may be in the form of letters and other correspondence regarding the plan or comments received electronically on the website.
8. Communications Programs and Information Services. As staff and budgetary resources allow, the following activities will be undertaken to ensure broad-based citizen participation (during and after) the Plan is completed and provide compliance with other requirements:
    a. Conduct a survey on natural hazards and mitigation strategies.
    b. Press Releases and Public Service Announcements. Work with the local newspaper, radio stations and televisions stations to advertise and promote significant events related to the comprehensive plan.
    c. Maintain a website (City of Centralia – Community Development Department & Lewis County EMD) that will provide the adopted 2015 Plan as well as draft versions of the Plan when it is updated. Provide other materials such as: presentations, meetings notices, forms, maps, and a comment link including telephone numbers to Lewis County or City of Centralia staff on the Plan.
    d. Post material on mass media outlets requesting comments on the Plan
    e. Provide written articles to the local media for publication.

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