

Chehalis Basin LAND*

* LOCAL ACTIONS NON-DAM ALTERNATIVE



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Executive Summary

ECONOMIC ENGINE. PRIME DESTINATION. CULTURAL CONNECTIONS.

The Chehalis Basin, Washington's second-largest river drainage system, is the region's economic engine, a prime recreational destination, and home to many communities and tribes with deep cultural connections to the land. It is also the home of important and rare species of fish and aquatic wildlife that live in its wetlands, streams, and rivers.

As residents are well aware, the Basin is prone to flooding—minor floods occur every two to five years, and major flood events happen once every ten years, on average.

BEARING THE **IMPACT.**

Intensive land use, man-made changes to river flows, and the effects of climate change have made flooding more frequent and severe. As flood events become more common and intense, local communities bear the impacts.

Following a devastating flood in 2007, the State evaluated several projects and programs to mitigate flood damage to Chehalis communities, including a potential flood retention facility.

Communities across the Basin have differing views on how to move forward and what actions should be taken to address flooding.

In January 2021 Governor Jay Inslee directed the Chehalis Basin Board (a collaborative body formed in 2016) to develop and evaluate a Local Actions Program that considered potential actions in absence of a flood retention facility.

The LAND Alternative is the culmination of years of technical analysis, policy studies, community workshops, online surveys, and other engagement activities to solicit broad and diverse input across a wide range of issues—environmental, ecological, economic, and cultural.

A full draft of the Chehalis Basin LAND report can be accessed at: www.chehalisbasinland.com



A VIABLE ALTERNATIVE TO FLOOD RETENTION

The LAND Alternative is an alternative to a proposed flood retention facility on the Chehalis River near Pe Ell. It puts forward a combination of new and extended levees; Chehalis River channel modifications; and acquisition, retrofitting, and relocation of structures; as well as restoration efforts and policy changes that together will reduce flood damage.

SHARED VALUES

Community-based flood damage reduction must be firmly rooted in values shared across the Basin—the values that tie the Basin together as a community—and lead to solutions that address all community needs.



FAMILY, CULTURE, HERITAGE

The strength of the Chehalis Basin comes from its people and the diverse heritages, cultures, and experiences they represent.



NATURAL WONDER

We value Chehalis Basin's unique environment, employment and recreation options, and a home to a wide array of animal and plant life.



ECONOMIC VITALITY

We strive to support local economies, keeping Chehalis Basin businesses robust. A thriving regional economy inspires innovation.



TRUST, RESPECT, SELF DETERMINATION

The future of the Chehalis Basin must be decided by the community itself. We recognize and respect the rights of Tribal Nations and all private property owners in the Chehalis Basin.



PUBLIC SAFETY AND RESILIENCE

Safeguarding our communities from the negative impacts of flooding is fundamental. Adequate infrastructure should ensure regional resiliency.



HEALTHY ENVIRONMENT AND HEALTHY PEOPLE

We envision a solution that prioritizes the well-being of our people and our environment.

IDENTIFYING LOCAL SOLUTIONS

The LAND development process involved determining key criteria to help identify local solutions that can be applied across the basin.



Targeted Flood Damage Reduction Levels

Flood events range from minor, non-life-threatening damage in localized areas to catastrophic events with deep and sustained floodwaters that have significant impacts on structures and infrastructure.

The LAND Alternative seeks to mitigate damage from flooding that is categorized at the lower end of catastrophic. This alternative is for greater than 100-year major flood events.

AN EQUITY FRAMEWORK

The LAND development process uses an equity framework in how it considers potential impacts on all individuals, property owners, and land uses most affected by flooding.



Options Considered

The development process considered three potential options before identifying the preferred alternative. These options ranged from non-structural floodplain restoration and management to the construction of 22.1 miles of new and expanded levees.

After extensive technical analysis and review at community briefings, the consensus recommendation was to implement all options presented, as described in the LAND Alternative.

PROJECTS · PROGRAMS · POLICIES

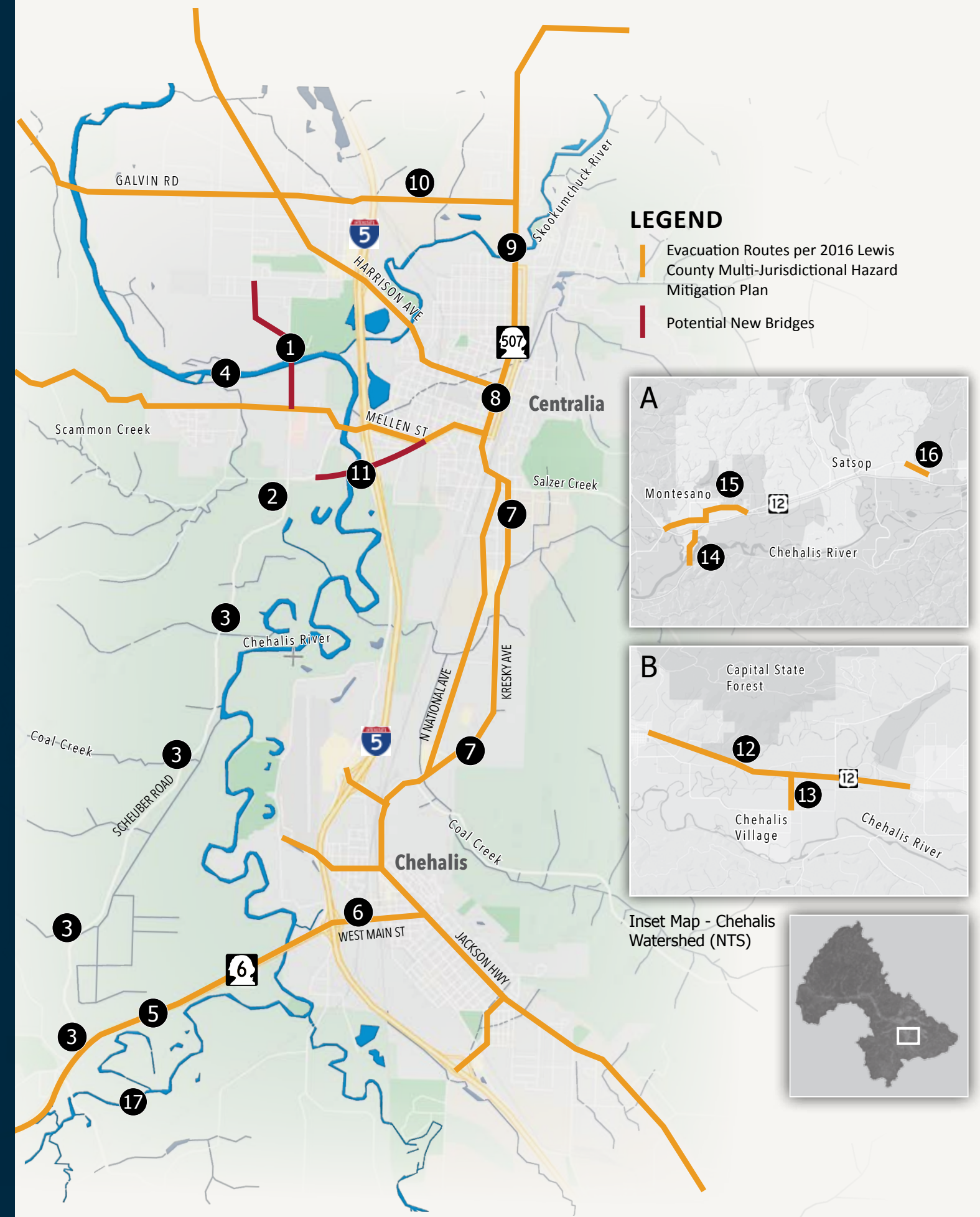
The LAND Alternative is a set of projects, programs and policies that are proposed as an alternative to the proposed flood retention facility on the Chehalis River near Pe Ell. The proposed projects, programs, and policies are designed to generate equitable outcomes for individuals and businesses living and working in all communities throughout the Chehalis Basin.

I. Projects

1. Transportation System and Accessibility

Roadway closures have a dramatic effect on emergency services and transportation—and hinder community recovery efforts after an event.

- 1 South Scheuber Road Bridge (Bridge)
- 2 South Scheuber Road–Graf Road Military Road (Raised Roadway)
- 3 South Scheuber Road–West Connection (Raised Roadway)
- 4 Cooks Hills Road (Raised Roadway)
- 5 State Route 6 (Bridge; Raised Roadway)
- 6 West Main Street (Raised Roadway; Levee)
- 7 National to Kresky Avenue (Raised Roadway; Levee)
- 8 State Route 507 (Levee)
- 9 Pearl Street and Pearl Street Bridge (Bridge; Raised Roadway)
- 10 Reynolds Road (Raised Roadway; Levee)
- 11 New Mellen Street Bridge–South (Bridge)
- 12 State Route 12 (Raised Roadway)
- 13 Anderson Road (Raised Roadway)
- 14 State Route 107
- 15 Montesano Bypass
- 16 Monte Elma Road
- 17 Old Highway 603



2. New and Expanded Setback Levees and Floodwalls

Levees would be needed to protect urbanized areas where it is unlikely that enough structures could be protected, raised, or relocated from the floodplain.

- 1 Adna High School (Levee)
- 2 Newaukum River (Levee)
- 3 Skookumchuck River (Levee)
- 4 Fort Borst Park (Levee)
- 5 China Creek (Levee)
- 6 Salzer Creek (Levee)
- 7 Chehalis-Centralia Airport (Levee)

3. Improved Channel Conveyance

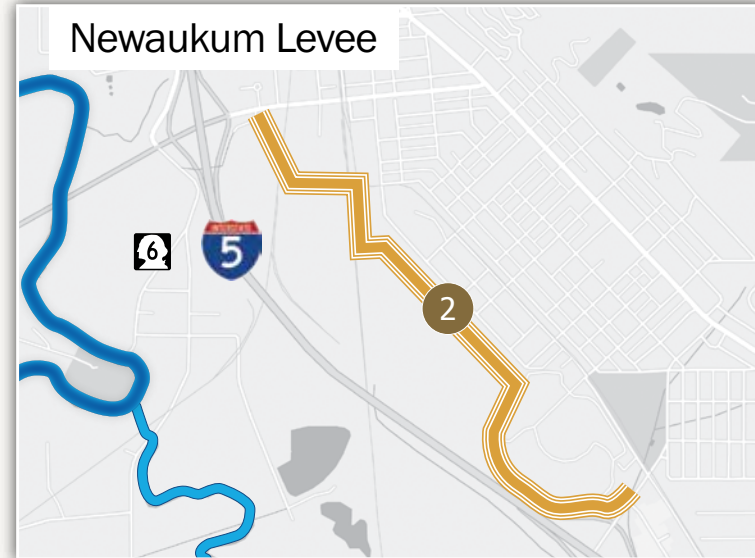
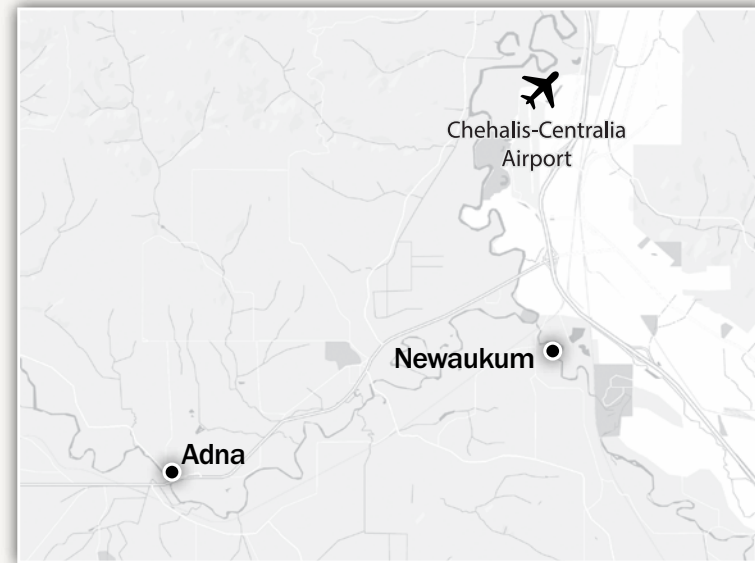
- 1 Improved conveyance will remove pinch points on the Chehalis River.

4. Channel Diversion

- 2 The Chehalis River Diversion intervention would reduce peak flood elevations by providing another path for flood waters.

5. Daylight China Creek (Daylighting)

- 3 Opening up the underground culvert where China Creek is buried—resurfacing the creek—would expand flood capacity of the creek and add a community amenity.



II. Programs

1. Safe Structures

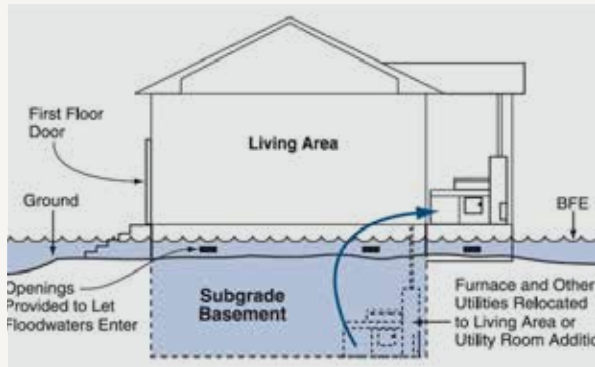
The Safe Structures Program would offer flood damage protection for valuable structures (residences, schools, businesses, etc.) that might remain in danger of flooding. The program would utilize a risk assessment analysis to determine the most effective mitigation approach from one of the following five levels:



LEVEL 1: INSURANCE



LEVEL 2: RELOCATE UTILITIES



LEVEL 3: FLOODPROOF



LEVEL 4: RAISE



LEVEL 5: RELOCATE

2. Community Resiliency

Educating Basin residents about flood risks and projected floodplain boundaries, emergency escape routes, refuge areas, and resources such as resilience hubs is crucial for each family to prepare and execute an emergency plan.

Resilience hubs are neighborhood centers equipped to support residents, coordinate communication, and distribute resources before, during, and after a crisis. Importantly, these hubs are established and managed by community members, often in partnership with local governments, and typically housed in an existing facility such as a community center, school, or place of worship.

3. Alignment with Aquatic Species Restoration Plan

The Aquatic Species Restoration Plan is a science-informed restoration roadmap for habitat and ecosystems along the rivers and streams of the Chehalis Basin, aiming to honor the social, economic, and cultural values of the region and maintain working lands.

The Quinault Indian Nation, the Confederated Tribes of the Chehalis Reservation and the Washington Department of Fish and Wildlife worked together with landowners, farmers, foresters, conservationists, and agencies to develop the plan.

4. Equity Set-Aside

An Equity Set-Aside program would provide resources to assist low-income households that are affected by flooding. Resources could take the form of funding assistance, low-interest loans, and technical assistance to assist households to better understand their options for coping with flood risk.

5. Floodplain Restoration

A critical component of the LAND Alternative is restoring floodplains, which provide improved hydrologic conveyance, reducing water velocities, filter debris, absorb flood waters, increase flood storage, raise groundwater tables, and create critical habitats for salmon and other terrestrial and aquatic species.

III. Policies to Reduce the Impact of Future Flooding

1. Economic Development, Land Use, and Growth Management

Updates to local Comprehensive Plans can establish the foundation for more resilient communities and prevent development in flood-prone areas in the future.

2. Building and Development Codes

Cities and counties will need to implement regulations such as zoning and development code revisions that establish new land use designations and additional flood protection.

3. Capital Facilities

Cities and counties should update Capital Facilities Plans, prioritizing facilities to serve receiving area development and emergency access projects, as applicable.

4. Funding

Estimated costs for the LAND Alternative range from a low of \$1.25 billion to a high of \$1.9 billion. Cities and counties could consider identifying existing or new funding sources for LAND projects and programs, including excise taxes, general obligation bonds, impact fees, local improvement districts, connection fees, and state and federal grants.

IDENTIFY THE SOLUTION
REDUCE THE IMPACT
PREPARE FOR THE FUTURE

Rendering of Existing: Looking North toward the hospital



Rendering of Proposed Diversion with New Mellen Street Bridge, Open Space and Recreation Amenities



Chehalis Levee Bridge View Sketch



Rendering of Proposed Diversion During a Flood



Borst Park Levee



Introduction

The Chehalis Basin is the State's second-largest river drainage system, made up of distinct landscapes: mountain foothills, farms, forests, small towns, and cities. Its elevation ranges from sea level up to around 2,700 feet on its highest mountain. It is the region's economic engine, a prime recreational destination, and home to many communities and tribes with deep cultural connections to the land. It is also the home of important and rare species of fish and aquatic wildlife that live in its wetlands, streams, and rivers. The Basin provides crucial nesting grounds for migratory birds and a wildlife corridor connecting the Cascades to the Olympics, and it is one of the state's most important wild salmon strongholds.

Both built and natural environments are subject to increased and often catastrophic flooding.

In 2012, Governor Gregoire created the Chehalis Basin Work Group to develop options for Basin-wide flood damage reduction and aquatic species habitat restoration. The Washington State Legislature created the Office of Chehalis Basin (OCB) and Chehalis Basin Board (CBB) in 2016 (members listed on the Acknowledgments Page). The Office of Chehalis Basin operates within the Washington State Department of Ecology and works with the CBB to oversee the development and implementation of the Chehalis Basin Strategy. The Chehalis Basin Strategy is long-term plan designed to both restore aquatic species and reduce flood damage for Basin communities.



Source: Office of Chehalis Basin

The Origins of the LAND Alternative

The Chehalis Basin Strategy establishes the framework for a suite of projects and programs many of which have been studied for many years. Since the 1930s, there have been approximately 1,000 studies that examined ways to reduce damage from major and catastrophic floods in the Chehalis Basin. As part of these studies, structural approaches such as infrastructure bypass options, levees, floodwalls, floodproofing, and flood retention facilities (dams) of various scales and locations have been assessed for effectiveness in reducing flood damage as well as mitigating and recovering from floods. Large-scale restorative flood protection actions, large-scale and localized buyouts, changes in land use management, and localized restoration actions have also been assessed for effectiveness in

reducing flood damage as well as mitigating and recovering from floods.

The focus and breadth of the technical work and policies to reduce flood damage increased following the devastating 2007 flood. This refocusing has included preparation of a State Environmental Policy Act (SEPA) Programmatic Environmental Impact Statement (PEIS; Ecology 2017) that evaluated a number of potential programs and projects, followed by two project-level Draft EISs (Ecology 2020 for SEPA and Corps of Engineers 2020 for the National Environmental Policy Act [NEPA]) that assessed impacts from a potential flood retention facility (FRE), all focused on reducing flood damage in the Chehalis Basin.

Source: Shutterstock



Local Actions Program

After extensive community feedback, it was clear that communities across the Basin had differing views on how to move forward and what actions should be taken to address flooding in the basin. In response to concerns expressed by communities, in July 22, 2020 Governor Jay Inslee directed the CBB to develop and evaluate a Local Actions Program that considered actions that would be needed in absence of the FRE. As a result, the CBB led two advisory groups (a technical advisory group and an implementation/

policy advisory group) to develop the Local Actions Program (LAP), a series of basin-wide flood damage reduction options. The advisory groups identified projects and actions that would be needed in the absence of the proposed FRE, as well as how a LAP (or individual projects within the program) might differ if implemented in conjunction with the proposed FRE. The advisory groups considered the following:



Floodplain storage



Structural actions such as levees



Structure elevations and floodproofing



Buyouts, relocations, and changes to land use management requirements



Updated land use and development regulations

Local Actions Non-Dam Alternative

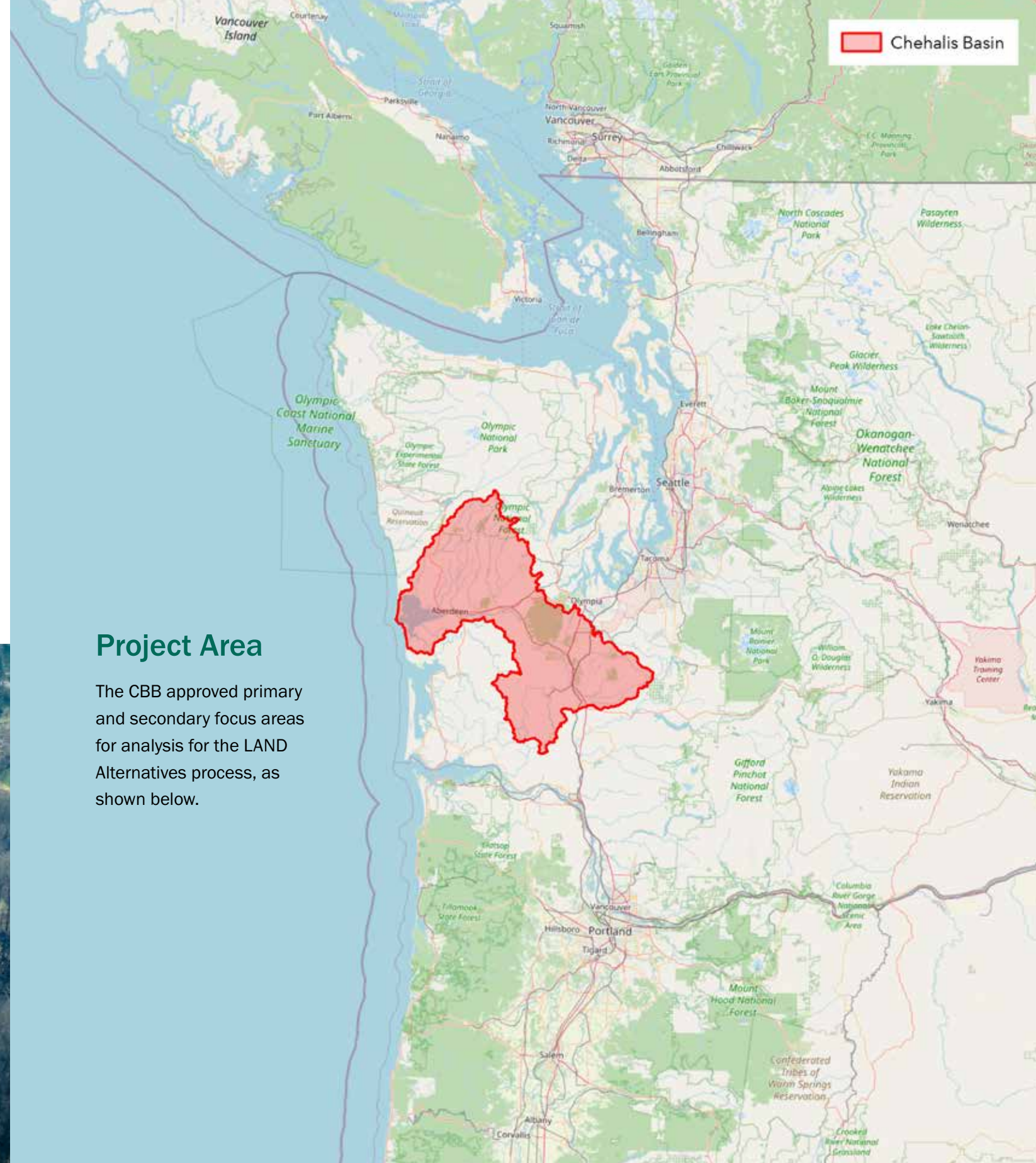
In 2021, the CBB approved funding for the next steps in developing a comprehensive Basin-wide flood damage reduction roadmap that can be incorporated into the long-term Chehalis Basin Strategy. The LAND Alternative builds upon the LAP advisory group options and previous studies to provide the CBB, other decision makers, and the public with a credible alternative to the proposed FRE on the upper Chehalis River.

The LAND Alternative was established to address the many needs of people in the Chehalis Basin—soliciting input from local business and the agricultural community, tribal governments, community members, technical experts, and the area’s city and county departments—to develop credible recommendations.

To be successful, the LAND Alternative must show that a comparable amount of flood damage reduction could be achieved without the FRE on the Chehalis River.

Change can involve difficult and sometimes painful discussions. Resiliency after a flood event rests on the community’s ability to meet a challenge head on and adapt—while maintaining its identity. The LAND Alternative described in this plan establishes a series of projects, programs, and policies that provide multiple opportunities to bolster existing flood damage reduction activities, while also identifying larger and more complex infrastructure solutions.

Source: Office of Chehalis Basin



Project Area

The CBB approved primary and secondary focus areas for analysis for the LAND Alternatives process, as shown below.

Vicinity Map

Chehalis Basin Briefing Book

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Primary Focus Area



The Primary Focus Area includes the mainstem of the Chehalis River upstream of its confluence with the Skookumchuck River, including the major tributaries to the mainstem in the upper basin: Skookumchuck, Newaukum and South Fork Chehalis Rivers.

Secondary Focus Area



The Secondary Focus Area includes the mainstem and major tributaries of the Chehalis River downstream of the Skookumchuck River, including the Black, Satsop, Wynoochee, Wishkah and Humptulips Rivers.

LAND Steering Group

The CBB created the LAND Steering Group to guide the process and provide consensus recommendations to the Board, identifying the most optimal and feasible alternatives that could meet the CBB's targeted outcomes without the need for an FRE. LAND Steering Group members (listed on the Acknowledgments Page) represent more than a century of living in the Chehalis Basin and all hold vested interests in the safety of the basin and its communities.

The CBB provided the LAND Steering Group with the following targeted outcomes to help guide deliberation and discussion:

Valuable Structures Protected from Mainstem, Catastrophic Flooding:

The amount of existing homes, businesses and public buildings in the focus area that could be vulnerable to flood damage by current or 2080 predicted 100-year flood levels in the basin would be significantly reduced, because they are protected by localized infrastructure, flood-proofed/elevated, or the structure has been removed.

Critical Facilities Protected: The amount of critical facilities in the focus area that could be vulnerable to flood damage by current or 2080 predicted 100-year flood levels would be significantly reduced, because they are protected by localized infrastructure, elevated/flood-proofed, or relocated.

Farmland and Rural Structures Protected:

The number of locations where migrating river channels and bank erosion pose a high risk of near-term damage to valuable structures or loss of economically productive land uses would be significantly reduced while protecting ecological processes.

Environmental Justice Advanced:

Communities with environmental justice concerns would suffer less hardship and damage from flooding, would not be disproportionately burdened by actions to reduce flood damage, and would be improved by flood solutions.

The LAND Steering Group began its series of monthly meetings in November 2021, exploring a range of potential projects and programs that included both structural and non-structural interventions and actions: large and small-scale infrastructure, floodproofing structures, incentives and other mitigation efforts that can help reduce flood damage to the Basin's people, property, and natural resources.

The LAND Steering Group provided its preliminary consensus LAND Alternative recommendations to the CBB in January 2023. The LAND Steering Group presented its final recommendations to the CBB at its April 2023 meeting.

Public Input and Discussion

The LAND Alternative process included extensive conversations with local community leaders, the Quinault Indian Nation (QIN) and Confederated Tribes of the Chehalis Reservation, technical experts, elected officials, and the Basin communities. The types of engagement implemented ranged from individual meetings with interested parties to Basin-wide events that brought together a range of participants with diverse interests and experiences.

INTERESTED PARTIES MEETINGS AND FOCUS GROUPS

The Project Team met with several community leaders throughout the Basin to understand the background of flooding, review current proposals for flood damage reduction in the Basin, and discuss other issues that should be considered as part of the LAND development process. While not exhaustive, these initial meetings helped lay the foundation for the project and started meaningful conversations about LAND. The results directly informed the project's scope and direction.

SITE TOUR

The CBB and LAND Steering Group members, staff from cities and counties, elected officials, and Project Team members took part in a half-day site tour to meet with local landowners affected by flooding, observe areas damaged by previous floods, and view flood damage reduction projects that have been completed recently to address flooding. The site tour encouraged participants to discuss key issues in the Basin and consider the diverse perspectives represented in the LAND process.

MONTHLY CHEHALIS BASIN BOARD MEETINGS

The CBB was updated regularly on the LAND alternative development process during its monthly meetings. The Project Team was introduced to the CBB in February 2023, and it provided additional details and responded to requests for input at subsequent meetings. The LAND Alternative was presented to the CBB in April 2023, with follow-up discussions with the CBB through August 2023.

CHEHALIS BASIN VALUES PLANNING WORKSHOP AND ONLINE SURVEY

The LAND Alternative development process began in earnest in May 2023 with the Chehalis Basin Values Planning Workshop, a two-day event that established the foundation and vision for LAND and presented potential concepts for further refinement. Over 60 people attended the Values Planning Workshop (including staff working on other flood projects in the region) and identified a number of critical areas to address, including infrastructure and natural systems, agriculture and forestry, economic development and housing, recreation and education, and land use. Key outcomes from this meeting included the values described in Chapter 3 that have guided the various components of LAND throughout the process. Additionally, approximately 200 members of the public provided input through an online survey, which offered participants the opportunity to weigh in on the values established at the workshop, as well as to describe their own personal experiences with flooding.

COMMUNITY PRIORITIES WORKSHOP

Using information gathered from the Values Workshop, online survey, and other outreach, the Basin community came together again in January 2023 to review LAND concepts, which included potential projects, programs and policies that could be packaged together in various ways to address flooding in the Basin. Options includes both structural and non-structural elements as well as programs and policies to reduce impacts of flooding for those where structural solutions such as levees would not provide protection. Approximately 75 people attended the event. The information gathered provided additional information necessary for the Steering Group to develop the LAND Alternative that was presented to the CBB in April 2023.

ONLINE AND IN-PERSON COMMUNITY BRIEFINGS

In February 2023 the Project Team presented a webinar that described the flood damage reduction concepts discussed during the Community Priorities Workshop in January 2023. The Project Team facilitated a discussion with community members about the tradeoffs of each of the concepts and also explained the next steps for the project. The webinar was recorded and can be accessed on the Chehalis Basin Strategy website.

As part of its ongoing outreach, the Project Team also presented to and facilitated discussions with many local community and environmental organizations, city council and county commissions, state agencies and Tribal governments. The Project Team presented to the following organizations and agencies:

- Cities of Chehalis and Centralia City Councils
- Lewis and Thurston Counties Board of County Commissioners
- Confederated Tribes of the Chehalis
- Quinault Indian Nation
- Washington Department of Ecology
- Washington Department of Transportation
- Washington Department of Fish and Wildlife
- Lewis County Fire and Emergency Response Committee
- Lewis County Flood Authority
- Chehalis River Alliance
- Citizens for a Clean River
- American Society of Civil Engineers Water Resources Group
- Sierra Club

Input gathered during these meetings provided additional information to the LAND Steering Group as they developed recommendations for the LAND Alternative.

2

The Chehalis Basin

A History of Flooding

Flooding is a natural part of the Chehalis Basin's ecology, with minor flooding occurring every two to five years and a major flood event occurring approximately every ten years, on average.

The past decades have seen intensive land use and man-made changes to river flows. In addition, climate change has made heavy rains and flooding more common—making the situation potentially catastrophic.

Within the last 50 years, major floods occurred in 1972, 1975, 1986, 1990, 1996, 2007, 2009 and 2022. With the impacts of climate change, flooding has become increasingly severe—the 1996, 2007, 2009 and 2022 floods are the four largest floods on record, and the 2007 and 2009 floods occurred only 14 months apart.

Flooding puts homes, businesses, towns, and fish and wildlife at risk. As flood events become more common and intense, local communities bear the impacts. Much of the damage from recent major floods occurred in Chehalis and Centralia, where there has been more development in the floodplain than in other areas of the Basin. The 1990, 1996, 2007, 2009 and 2022 floods all resulted in the loss of homes, farms and businesses, as well as closures of Interstate 5.

2022 FLOODING DAMAGE IN THE BASIN

Lewis County:

\$3,996,744 in public damages (reported by cities and taxing districts)

\$1,613,774 in individual damages (reported by 141 residents and 10 businesses)

Thurston County:

\$2,640,000 damages total (public infrastructure and private)

\$1,400,000 in private industry damages (reported by 100 residents and two businesses)

Grays Harbor County:

\$800,000+ in public damages (across 12 jurisdictions)

\$3,127,145 in primary residence damages (structure and personal property)

\$265,200 in business damages (structure, furnishings, inventory, etc.)

Source: Office of Chehalis Basin

Note: Preliminary numbers

Chehalis Basin Timeline: The Last 100 Years

MINOR, MAJOR, CATASTROPHIC?

Minor flooding usually results in minimal or no property damage, but there might be some public threat. Those will likely happen with great regularity.

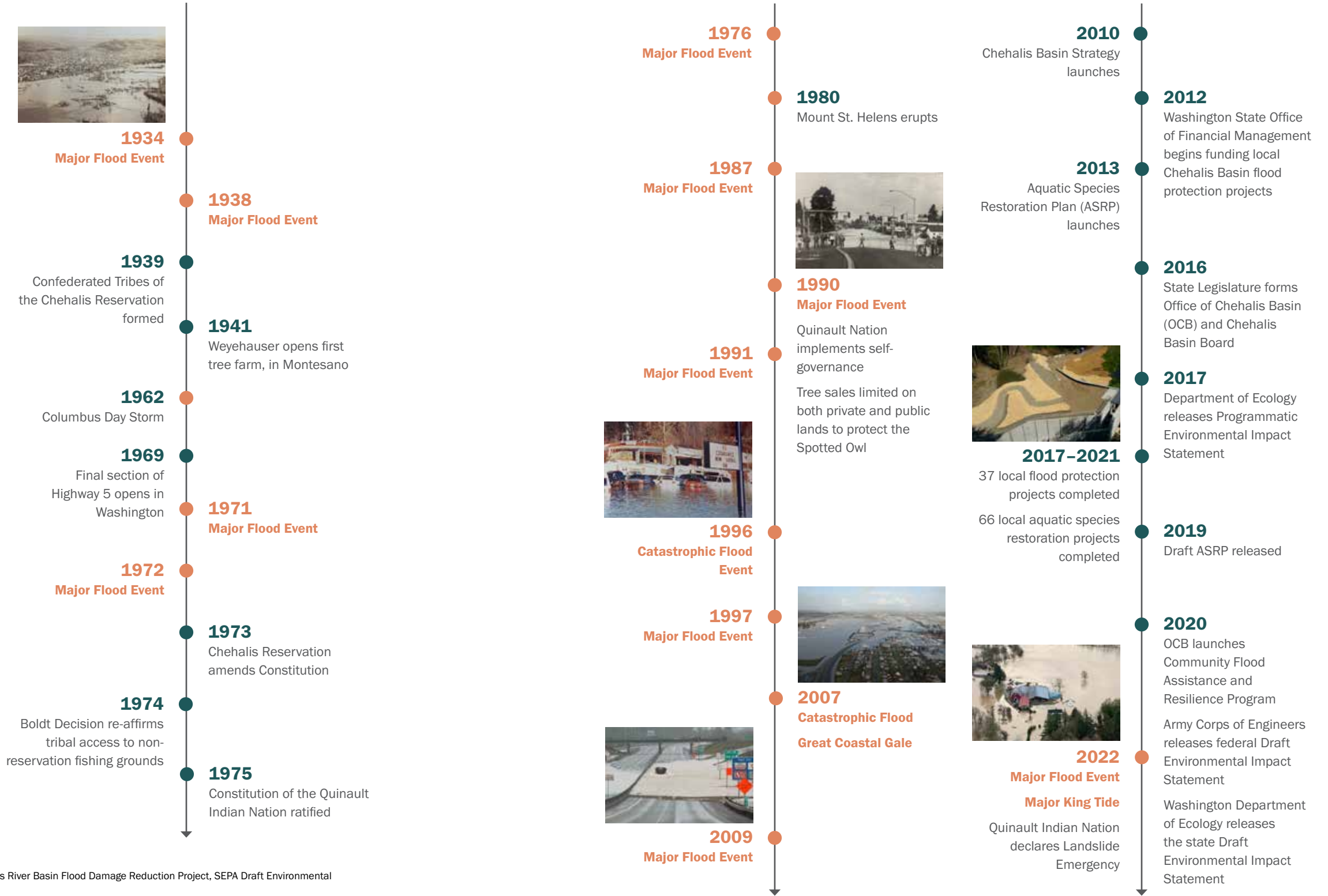
A major flood (100-year) on the Chehalis River is when water is flowing at more than 38,800 cfs at the Grand Mound gauge. A catastrophic flood (500-year) is water flowing at more than 75,000 cfs.

Native Peoples

The Quinault, Chehalis, and other tribes have called the Chehalis Basin home for centuries. This is their ancestral land.

European Settlers

Settlers arriving from points east established townships in the Chehalis Basin starting around the 1850's.



Sources:

- Flood Data: State of Washington Department of Ecology, Proposed Chehalis River Basin Flood Damage Reduction Project, SEPA Draft Environmental Impact Statement, Appendix N: Water Discipline Report, 2020
- Tribal Timeline: Northwest Portland Area Indian Health Board Website, Washington Tribes, Chehalis Tribe and Quinault Indian Nation
- Chehalis Basin Strategy Overview Brochure

Regional Importance

The Chehalis Basin provides tremendous value to the entire region: to residents and visitors, to businesses throughout Washington and Oregon, and to commercial and private transportation along the entire West Coast.

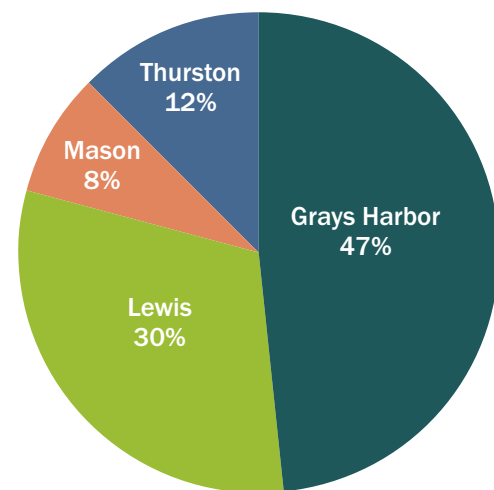
In aiming for a multi-benefit approach to flood damage reduction—balancing water supply, habitat and species conservation, recreation planning, and land use and economic development—the Chehalis Basin Strategy and the LAND Alternative development process seek to balance structural interventions that affect the natural flow of water with programs that minimize negative environmental and cultural impacts.

Navigating diverse cultural, economic, and ecological issues; juggling multiple objectives and stakeholder needs; and addressing the complex challenges of climate change make the Chehalis Basin a microcosm of challenges of the broader region.

The State of Washington prides itself on its commitment to sustainable solutions that combat climate change. Chehalis Basin Strategy’s comprehensive and inclusive approach can provide a template for other communities facing similar concerns.

Communities in the Basin

Over 190,000 people call the 2,700-square-miles of the Chehalis Basin area home. Most of the population lives in Grays Harbor County, followed by Lewis, Mason, and Thurston County.



Source: United States Census Bureau

The area is planning for growth—approximately 220,000 people are projected to live in the Basin by 2025. Growth is predicted to continue beyond 2025 as well.

The Washington State Employment Security Department estimates that the Basin’s population will increase by about 42,000 people by 2040; Grays Harbor County as a whole will increase about 3%, Lewis County by 12%, Mason County by 27%, and Thurston County by 27%.

Another four counties share a combined total of 3% of population of the Basin: Pacific, Cowlitz, Jefferson, and Wahkiakum.

Census data shows that the Basin has lower population and housing density than the state average, although the average household size is similar to the state. Income is lower than the state average across all metrics. Most of the population has a high school education, followed to a lesser degree with some college but no degree. Most families own the home they live in, but the average median home income is lower than the state average.

Population Characteristics

	Quinault Reservation*	Chehalis Reservation/Off-Reservation	Chehalis Basin	Grays Harbor County**	Lewis County	Washington State
Population	1,272	847	192,881	71,734	75,382	6,899,123
Population Density (sq. mile)	4.1	124.2	71.4	38.3	31.4	101.2
Housing Density (sq. mile)	1.5	41.1	32.4	18.5	14.2	43.4
Average Household Size	3.19	3.47	2.4	2.51	2.52	2.55
Median Household Income	\$29,659	\$39,318	\$50,265	\$43,379	\$42,917	\$60,294
Owner Occupied Housing	61.1%	57%	67.8%	69%	67.8%	62.7%
High School Degree	34%	41.1%	29.5%	31.4%	32.2%	23.3%
BA Degree	9.3%	7.4%	13.4%	10.5%	8.6%	20.6%

Source: USCB 2020a,b,c,d.

*QIN reservation lies outside of the Chehalis Basin

**Countywide population

Population Centers in the Upper Basin

ADNA

Unincorporated Adna, in the rural farm country of Lewis County, is next to the Chehalis River about six miles south of the City of Chehalis. The US Census defines Adna as a “populated place.” The Adna School District serves a population of about 3,500. Adna boasts many acres of fertile farmland and a small commercial center that serves surrounding residents.

CHEHALIS

At a point almost exactly between Seattle and Portland, straddling Interstate 5, is Chehalis. With a population of about 7,700, it is also the county seat of Lewis County. The historic downtown and most of the city’s amenities lie on the east side of the freeway nestled at the base of forested hills. On the west side of the freeway are parks, farms, housing subdivisions and a centralized shopping district, the Twin City Town Center. The Chehalis–Centralia Airport, just west of the freeway, does not have commercial flights but averages about 130 private flights a day.

CENTRALIA

Centralia began as the site of a toll ferry at the confluence of the Chehalis and Skookumchuck rivers, and the stopping point for stagecoaches between Kalama and Tacoma. It was primarily a logging and mining town. In 1980, the explosion

of Mount St. Helens destroyed or damaged much of the area’s stockpiled lumber and salable timber, which devastated an industry already in decline. The City reinvented itself as a historical district and has found new life as a shopping destination, based on its central location between Seattle and Portland. Centralia is experiencing growth in both its light industry areas as well as its core business district. And new regional distribution and transportation facilities, along with in-migration from retirees from more populated counties to the north, have helped diversify the economy. It’s seen a 60% growth in population during the past four decades; over 18,000 people now live there.

PE ELL

Located high in the hills of the upper Chehalis watershed, Pe Ell has a population of about 650. The site was established by farmers in the 1850s, but the local industry soon switched to logging. The town today is the starting point of the Pe Ell River Run with entrants floating down the Chehalis River in mostly homemade crafts. The proposed FRE would be located just above the town.

There are also a number of communities north of Grand Mound in the lower Chehalis Basin. These include Rochester and Oakville, Elma, Satsop, Montesano and Aberdeen at the mouth of the Chehalis River.

Confederated Tribes of the Chehalis Reservation and the Quinault Indian Nation

The Chehalis river system has long been—and continues to be—an integral part of the culture, economy, history and spiritual identity of the Chehalis, Quinault, and other tribes of the region.

Native peoples, many of whom now make up the Confederated Tribes of the Chehalis Reservation (Chehalis Tribe) and the Quinault Indian Nation (QIN), have called the Chehalis Basin home or have traveled to the Basin for spiritual journey and sustenance, for thousands of years. The Chehalis Tribe and QIN originally occupied and traveled throughout an extensive region stretching westward from the Cascade Mountains to the Pacific Ocean. The traditional territories of the Chehalis Tribe were along the entire Chehalis and nearby rivers, as well as near Grays Harbor and the lower Puget Sound. The Quinault Indian Nation’s ancestors historically lived along the Coast of Washington and roamed throughout a traditional territory that included the entire Chehalis River Basin. In the mid-1800’s, the federal government reservations and the Tribe were displaced from their original homes to these locations.

The Chehalis Tribe’s Reservation is about 4,440 acres along the northern banks of the Chehalis River southeast of Oakville and contains about 10 river miles of the Chehalis River and three river miles of the Black River upstream from the mouth. The Chehalis Tribe rejected the unacceptable terms of treaties offered by the U.S. government and are a federally recognized “non-treaty” tribe. Its status as a non-treaty tribe has affected the Chehalis’ hunting and fishing rights.

The Quinault Indian Reservation is about 200,000 acres around Taholah at the mouth of the Quinault River—one of the largest among the 29 federally recognized sovereign tribes in Washington State. The Quinault signed the Treaty of Olympia, in which it reserved the right of “taking fish at all usual and accustomed fishing grounds and stations”—which includes all streams that flow into Grays Harbor—and the privilege of hunting and gathering, among other rights, in exchange for ceding lands it historically roamed freely.

Source: Office of Chehalis Basin



Transportation Corridors

I-5 is the major north-south route along the West Coast, from Mexico to Canada. When it is closed, the entire West Coast feels an economic ripple effect. The I-5 corridor was closed for several hours in 1990, for four days in 1996 and again in 2007, for two days in 2009, and for several hours in 2022. Under current conditions, the Washington State Department of Transportation (WSDOT) predicts I-5 could be closed for as many as five days during a catastrophic flood in the Chehalis-Centralia area. A closure that long would drastically affect interstate commerce and impede local access to critical medical facilities.

During flooding events, no viable detours are available because feeder roads and local streets and highways are also flooded or gridlocked with diverted traffic.

Past flooding has also affected State Route 6 and U.S. Route 12 as well as major roadways in Lewis, Thurston, and Grays Harbor counties; the Centralia-Chehalis Airport; and railroad facilities. In addition to extensive cleanup and repair costs, flood closures also result in lost productivity and revenue for businesses each time I-5 is closed.

Economies of the Basin

The 2,700-square mile Chehalis River Basin is a unique mosaic of distinct economic communities: industry and agriculture, forestry, and fishing and all the community-based supporting business and services. These industries, whether large-scale or community-serving, are both economically and culturally important for the identity of the Basin. They also have been instrumental in shaping the physical characteristics of the Basin and how it responds to flooding.

The timber industry plays a huge role in the Basin's economy. The dense forests

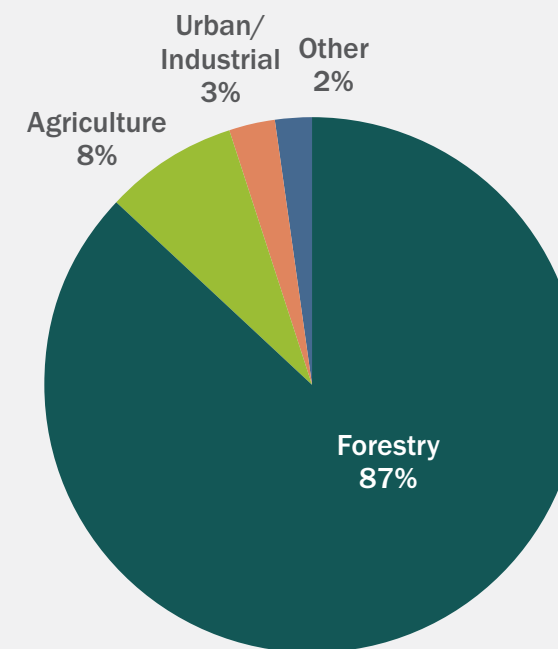
of cedar—along with spruce, hemlock and Douglas fir—attracted large numbers of loggers and mill operators from the 1800s to the early 1900s, eager to harvest as much as they could, as quickly as they could, clear-cutting old growth forests.

The last 150 years of human development have altered the natural operations of Basin's ecosystem. While flooding has been documented in the region for hundreds of years, salmon populations have declined precipitously since the area was colonized.

Source: Shutterstock

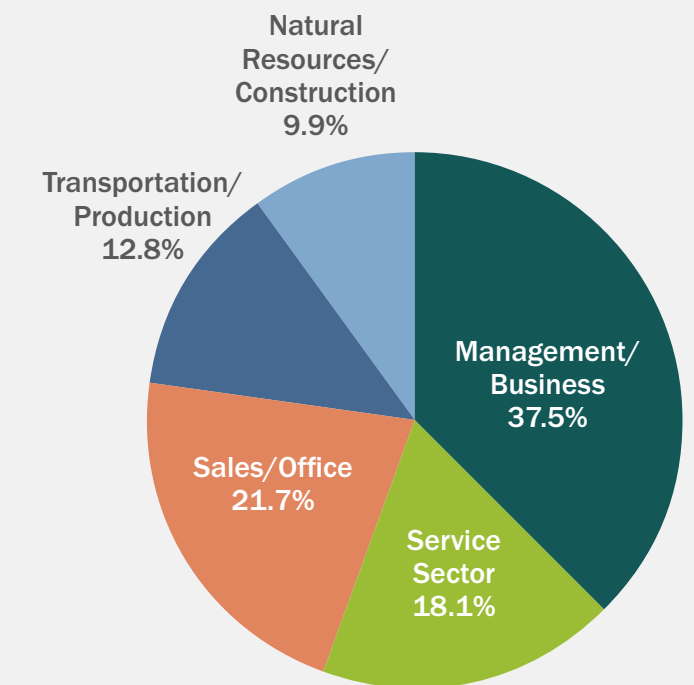


Percentage of Basin Lands



Source: Office of Chehalis Basin

Employed Population in the Basin



Note: Civilian sector, 16 years and older.

Source: Resource Dimensions, 2020 (USCB, 2019c)

Fisheries and Wildlife

The Chehalis Basin is a fertile ecosystem with abundant wildlife. The Chehalis River and its tributaries are home to some of the most culturally and ecologically important species in the region, including steelhead, chinook, coho, and chum salmon. The Chehalis Basin is also unique in Washington in that no salmonids are listed as threatened or endangered, although spring chinook are currently being evaluated to determine if they should be listed. Also important to the ecosystem are freshwater shellfish and the aquatic macroinvertebrates that fish feed on, as well as the local bird species that rely on the availability of fish for food. These waters also provide important habitats for the largest array of amphibians in the state, including the Oregon spotted frog which is listed as endangered or threatened species.

Fishing and shell fishing are a core part of the Basin's identity, both in terms of economic sectors (tribal and non-tribal commercial fishing industries and sport fishing) as well as for their cultural significance for tribes and non-tribal fishers. Salmon runs have declined precipitously, due to a combination of lost and damaged habitat, changing climate conditions, and development. Estimates show that habitat for salmon production has already been reduced by as much as 80-87% from historic levels.

Existing salmon populations are now less than 50% of their historic run sizes, with spring chinook salmon currently just 23% of historic run sizes in the Chehalis Basin overall.

Other estimates indicate even more significant reductions. Recent modeling shows salmon declines in the Upper Chehalis as high as 97.9% for spring chinook, highly prized as the first salmon species to return to the rivers in the spring. Modeling also shows salmon in the Upper Chehalis River are down 92.4% for coho, 81.4% for fall chinook and 76.7% for steelhead.

Scientists, researchers, and technical specialists say if no action is taken the Basin could lose Chehalis River spring chinook salmon entirely in 60 years. The Basin could also lose a significant percent of the economically-vital steelhead runs in that same period. In most years, both tribal and non-tribal fishers have had to limit harvests or forego them entirely to protect the most vulnerable species. In the future, without aggressive protection and restoration, Upper Basin salmon and steelhead populations are predicted to drop 70% from current levels, and by the late century spring-run chinook, coho, and steelhead could disappear entirely from Rainbow Falls to Crim Creek. Future flood damage reduction projects could also have an impact on the health of the Basin's fisheries.

Salmon Loss in the Chehalis River

Species	2016 Analysis		
	Historic Levels	Current Levels	% Loss
Coho	538,000	41,000	92.4%
Fall Chinook	140,000	26,000	81.4%
Spring Chinook	70,000	1,500	97.9%
Winter Steelhead	30,000	7,000	76.7%

Source: 2016 Report to the Quinault Indian Nation by Larry Lestelle
 Note: Based on EDT modeling; numbers are from ICFI. Chum not included.

Source: Chronicle



Current Agricultural Activity

The Chehalis Basin has rich soil, a mild climate, and proximity to large population centers for access to local markets. As a result, the ~200 working farms in the Basin—providing both livestock and crops—produce \$650 million in revenue annually (including the “economic multiplier” effect from local job creation).

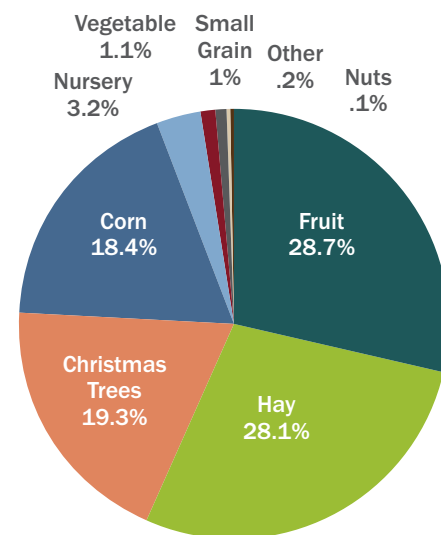
The value of livestock surpassed crops in all counties except Grays Harbor, where the value of crops and livestock production are about equal (as of 2017).

Most agricultural land—just under 300 square miles—are located within low-lying valleys west of the Chehalis River and along its major tributaries (the South Fork Chehalis, Newaukum, Skookumchuck, Black, Satsop, and Wynoochee Rivers and Scatter Creek). When the rivers flood, this agricultural land also floods.

Although cultivated cropland represents less than one percent of the total land area in the Basin, almost half the land along the mainstem of the Chehalis River is used for agricultural purposes (including pasture for livestock). Principal crops include fruits such as blueberries, cranberries, and grapes; alfalfa, Christmas

trees, hay and silage, corn with some nursery stock, vegetables, and small grains. Impacts to agriculture are highly dependent on the scale and severity of flooding. While some areas may benefit from periodic flooding, other areas can be adversely affected by debris and damage brought by floodwaters, as well as the negative economic impacts brought about by road closures and lack of access to markets.

Agricultural Crops



Source: Office of Chehalis Basin

Recreation

Both Basin residents and visitors from Washington and Oregon enjoy the fishing, hiking, camping, birdwatching, kayaking, canoeing, whitewater rafting, hunting, and golfing that the area offers. On the Chehalis River, three main recreational facilities have experienced severe damage during flooding: Rainbow Falls State Park, Southwest

Washington Fairgrounds, and the Willapa Hills State Park Trail. Others have experienced less severe flooding that can often damage and close the facility. With continued flooding, more users would be affected by closures, which would also have an economic impact on communities like Chehalis, Centralia, and Pe Ell.

Ecosystem Services

The QIN Indian Nation sponsored a 2020 study by Resource Dimensions, whose findings were published in a technical report titled “Economic Value of Chehalis Basin Ecosystem Services”. The report states:

From an ecological economics perspective, the goods and services provided by the Chehalis Basin landscapes are both vital to the functioning of the regions ecosystems and contribute significantly to the human welfare of the Basin’s residents...For example, salmon is a cultural foundation, as well as economic, with important cultural ties to local customs and traditions and identity.

Ecological economics addresses the relationships between natural ecosystems and human economic systems by accounting for the natural environment as a form of natural capital and valuing the goods and services delivered by those ecological systems. “The Chehalis Basin provides an estimated minimum of \$1.1 billion to upwards of \$15.7 billion in ecosystem service benefits annually,” the study finds. And during the next 100 years, the Chehalis Basin will provide “\$49.1 billion to \$233.7 billion.” The wide range reflects a conservative approach, and the study notes that even the high range may be an underestimate.

Source: Chronicle



3

Building the LAND Alternative

The LAND Alternative, developed by the LAND Steering Group and presented to the Chehalis Basin Board, is an alternative to a proposed FRE on the Chehalis River near Pe Ell. While many of the proposed actions have been considered in the past, the LAND Alternative is the a comprehensive effort to address the complex issues of flooding in the Chehalis Basin. It puts forward a combination of new and extended levees; Chehalis River channel modifications; and acquisition, retrofitting, and relocation of structures; as well as restoration efforts and policy changes that together will reduce flood damage. While LAND has been developed independently of the FRE proposal, components of the LAND Alternative could potentially be implemented in concert other proposals, depending on the outcomes of CBB decisions and with environmental review and approvals.

Some programs, such as acquisition, retrofitting, and relocation of structures, would likely occur under either the LAND Alternative or the FRE. The LAND Alternative assumes that acquisition, retrofitting, and relocation of structures is an integral part of the the overall flood damage reduction strategy.

Community-based flood damage reduction must be firmly rooted in values shared across the Basin—the values that tie the Basin together as a community—and lead to solutions that address all community needs. In May 2022, community leaders, public officials, non-profits, tribes, advocacy organizations, and others created a set of shared values to guide how community-based flood damage reduction can be achieved. These include:



FAMILY, CULTURE, HERITAGE

The strength of the Chehalis Basin comes from its people and the diverse heritages, cultures, and experiences they represent.



NATURAL WONDER

We value Chehalis Basin's unique environment, employment and recreation options, and a home to a wide array of animal and plant life.



ECONOMIC VITALITY

We strive to support local economies, keeping Chehalis Basin businesses robust. A thriving regional economy inspires innovation.



TRUST, RESPECT, SELF DETERMINATION

The future of the Chehalis Basin must be decided by the community itself. We recognize and respect the rights of Tribal Nations and all private property owners in the Chehalis Basin.



PUBLIC SAFETY AND RESILIENCY

Safeguarding our communities from the negative impacts of flooding is fundamental. Adequate infrastructure should ensure regional resiliency.



HEALTHY ENVIRONMENT AND HEALTHY PEOPLE

We envision a solution that prioritizes the well-being of our people and our environment.

Basin residents and businesses that are most affected by flooding often have the least ability to recover after an event. The LAND Alternative includes a framework that equitably considers potential impacts on all individuals and property owners, as well as land uses most affected by flooding during a major flood event that could occur in the late-century—in the year 2080.

The LAND Alternative Development Process

The LAND Alternative was developed using a series of shared values to frame the technical analysis and identify ways to reduce flood damage and speed recovery after an event.

The process reflects the desire for local solutions that can be applied basin wide. It identifies a series of potential infrastructure interventions to reduce damage to existing structures, as

well as local infrastructure projects necessary to maintain emergency access in the event of both catastrophic floods and the smaller, more frequent floods common in the Basin. In addition, the LAND Alternative identifies programs and other opportunities to increase preparedness and resiliency, and acquisition, retrofitting, and relocation of structures located within the floodplain.

LAND Alternative Development Process



Determine the target level of protection



Determine the mix of infrastructure protection, structure protection, and potential relocation



Determine the extent to which the natural systems of the floodplain can be restored through environmental design

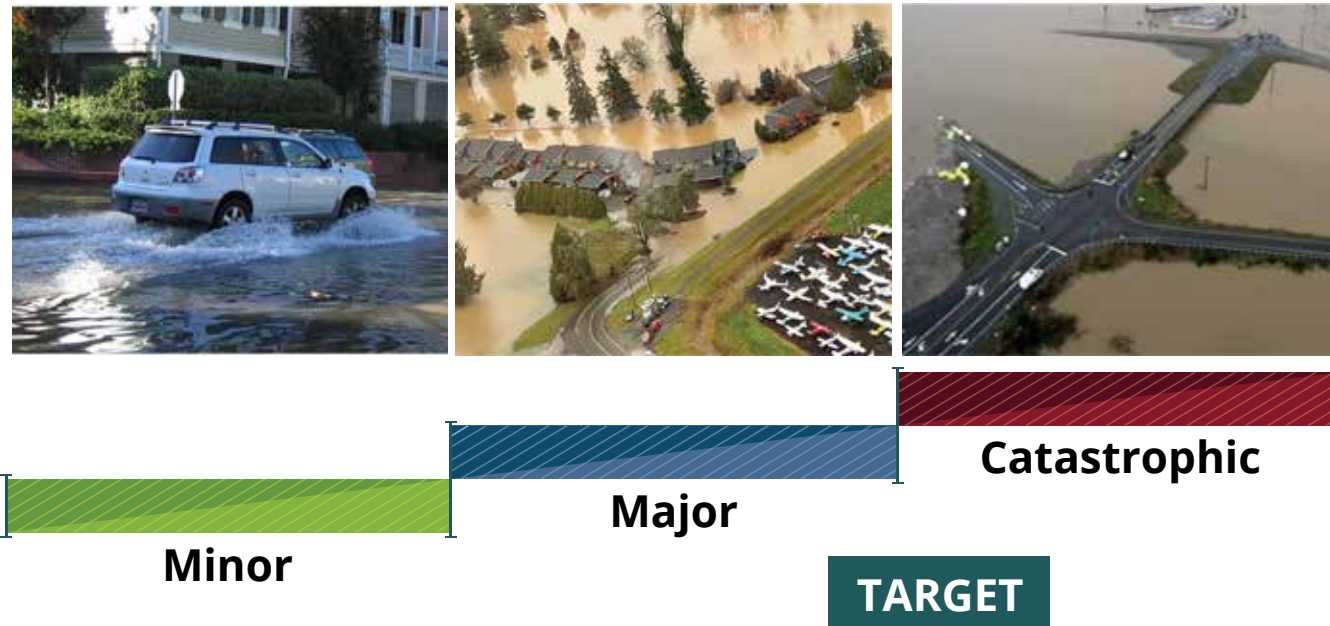


Determine the number and extent of resiliency elements and programs



Determine funding, project management entity, and implementation

Targeted Flood Damage Reduction Levels



MINOR EVENTS

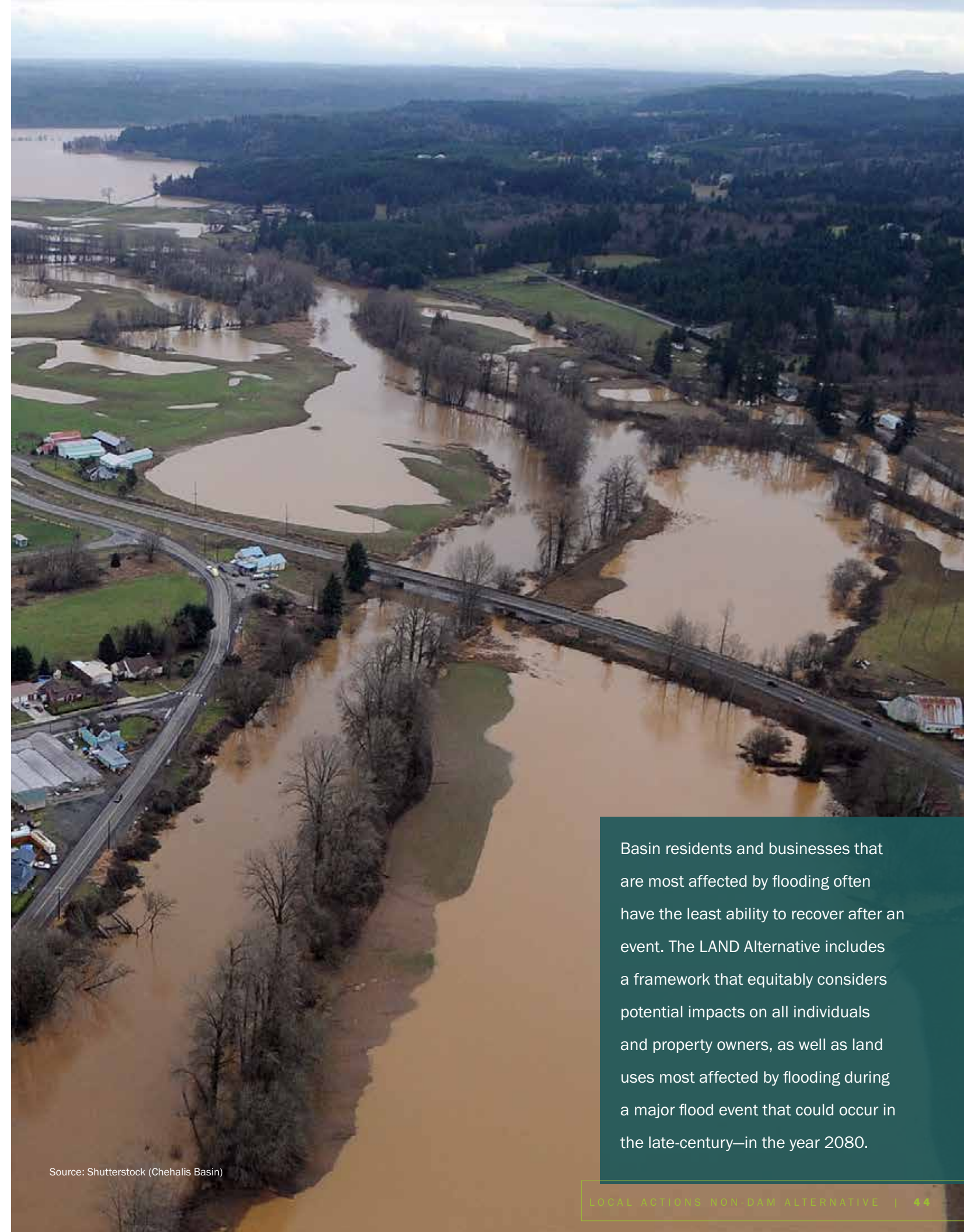
More frequent events that typically happen every few years. These events may have some localized damage to areas within the floodplain, damage roadways, and other infrastructure, but are not life threatening

MAJOR EVENTS

Major events typically happen less regularly, but cause significantly more damage in the Chehalis Basin. Major Events are categorized as 100-year events where there is more than 38,800 cfs at the Grand Mound gauge. Example events include the 2009 and 2022 floods.

CATASTROPHIC EVENTS

Catastrophic events are larger and more severe than 100-year events where floodwaters reach more than 75,000 cfs at the Grand Mound gauge. These types of events affect many areas in the basin with deep floodwaters for a prolonged period of time and that have a significant impact on structures and infrastructure. Examples of catastrophic floods include the 1996 and 2007 floods.



Source: Shutterstock (Chehalis Basin)

Basin residents and businesses that are most affected by flooding often have the least ability to recover after an event. The LAND Alternative includes a framework that equitably considers potential impacts on all individuals and property owners, as well as land uses most affected by flooding during a major flood event that could occur in the late-century—in the year 2080.

Guiding Principles

The LAND development process uses an equity framework in how it considers potential impacts on all individuals, property owners, and land uses most affected by flooding. Equity is embedded in the process, from early development of the potential project elements described in this document to existing and future analysis to develop implementation recommendations.

Based on input from community leaders, non-profits, tribes, advocacy organizations, and a community online survey, the LAND Steering Group developed a set of Guiding Principles that provided direction for how any potential implementation measures are developed and could be administered—whether infrastructure and restoration, programs, or a combination of options.



1. All properties that might be adversely affected by any of the LAND Alternative flood protection interventions would be **mitigated at little or no cost** to the affected property owner within the legal requirements allowed for these types of actions.



2. Property owners and tenants would be **compensated fairly**, assuming pre-disaster conditions, for voluntary relocations or property acquisition using funds to supplement public funding sources, to the extent feasible.



3. Site selection and site planning for any designated “receiving areas” would be **guided by a combination of local codes, quality design standards, and community input** governing each receiving area.



4. To the greatest degree practicable, proposed flood protection measures would be **locally led and based on reasonable cost/benefit assumptions** with consideration for all impacted property owners and tenants at all income levels.



5. Implementation of proposed flood protection strategies and solutions would be **at the discretion of individual property owners**, except where Basin-wide flood protection measures are required for the success of the project as a whole.



6. The LAND Alternative would include a **prioritized list of actions to reduce flood damage** for property owners and tenants in the short term (0-5 years), medium term (5-10 years), and long term (10+ years). Some measures will be required throughout the entire life of the project.



7. All proposed flood protection measures will be consistent with the goals of the Aquatic Species Restoration Plan (ASRP) and would be **designed to minimize impacts on aquatic and semi-aquatic species**, while maintaining and supporting the revitalization of the salmon fishery in the Chehalis Basin.



8. All proposed flood protection measures would be **designed using currently available, peer-reviewed ecological and biological science**, to reduce potential harmful impacts, and to restore and revitalize the natural systems of the watershed, where feasible.



9. The LAND Alternative would be **designed to support community economic vitality** throughout the Chehalis River Basin.

Options Considered

Prior to developing recommendations (see Chapter 4) the LAND Steering Group developed and evaluated possible options that expanded upon one another to test each one's ability to meet the criteria given to the LAND Steering Group by the Board. The LAND Steering Group considered nonstructural options—i.e., those that focus on restoration and programs—and structural

interventions such as levees and floodwalls, among other major infrastructure projects. The options were organized in an ascending scale, from the least amount of structural interventions (Option 1) to options that include all structural interventions, programs, and policies (Option 4) to reduce flood damage. A brief description of each option is included below.



OPTION 1: SAFE STRUCTURES AND FLOODPLAIN MANAGEMENT



OPTION 2: IMPROVE CHEHALIS RIVER WATERFLOW AND CONVEYANCE



OPTION 3: NEW AND EXPANDED LEVEES



OPTION 4: ALL INTERVENTIONS

OPTION 1: SAFE STRUCTURES AND FLOODPLAIN MANAGEMENT

Option 1 focused on non-structural interventions and would address flooded structures through voluntary protection, raising, and/or relocation.

Restoration and Floodplain Management

A critical component of the LAND Alternative is providing improved hydrologic conveyance, reducing water velocities, filtering debris, absorbing flood waters, increasing flood storage, raising groundwater tables, and creating critical habitats for salmon and other terrestrial and aquatic species. Improved habitat restoration also offers recreation and education opportunities. While restoration throughout the floodplain can have major benefits for the natural environment, floodplain restoration alone would not reduce impacts to structures during catastrophic flooding for communities within the upper Chehalis Basin; however, it could provide benefits for minor flooding occurring every few years.

Floodplain restoration under this option would focus on reducing flood damage for smaller, but more frequent flood events with small interventions such as berms, logjams, and other projects to increase the capacity of the floodplain to store water during smaller events. Floodplain restoration would also include removal of and replacement of undersized culverts and reconnecting off channel floodplain and side channels. This option assumes coordination and alignment with the Aquatic Species Restoration Plan. Restoration and other nonstructural elements of this option would be in addition to what is identified in the Aquatic Species Restoration Plan.

Safe Structures

This option would implement a voluntary Safe Structures program scaled to the need within the basin. Safe Structures would evaluate vulnerable structures within the floodplain to determine an appropriate method to address the potential damage to a structure in the event of a flood. Structures would be evaluated, scored, and grouped by level of risk and resulting action(s) needed to reduce damage from flooding. These levels include:

Level 1: Flood Insurance. Encourage flood insurance through private insurance or through the National Flood Insurance Program to property owners, renters, and businesses.

Level 2: Utility Relocation. Elevate utilities, including furnaces, air conditioners, appliances, electrical and plumbing systems above the flood elevation.

Level 3: Flood-Proofing. Modify structures using wet or dry methods: Wet flood-proofing. Water is allowed to enter the impacted area such as a crawl space to equalize the hydrostatic pressure. Dry flood-proofing. The walls are made watertight, and all openings closed so water that reaches the building does not get inside. The building itself becomes the barrier to the passage of floodwaters.

Level 4: Structure Elevation. All damage-prone parts of the building are elevated above the flood protection level on a foundation intended to resist flood damage.

Level 5a: Voluntary Acquisition. Property is purchased under a voluntary program and demolished, creating open space that preserves the natural function of the floodplain. Property owners and tenants will be compensated fairly, assuming pre-disaster conditions, for voluntary relocations or property acquisition. (Guiding Principle #2).

Level 5b: Voluntary Relocation. Acquisition/ Demolition & Relocation. Same as Level 5a, with relocation assistance. Options include physically moving a residential structure to a new location outside of a floodplain or identifying potential receiving areas for relocation outside of the floodplain. Financial incentives may be provided to housing developers, reducing housing costs to closely resemble buy-out costs.

The history of voluntary relocation in the Basin is limited. Information provided by the City of Centralia in 2023 identified seven properties that have been purchased, primarily in Centralia, that have repeatedly flooded. The Chehalis Basin Flood Hazard Migration Report (2012) identified 173 as elevated since 1996; 19 of which were repetitive loss properties. The program would also include assistance for renters who might be displaced, on the local, state, and federal level

OPTION 2: IMPROVE CHEHALIS RIVER WATERFLOW AND CONVEYANCE

Option 2 built upon Option 1 by including a new approximately 700-foot-wide diversion west of the Mellen Street Bridge to reduce peak flood elevations by providing another path for flood waters. The existing Mellen Street Bridge would be removed and relocated to the south. A significant amount of soil immediately upstream and about 3,000 feet downstream of the Mellen Street Bridge would also be removed to increase conveyance opportunities for floodwater to move through this constricted area.

The size of the diversion channel would be determined through engineering and modeling refinements. The Mellen Street Bridge relocation could occur in advance of the diversion and conveyance projects.

OPTION 3: NEW AND EXPANDED LEVEES

Option 3 included the floodplain restoration and Safe Structures components of Option 1. This option would also construct approximately 22.1 miles of new levees or expanded levees, potentially including pump stations:

1. New ring levee in Adna around the new high school and commercial area (1.7 miles)
2. New levee on the east bank of the Newaukum and Chehalis Rivers east of I-5 (1.2 miles)
3. New and expanded levees on the north and south sides of the Skookumchuck River (6.6 miles)
4. New levee on the north bank of the Chehalis River from north of Fort Borst Park downstream to Galvin Road (2.7 miles)
5. New levees on the north and south sides of China Creek from I-5 to the railroad tracks (2.3 miles)
6. New levee on the east side of I-5 from China Creek to Salzer Creek (3.3 miles)
7. Expanded levee around the Chehalis-Centralia Airport (4.3 miles)

Levees would likely be phased and also combined with road and bridge projects.

OPTION 4: ALL INTERVENTIONS

Option 4 included all interventions described in Options 1 through 3.

OTHER CONSIDERATIONS: EMERGENCY ACCESS AND RESILIENCY

In addition to the options described above, the LAND Steering Group evaluated emergency access during an event and potential resiliency measures to speed recovery after a flood. Those recommendations have been included in the recommended LAND Alternative, described in Chapter 4.

Community Feedback and Steering Group Recommendations

The LAND Steering Group reviewed feedback from the Community Priorities Workshop in January 2023 and information gathered through the community briefings, in addition to technical analysis, to deliberate over the key elements to carry forward in the LAND Alternative. In March 2023, the LAND Steering Group reached consensus (with all nine members in agreement) to move forward with what was originally called “Option Four: All Interventions”, as presented and discussed in the Community Prioritization Workshop in January 2023. The LAND Alternative was presented to the Chehalis Basin Board in April 2023. The Land Alternative is Described in Chapter 4.





Chehalis Basin today



Water inundation during modeled major flood in the late-century, 2080

4

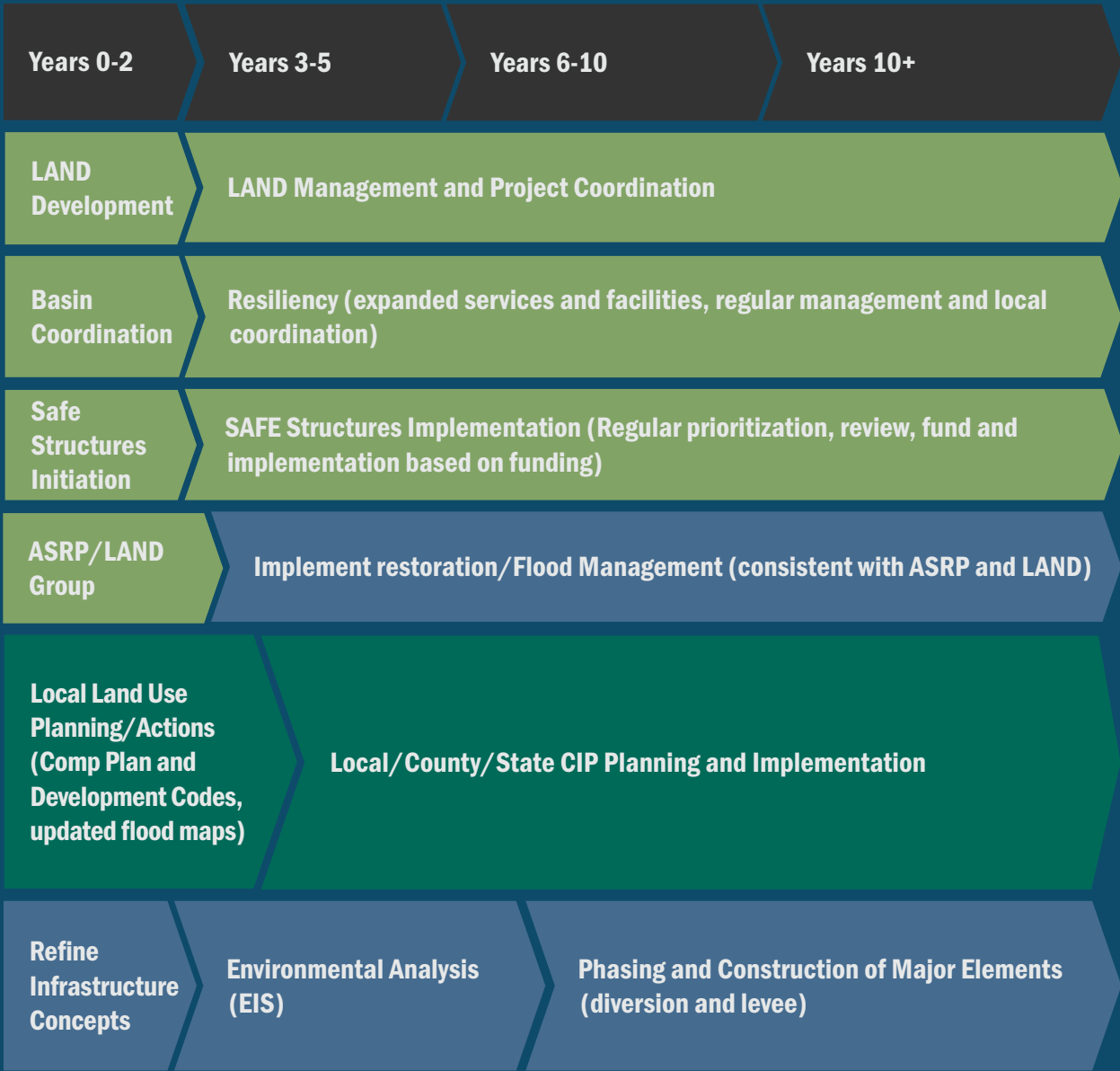
The LAND Alternative

The LAND Alternative is a set of projects, policies, and programs that are proposed as an alternative to the proposed FRE on the Chehalis River near Pe Ell. The LAND Alternative was developed by the LAND Steering Group, which comprises nine individuals representing the Chehalis Tribe; Quinault Indian Nation; local communities; and economic development, environmental, and agricultural interests with input from the community.

The LAND Alternative lays out a plan for equitable flood damage reduction, taking into account upstream and downstream impacts resulting from structural interventions. The elements work together to reduce flood damage, while encompassing the shared values and guiding principles the community has agreed on. Implementation assumptions, relationships between the recommendations, and assumed timing for completion are described in Chapter 5. While many projects will take time, some can start immediately.

Basin residents and businesses that are most affected by flooding often have the least ability to recover after an event.

The LAND Alternative incorporates a framework that equitably considers potential impacts on all individuals and property owners, as well as the land uses most affected by flooding, with the most recent information available at the time. All flood damage reductions actions take into account the extent of potential flooding during a major flood event that could occur in the late-century—by the year 2080.



The proposed projects, programs, and policies are designed to generate equitable outcomes for individuals and businesses living and working in all communities throughout the Chehalis Basin. The strategies include:



FLOODPLAIN MANAGEMENT AND RESTORATION actions to reduce the severity and impacts of more frequent, but minor, flood events that still affect homes and businesses.



STRUCTURAL INTERVENTIONS such as floodwalls, levees, daylighting and channel diversions to reduce the impacts of major floods.



A SAFE STRUCTURES PROGRAM to help landowners, residents, renters and businesses reduce flood damage to existing structures in the floodplain.



CHANGES TO LOCAL LAND USE PLANNING and building code programs to direct future development away from the floodplain.



IMPROVEMENTS TO THE TRANSPORTATION SYSTEM that provides vehicle access in the event of a catastrophic event.



RESILIENCY PROGRAMS to speed recovery after an event.



MANAGEMENT AND FUNDING considerations for implementing recommendations.

Although the LAND Alternative focuses flood damage reduction interventions on the upper Chehalis Basin, the LAND Steering Group found it essential to also account for impacts across the entire Basin. A key goal is to respect the natural river: wherever feasible, actions will recreate natural floodplains to restore natural geomorphic river flows and increase natural floodplain water storage capacity.

The major components of the LAND Alternative include:



PROJECTS:

- Infrastructure investments that include diversions for floodwaters to move water through the Basin and reduce flood heights during major events;
- Levees located at strategic locations to protect populated areas and essential infrastructure; and
- Local infrastructure projects to provide continued access to emergency services and connectivity across the Basin during major flood events;

PROGRAMS

- Implement Safe Structures to address the scale of need to voluntarily protect, raise, and relocate at risk valuable structures;
- Resiliency measures and recommendations to speed recovery after an event; and
- Floodplain restoration aligned with the ASRP that includes additional floodwater storage capacity to reduce the severity of more frequent minor storm events.

POLICIES

- Update land use policies and zoning within urban growth areas to accommodate voluntary relocation of residences from flood-prone areas in addition to projected future population and jobs growth;
- Review and update, as needed, building codes to reduce flood damage; and
- Align existing local and state capital facilities plans to maximize near-term projects and investments.

LAND Alternative projects, programs and policies are labelled with unique identification numbers. The numbering system is used to track each project, and where applicable, show relationships and timing for related actions.



Agriculture is an critical component of the LAND Alternative. Restoration of the floodplain, identifying storage opportunities for smaller events, and developing emergency planning for machinery, livestock and structures is essential for agricultural areas that will continue to flood. The LAND Alternative assumes that existing agricultural uses will continue in the basin.

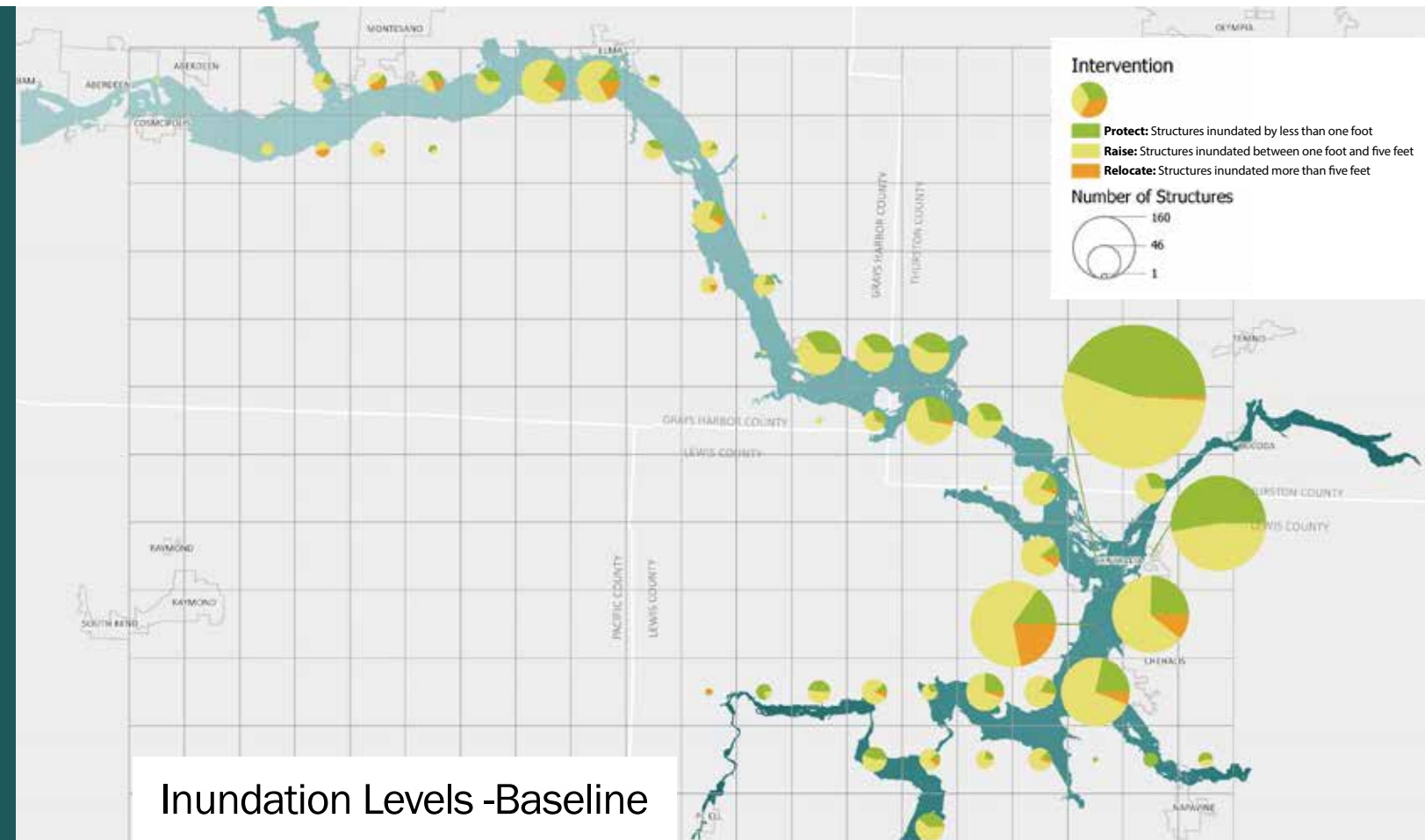
Source: Office of Chehalis Basin

Projects to Reduce Flood Damage

Most infrastructure—levees, the diversion channel, conveyance improvements—is located where there are high concentrations of homes, commercial, and institutional buildings that cannot be moved. With the flood damage reduction projects in place:

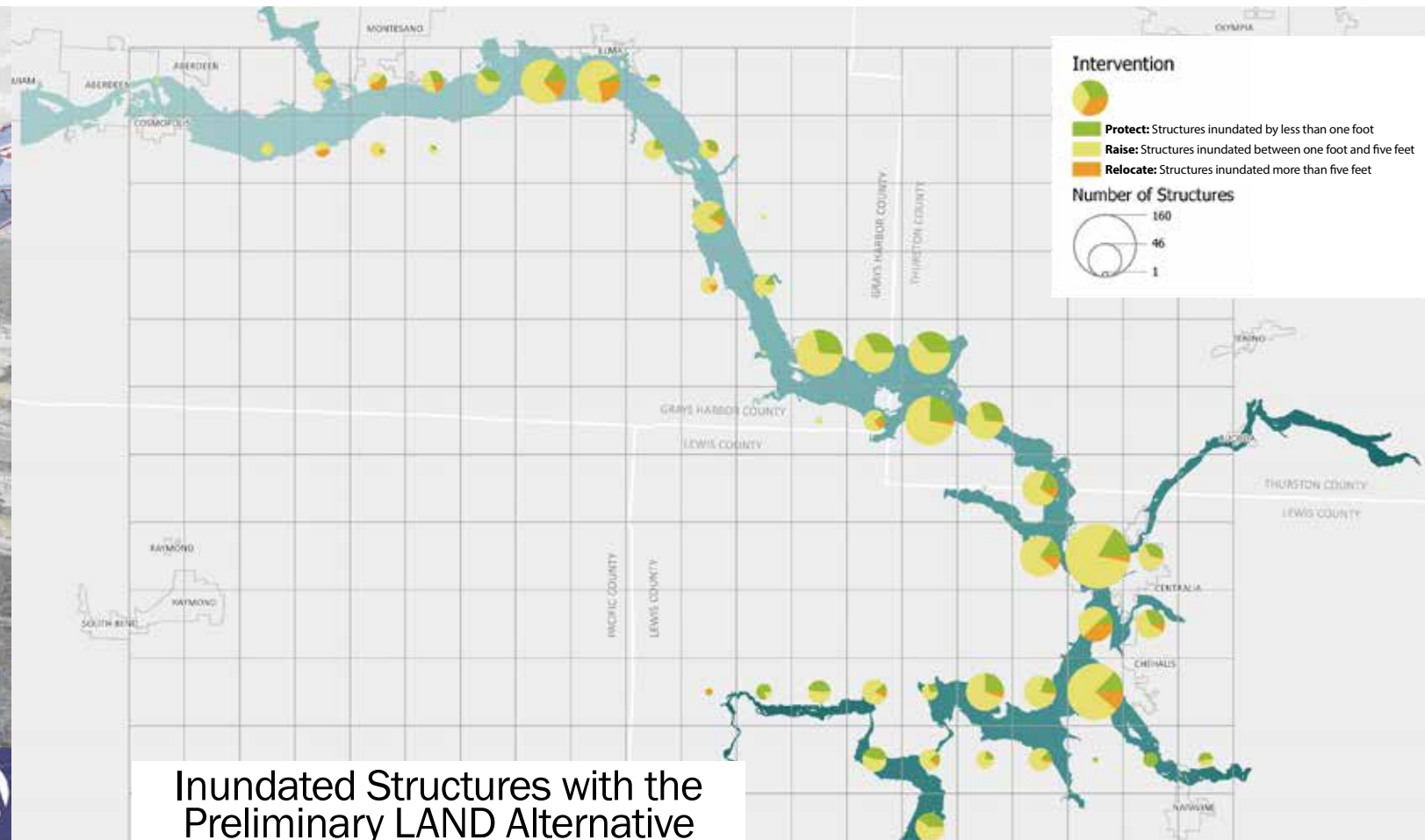
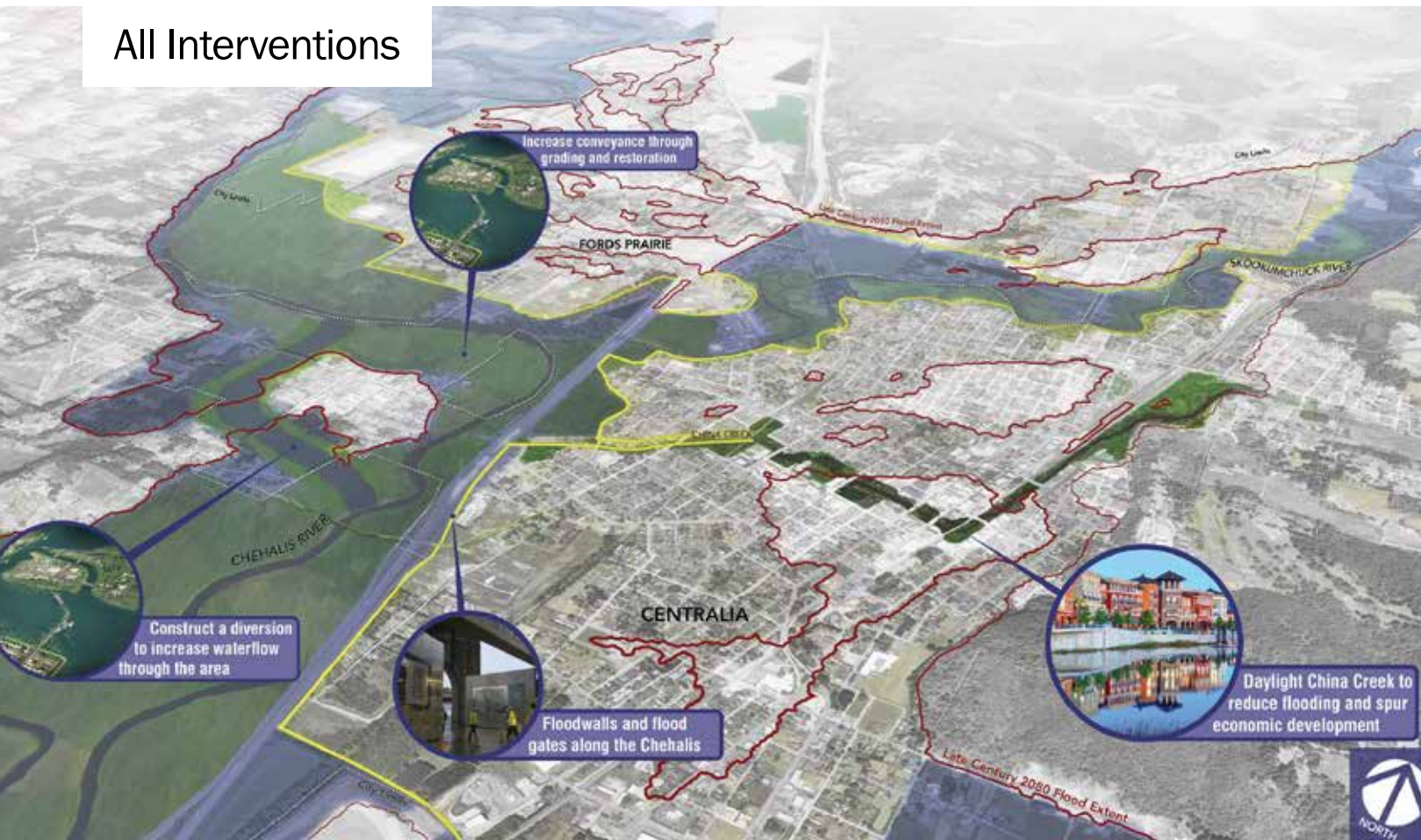
- The potential for flood damage would be reduced in higher population centers where high concentrations of structures are located and cannot be moved.
- The levee around the Adna commercial center and high school would reduce flood damage and also provide a site for a resiliency hub in the upper basin for rural residents.
- Rural structures outside the levees would be protected through the Safe Structures Program.
- Upstream and downstream impacts would be mitigated as required.

These investments would reduce the risk of flood damage for about 1,625 structures during a major flood event. That leaves an estimated 1,634 structures that would still be vulnerable and require an additional program to reduce potential flood damage (see Safe Structures Program).



Inundation Levels -Baseline

All Interventions



Inundated Structures with the Preliminary LAND Alternative

PJ 1: Transportation System and Accessibility

A major flood can inundate streets and roadways and some, including I-5, have been closed for several days due to flooding. Roadway closures have a dramatic effect on emergency services and transportation—and hinder community recovery efforts after an event. The following projects would likely require a combination of city, county, and state leadership, depending on who is currently responsible for roads and/or bridges and how construction would be funded.

COST RANGES

\$ \$2M	\$\$ \$2M-\$10M	\$\$\$ \$10M-\$24M	\$\$\$\$ \$25M-\$49M	\$\$\$\$\$ \$50M
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1. SOUTH SCHEUBER ROAD BRIDGE (\$\$\$\$)

Install a new bridge from Fords Prairie across the Chehalis River to provide an alternative route for I-5 in the event of a closure. Concept layout of the new bridge is from South Scheuber Road to the south and Oakland Avenue to the north. Lewis County has studied this alignment in previous years.

2. SOUTH SCHEUBER ROAD–GRAF ROAD MILITARY ROAD (\$\$)

Raise South Scheuber Road from near the Graf Road/Military Road intersection to approximately 700 feet north of the intersection to maintain access to the hospital.

3. SOUTH SCHEUBER ROAD–WEST CONNECTION (\$\$\$)

Raise sections of South Scheuber Road between State Route 6 and the Graf Road/Military Road intersection. This project, in combination with projects 1 and 2, will complete an alternative route for I-5.

4. COOKS HILLS ROAD (\$\$\$)

Raise Cooks Hill Road with structural fill to maintain access during an event. This project would also include raising utility castings and surface utilities (fire hydrants, communication and power cabinets and overhead utilities). This section of road does not have curb and gutter or sidewalks. Future improvements could include widening shoulders for a regional bike route and installing a fish-friendly culvert or bridge at Scammon Creek.

5. STATE ROUTE 6 (SOUTH SCHEUBER ROAD TO I-5) (\$\$\$\$)

Replace the existing bridge constructed in 1939 and elevate sections of Highway 6 to improve floodplain connections and minimize upstream raised water surface elevation.

6. WEST MAIN STREET (\$\$)

Raise West Main Street or construct a levee system in coordination with BNSF to provide a transportation connection from Chehalis to I-5 during flood events. This would require BNSF to raise its tracks, or construct a levee with a break for the rail and install a pump station on the shoulder. In the event of a flood, floodgates would be installed across the tracks.

7. NATIONAL TO KRESKY AVENUE (COST TBD)

Raise National to NE Kresky Avenue between its intersections with N National Avenue, or provide a series of levees, to maintain the roadway for emergency vehicles during a flood event. While the road is currently one-way northbound, it could also accommodate two-way traffic between Chehalis and Centralia during flood events.

8. SR 507 THROUGH CENTRALIA (\$\$) (ASSUMES LEVEE COSTS ARE IN OTHER PROJECTS)

SR 507 provides a connection from the existing Mellen Street Bridge area to the north of Centralia but is inundated in larger storm events. This project would provide levee protection for the roadway, but would also be coupled with other projects, such as projects 9 and 12.

9. PEARL STREET (SR 507) AND PEARL STREET BRIDGE (\$\$)

This section of roadway is in an area that frequently floods. This project would include replacing the existing 1928 bridge and raising the roadway to allow for vehicle passage. The height of bridge raising would be determined in concert with Skookumchuck Levee configuration and modelling results.

10. REYNOLDS ROAD (\$\$\$)

Reynolds Road provides an important east/west connection across I-5, but regularly floods near the Skookumchuck River. Raising the roadway with structural fill and increasing the width of the road prism would keep the road open and passable. Utility castings would be raised to the new asphalt road surface finish elevation. Surface utilities (fire hydrants, communication and power cabinets and overhead utilities) would also be raised to the new roadway elevation.

This section of road does not have formal curb, gutter, or sidewalk. There is a current project to widen the roadway and add a center turn lane. The Lewis County project team could review the option to raise the roadway as part of their analysis. A levee would be needed near the Reynolds and BNSF undercrossing of I-5. A Skookumchuck levee north of Downing Road would be needed to keep Skookumchuck flows from entering Coffee Creek unless Skookumchuck flows are mitigated upstream. An alternative to raising the roadway would be to install a levee south of the roadway.

11. NEW MELLEN STREET BRIDGE–SOUTH (\$\$\$\$)

This project would be required if additional conveyance projects are constructed in the general vicinity of the existing Mellen Street Bridge. The project would construct a new bridge across the Chehalis valley from the Ellsbury Overpass to Military/Scheuber Road to provide an operational vehicular connection during the storm events. This project is included in Options 2 and 4 because those options would require removal and relocation of the existing Mellen Street Bridge and approaches.

12. RAISE SR-12, CHEHALIS RESERVATION TO ROCHESTER (COST TBD)

This project would raise or protect SR-12 between the Chehalis Reservation and Rochester to the west to preserve emergency access routes for the area.

13. RAISE ANDERSON ROAD (COST TBD)

Anderson Road is the primary access road to the Chehalis Reservation and is inundated during flood events, limiting access to key facilities off of the Reservation. This project would raise the roadway to maintain access during a flood event.

14. STATE ROUTE 107

Evaluate SR 107 between Montesano to the north side of the Chehalis River to address flooding potential and potentially raising this section of the highway while maintaining access to the boat ramp and nearby lumber mill.

15. MONTESANO BYPASS

Analyze bypass to existing ramps or reconfigure ramps to allow access to SR 12 for emergency vehicles.

16. MONTE/ELMA ROAD

Evaluate potential for bypass route and associated improvements to Monte/Elma Road to allow freight and emergency vehicles access through that area during flood events.

17. OLD HIGHWAY 603

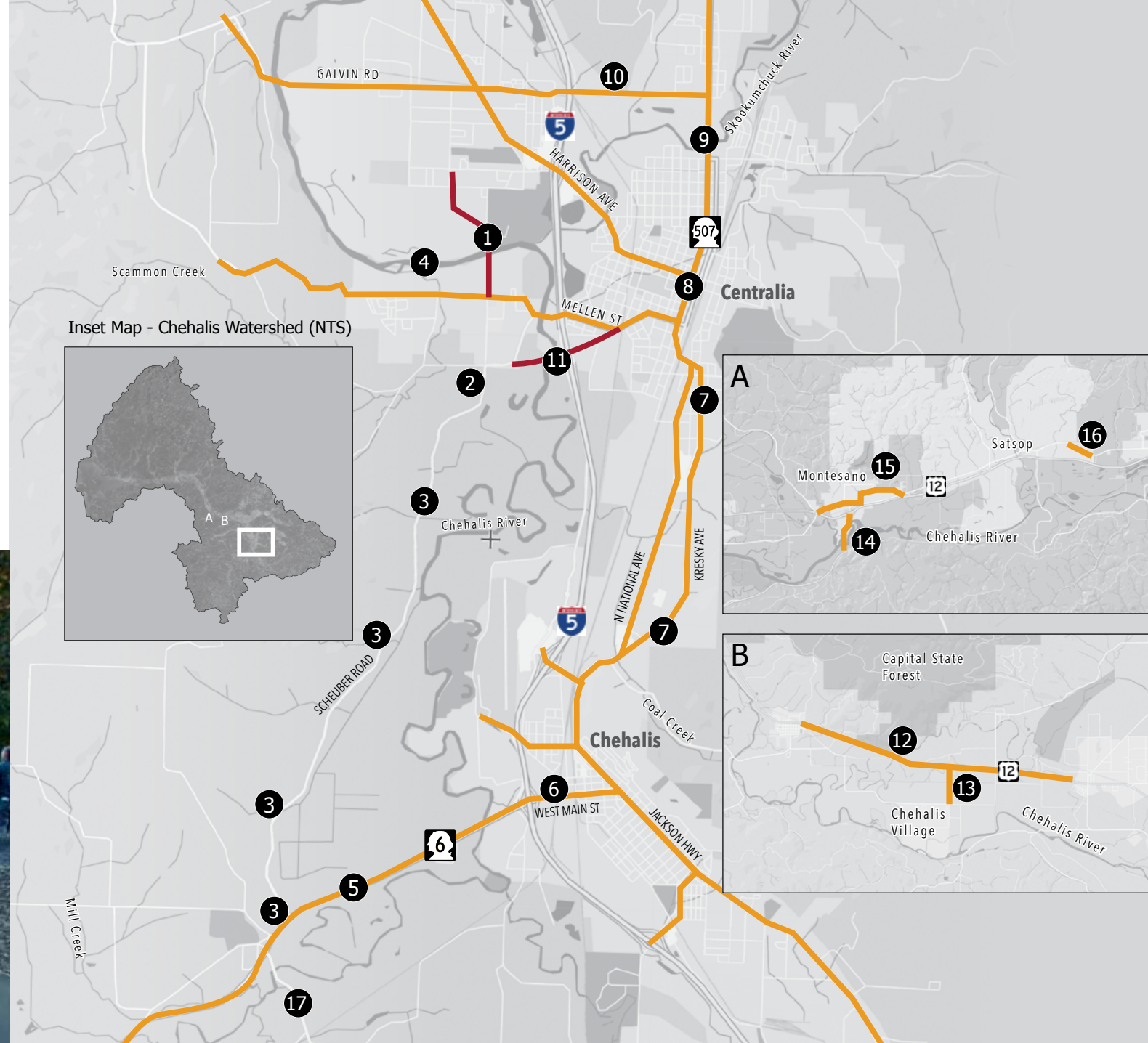
Raise road between SR 6 and to the east of Twin Oaks Road to provide an additional connection across the Chehalis River Valley.

Source: Office of Chehalis Basin



Investments would reduce the risk of flood damage for about **1,625 structures** during a major flood event.

That leaves an estimated **1,634 structures** that would still be vulnerable and require an additional program to reduce potential flood damage



LEGEND

- | Evacuation Routes per 2016 Lewis County Multi-Jurisdictional Hazard Mitigation Plan
- | Potential New Bridges
- 1** South Scheuber Road Bridge
- 2** South Scheuber Road —Graf/Military Road
- 3** South Scheuber Road —West Connection
- 4** Cooks Hill Road
- 5** State Route 6 (South Scheuber Road to I-5)
- 6** West Main Street
- 7** National to Kresky
- 8** State Route 507 through Centralia
- 9** Pearl Street and Bridge (SR 507)
- 10** Reynolds Road
- 11** New Mellen Street Bridge
- 12** Raise SR 12
- 13** Raise Anderson Road
- 14** State Route 107
- 15** Montesano Bypass
- 16** Monte Elma Road
- 17** Old Highway 603

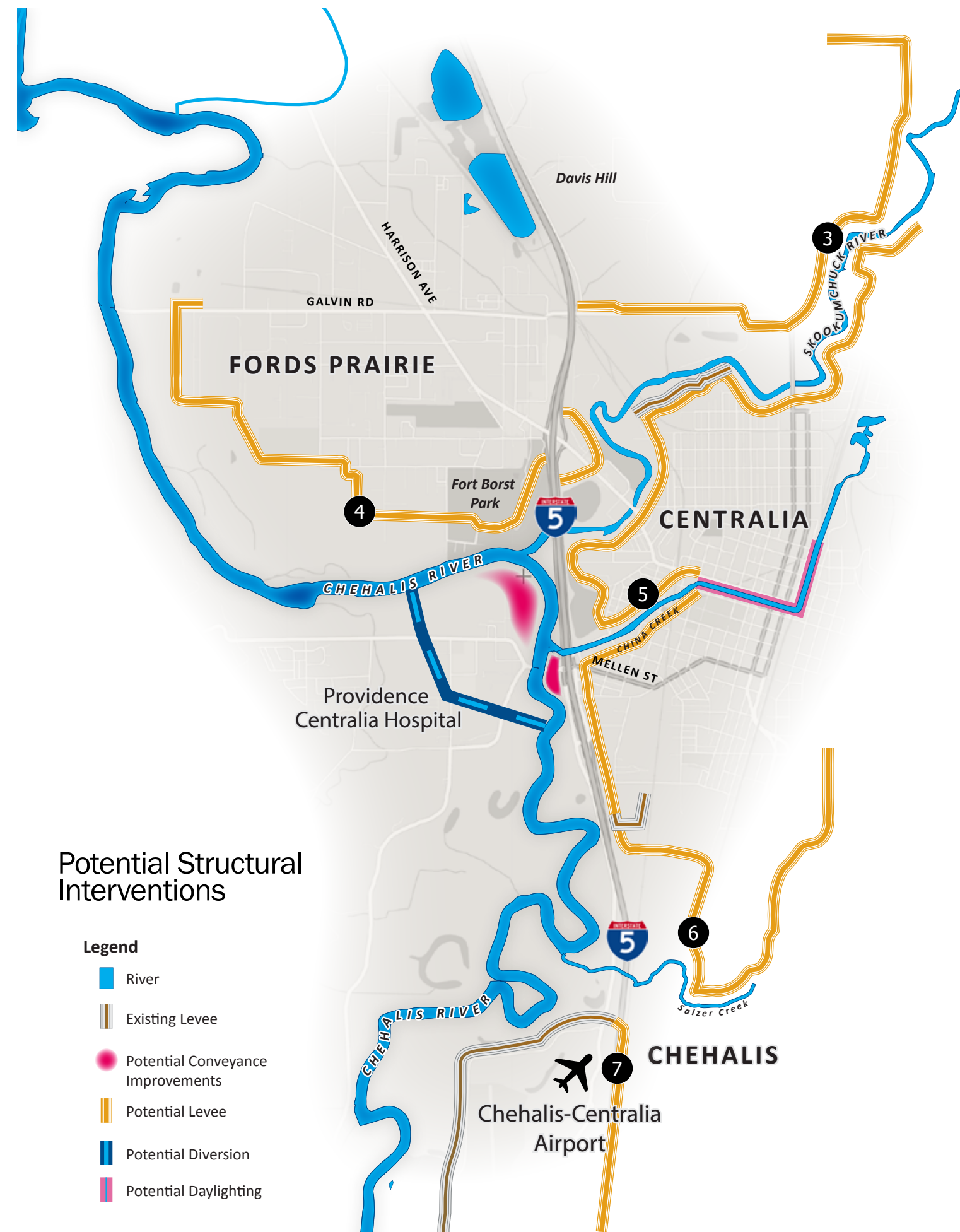
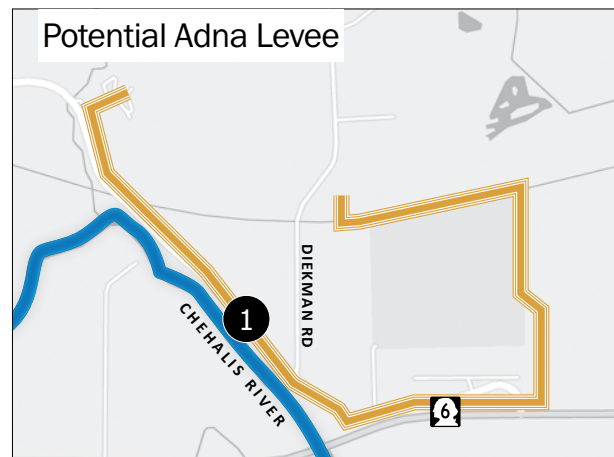
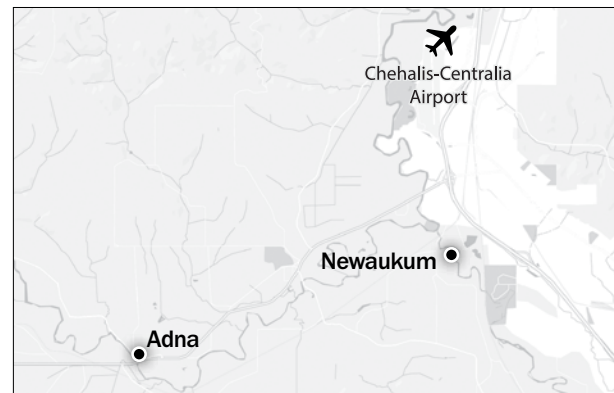
PJ 2: New and Expanded Setback Levees and Floodwalls

Levees would be needed to protect urbanized areas where it would be unlikely that enough structures could be protected, raised, or relocated from the floodplain. Levee height and size is directly influenced by PJ 3 and PJ 4, below.

Constructing about 22.1 miles of new or expanded levees will help contain floodwaters and reduce flood damage. The majority of the levee and floodwall infrastructure is located next to high concentrations of existing structures that cannot be easily moved. Constructing new or expanded levees would affect some existing structures; the impacts will be dependent on the final size and location of levees, which is still to be definitely determined. Upstream and downstream impacts, such as where there is an increase in flood depth, would be mitigated through the Safe Structures program.

- 1 Construct a new ring levee in Adna around the new high school and commercial area (1.7 miles)
- 2 Construct new levee on the north bank of the Newaukum River east of I-5 (1.2 miles)
- 3 Construct new and expanded levees on the north and south sides of the Skookumchuck River (6.6 miles)
- 4 Construct a new levee on the north bank of the Chehalis River from north of Fort Borst Park downstream to Galvin Road (2.7 miles)
- 5 Construct new levees on the north and south sides of China Creek from I-5 to the railroad tracks (2.3 miles)
- 6 Construct a new levee on the east side of I-5 from China Creek south to Salzer Creek (3.3 miles)
- 7 Expand the levee around the Chehalis-Centralia Airport (4.3 miles)

Levees could be constructed in phases and be combined with road and bridge projects.





Chehalis Levee Aerial Sketch



Chehalis Levee Bridge View Sketch



Borst Park Levee



Rendering of Existing: Looking North toward the Hospital



Rendering of Proposed Diversion with New Mellen Street Bridge, Open Space and Recreation Amenities



Rendering of Proposed Diversion During a Flood

PJ 3: Improved Channel Conveyance

Increasing conveyance near Mellen Street Bridge will remove pinch points on the Chehalis River. This would include removing approximately 1.3 million cubic yards of soil immediately upstream and approximately 3,000 feet downstream of the existing Mellen Street Bridge. This project is related to PJ 4 in that the improved conveyance completed through this project would also increase capacity. Added to PJ 4 (Channel Diversion), these projects could reduce the size of levees (PJ 2) needed to address a catastrophic event.

PJ 4: Channel Diversion

This Chehalis River Diversion intervention would reduce peak flood elevations by providing another path for flood waters. It would:

- Construct a new 700-foot wide, one-mile long water diversion by excavating approximately 1.3 million cubic yards of soil west of existing Mellen Street.
- Remove the existing Mellen Street Bridge and reconstruct it about 2,000 feet to the south, to connect to Military Road west of the Chehalis River and I-5.
- Remove about 1.3 million cubic yards of soil immediately upstream from the existing Mellen Street Bridge and approximately 3,000 feet downstream of the existing Bridge to increase the ability of floodwaters to flow through this constricted area.

PJ 5 Daylight China Creek

Opening up the underground culvert where China Creek is buried—resurfacing the creek—would both expand flood capacity of the creek and add a community amenity.



Rendering of Existing Conditions



Rendering of Daylighted Creek with New Development



Rendering of Daylighted Creek During Flood



Source: Office of Chehalis Basin

Programs that Support Those Affected by Flooding

PG 1: Safe Structures

Expanding Community Assistance and Resilience (CFAR) Program or replacing it with a Safe Structures Program should proceed regardless of what future flood damage reduction options are pursued.

The Safe Structures Program would offer flood damage protection for valuable structures (residences, schools, businesses, etc.) that might remain in danger of flooding, even with the structural and floodplain management investments proposed in the LAND Alternative. The Program identifies strategies to prioritize and protect valuable structures on an individual basis and would evaluate and prioritize actions for each of the valuable structures but not for “non-valuable” structures (garages, sheds, carports, etc.). While the Office of Chehalis Basin’s Community CFAR program is already performing many of the strategies of the proposed Safe Structures Program, it is not at the scale necessary to address the large number of valuable structures in need of flood damage reduction assistance. The Safe Structures program would:

- Work with local jurisdictions to update flood maps, a requirement to access Safe Structures funding within their jurisdictions.

- Pursue funding opportunities to address program scale and phasing.
- Provide additional project management and technical assistance for landowners, renters, and local jurisdictions to implement the program.
- Prioritize flood prone areas where structural investments (such as levees) are not proposed.
- Include programs for renters to secure new housing.
- Include measures for commercial, residential, and industrial structures.

The Safe Structures Program would include resources to assist low-income households (both renters and property owners) that are affected by flooding. Resources could take the form of funding assistance, low interest loans and technical assistance to help residents better understand their options for reducing their exposure to flood risk. Buildings behind FEMA-certified levees could reduce or eliminate their flood insurance; buildings in the Safe Structures Program would likely be paying similar rates to what they pay now.

Structure Risk Assessment

The approach to flood damage protection depends on the severity of risk, determining valuable structures that might be in harm's way and where flooding poses a risk to life and human safety. Desktop evaluation has been done to get ballpark estimates, but on-the-ground evaluations will need to be done in the future to fully implement the program. Each structure will be evaluated using the following primary criteria:



LOCATION of structure on the property



DEPTH OF WATER above the lowest floor of the building



VELOCITY of water



REPETITIVE LOSS/FREQUENCY where the structure has been identified as a repetitive loss property



COST EFFECTIVENESS and if the mitigation measure exceeds the value or condition of the structure

Secondary criteria include whether the property is near other proposed large-scale infrastructure projects, is adjacent to public land, and on each community's goals and preferences. The program includes five levels of flood damage protection.

Source: Office of Chehalis Basin



Five-Level Mitigation Continuum

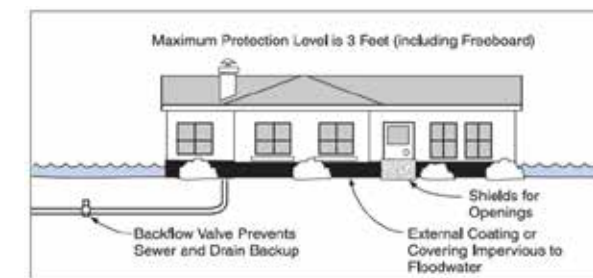
LEVEL 1: INSURANCE

Although not a specific mitigation measure, the first course of action for residential and commercial property susceptible to flooding is obtaining flood insurance as a cost recovery approach to flood damage repairs and restoration.

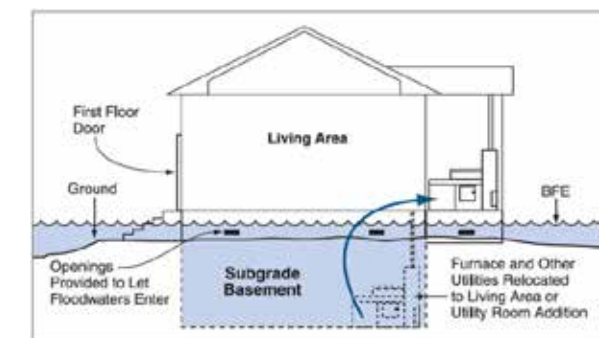
LEVEL 2: RELOCATE UTILITIES

Elevate utilities—including furnaces, air conditioners, appliances, electrical and plumbing systems—above the flood elevation.

LEVEL 3: FLOODPROOF



Floodproofing a structure mitigates, but doesn't totally eliminate, flood damage. With dry floodproofing, the structure is made watertight and all opening are closed so that water that gets to the building cannot get inside. The building itself is the barrier to the floodwater.



Wet floodproofing allows water to enter an area such as a crawl space to equalize the pressure of water on the building due to the force of gravity.

LEVEL 4: RAISE



Structures in areas the might see more than 1 foot of floodwaters would be raised, using fill material on extended foundation walls, piers, posts, piles and columns.

LEVEL 5: RELOCATE

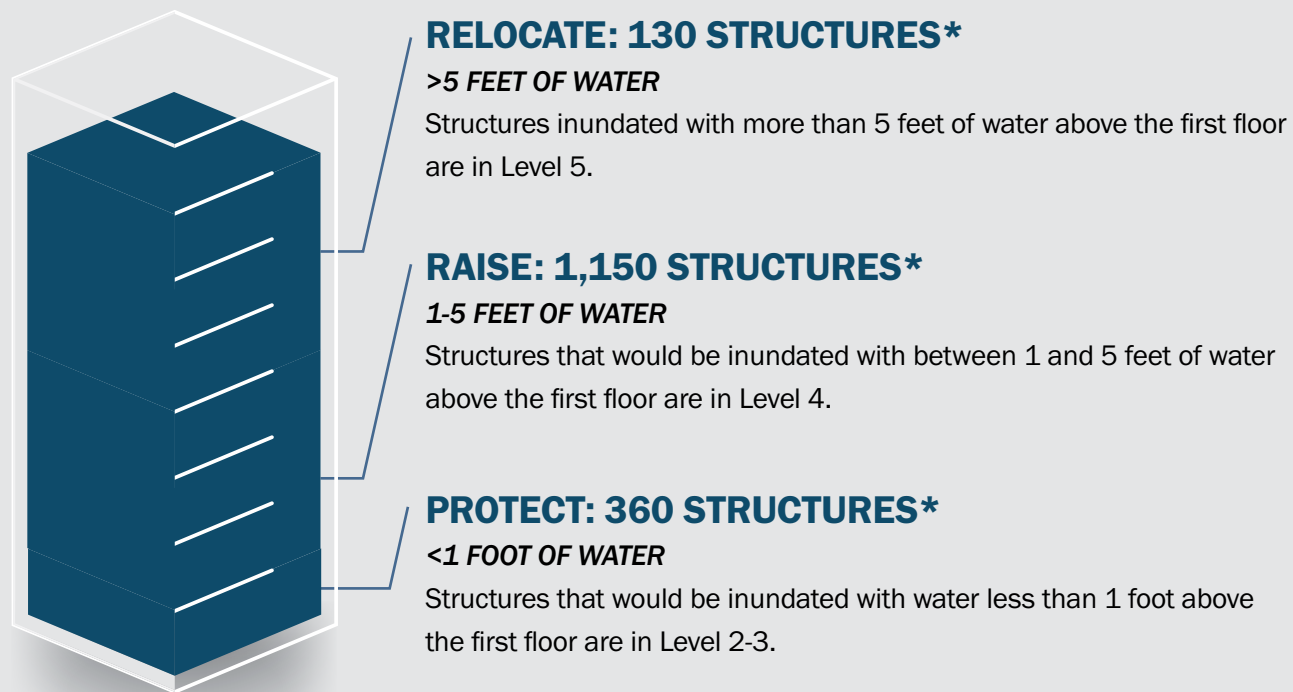
For homes that can't be raised, property owners could voluntarily participate in a buy-out with fair compensation and relocation assistance. The structure could be demolished and the property owner purchase or construct a new home outside the floodplain. Or the house could be physically relocated outside the floodplain, depending on the home condition and property owner preference. A key element of this program is offering "replacement value" rather than "fair market value," which can encourage greater voluntary participation.

Applying the Safe Structures Approach

Residential structures remaining in the floodplain have been assigned to flood mitigation levels 2-5, based on desktop evaluations. Residential risks will be confirmed and refined through individual on-site assessments before there is a final determination about appropriate mitigation. All commercial properties and agricultural buildings remaining in the floodplain are assigned to Levels 2-3.

Currently, structural risk is ranked by water level, to develop an order of magnitude determination about the number of structures that need specific mitigation and their potential costs. (It's recommended that an additional 1-3 feet of freeboard be added to each mitigation measure to increase safety.)

Safe Structures Program: Approximately 1,640 Structures*



*Estimated total valuable structures that could participate the Safe Structures Program. Relocation means either physically moving a structure to an area outside the floodplain or demolishing the structure, with owners moving into another structure outside the floodplain. Note that some structures, such as commercial structures, agricultural structures, and slab on grade structures with inundation greater than one-foot and included in the Raise category in this figure would likely still fall in the Protect or Relocate category because they cannot be raised.

Affected Structures

The number of structures affected by flooding will depend on the structural interventions constructed in the Chehalis Basin. Assuming all recommended structural interventions are constructed, the number of affected structures could be reduced by about half, with the Cities of Chehalis and Centralia seeing the most dramatic reductions.

Location	Without Recommended LAND Interventions*	With Recommended LAND Interventions*
Lewis County		
Centralia	1,339	278
Chehalis	274	158
Adna	100	100
Boistfort	80	80
Pe Ell	21	21
Thurston County		
Rochester	185	202
Grays Harbor County		
Elma	168	173
Oakville	129	136
Montesano	70	70
Satsop	9	9
Aberdeen	4	4
Cosmopolis	1	1
TOTAL	2,380	1,231

*This assumes a 75% participation rate of willing property owners. For example, of the 1,640 valuable structures remaining in the floodplain with the recommended LAND structural projects, 1,231 in total would become part of the Safe Structures Program. Adding the ring levee in Adna could reduce the number of inundated structures; future modeling will determine the number of structures affected by the proposed interventions.

*Estimates of valuable structures are based on the structures database developed for the FRE that contains finished floor elevations for valuable structures only. Because updated data is not available for recent development, the dataset does not include all structures in the floodplain; estimates of valuable structures might be low or missing for certain locations. It is possible that more structures than quantified in this table and in additional areas could qualify for Safe Structures interventions.

Relocation/Rental Assistance

Homeowners who choose to raise their homes will likely need temporary housing, while those that relocate will need moving expenses. Renters who are displaced will also need relocation expenses.

If the program is self-funded, relocation assistance can be provided based on the terms created by the agency in charge of the program. If federal or state funding is used, tenant assistance is available under the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1920. That assistance can include advisory services to find a comparable home and complete paperwork, pay for moving expenses, and replacement house assistance for the occupant to rent or buy (via down payment assistance) a comparable home.

Rough Order of Magnitude Costs

To provide an idea of the potential costs of the Safe Structures Program, the project team developed rough costs, per structure.

Home Utility Relocation/Floodproofing:	\$20,000
Commercial/Agricultural Floodproofing:	\$30,000
Structural Elevation:	\$150,000
Replacement Home:	\$400,000
Relocation/Rental Assistance:	5% of Relocation Costs

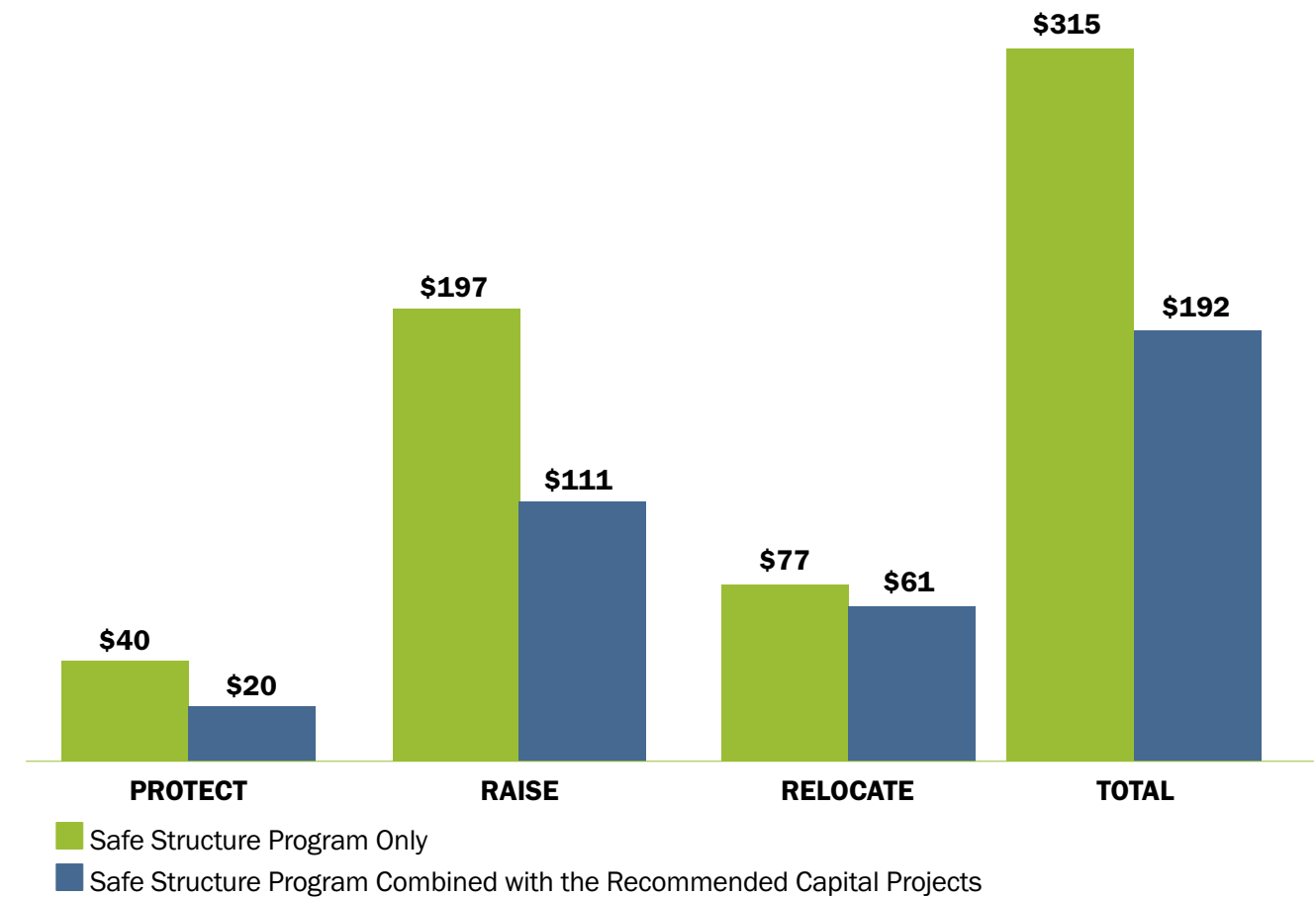
At the moment, there is no distinction between costs for building replacement homes versus relocating existing homes. The rough costs for implementing the program on its own are \$315 million. But when combined with capital projects and non-structural programs that take many properties out of the floodplain, the costs drop to \$192 million.

Source: Shutterstock



Rough Order of Magnitude Costs

in millions



Cost analysis assumes about 75% of property owners in all levels would voluntarily participate in a Safe Structures Program; but that could be higher with paying “replacement value” and with relocation and rental assistance.

Source: Larry Workman, Quinalt Indian Nation Communications Manager



PG 2: Community Resiliency

Educating Basin residents about flood risks and projected floodplain boundaries, emergency escape routes, refuge areas, and resources such as resilience hubs is crucial to equipping each family to prepare and execute an emergency plan when disaster strikes.

Resilience hubs are neighborhood centers equipped to support residents, coordinate communication, and distribute resources before, during, and after a crisis. Importantly, these hubs are established and managed by community members, often in partnership with local governments, and typically housed in an existing facility such as a community center, school, or place of worship. The hubs can host year-round community-building programming based on the needs and culture of its context, fostering the development of strong and supportive relationship networks. Meanwhile, the resilience hubs' physical location becomes a place for storing and distributing the material resources and information that become critical in an emergency. The hubs serve as a safe place to return to after a disaster, when key services and facilities elsewhere in the area may be disrupted.

The LAND Alternative proposes developing a Chehalis Basin Community Resiliency Plan to increase capacity and coordination among public agencies to consider tools such as:

- Identifying resiliency hubs basin-wide
- Providing pre-disaster training classes
- Updating the early warning system
- Updating evacuation plans and route guidance
- Expanding swift water rescue teams (trained personnel and rescue equipment)
- Providing safe transport and refuge for livestock
- Expanding farm evacuation plans
- Expanding utility capacity to handle peak events
- Pre-positioning of equipment (when major storm is imminent)
- Creating places for continuity of business operations

Resiliency measures should be expanded and coordinated across the Basin, regardless of what future flood damage reduction options are pursued.

PG 3: ASRP/LAND Alignment

The Quinault Indian Nation, the Confederated Tribes of the Chehalis Reservation and the Washington Department of Fish and Wildlife worked together with landowners, farmers, foresters, conservationists, and agencies to develop the Aquatic Species Restoration Plan (ASRP). ASRP is a science-informed restoration roadmap for habitat and ecosystems along the rivers and streams of the Chehalis Basin, aiming to honor the social, economic, and cultural values of the region and maintain working lands. As of 2023, the Office of Chehalis Basin has invested \$60.2 million towards 72 aquatic species restoration project.

The ASRP does not include flood damage reduction in its goals, but much of what is recommended in the ASRP and LAND could provide economic, environmental and flood damage reduction value. All LAND Alternative actions would be coordinated with the Aquatic Species Restoration Plan's goal to restore about 5,000 acres of floodplain.

To ensure close alignment, the LAND Alternative proposes creating an ASRP/LAND Working Group to identify potential synergies between the two programs and identify potential permit and regulatory streamlining opportunities to speed ASRP/LAND projects.

PG 4: Equity Set-Aside

Basin residents and businesses that are most affected by flooding often have the least ability to recover after an event. An Equity Set-Aside program would provide resources to assist low-income households that are affected by

flooding. Resources could take the form of funding assistance, low interest loans, and technical assistance to assist households to better understand their options for coping with flood risk.

Source: Chehalis Basin Partnership

Source: Chehalis Basin Partnership





Rendering of Existing Floodplain north of Centralia Hospital; facing north



Rendering of Floodplain - After Restoration is Complete

PG 5: Floodplain Restoration

A critical component of the LAND Alternative is providing improved hydrologic conveyance, reducing water velocities, filtering debris, absorbing flood waters, increasing flood storage, raising groundwater tables, and creating critical habitats for salmon and other terrestrial and aquatic species. Floodplain management can include floodplain storage, as well as smaller berms and floodwalls (under six feet). Actions include removing human-caused barriers to water flow such as undersized culverts and reconnecting off-channel floodplain channels and side channels.

Potential floodplain restoration projects would be identified through more detailed investigations of potential opportunity sites throughout the Basin. Lands that are currently in public ownership would be the first priority candidate sites. In cases where private land is involved, floodplain restoration efforts would only be undertaken with willing cooperation of the private landowners.



Rendering of Floodplain Restoration During Flood Event

Policies to Reduce the Impact of Future Flooding

Past development in the Chehalis Basin has resulted in thousands of residential, commercial, and industrial structures being constructed in the floodplain. Future expansions of the floodplain as a result of bigger storm events being driven by climate change threaten to encompass even more existing structures. Climate change, specifically its impact to floodplain boundaries, should be considered as part of all policy actions.

PL 1: ECONOMIC DEVELOPMENT, LAND USE AND GROWTH MANAGEMENT

Throughout the Basin, local Comprehensive Plan updates will be required in the next three to five years. Those updates can establish the foundation for more resilient communities and less development in flood-prone areas in the future:

- Update future land use maps to limit development in the floodplain.
- Evaluate Urban Growth Areas to incorporate receiving areas with planned city services.
- Refine receiving area locations through subarea planning that also incorporates infrastructure requirements.
- Incorporate comprehensive flood hazard management planning into comprehensive plans
- Update equity and affordable housing needs/policies, assuming updated floodplain maps and future land use designations are included in comprehensive plans.

PL 2: BUILDING AND DEVELOPMENT CODES

Cities and counties will need to implement regulations—such as zoning and development code revisions—to implement new land use designations and additional flood protection; a model development code; updates to local and county Critical Areas Ordinances; implementing National Flood Insurance Program criteria; and Flood Damage Prevention Ordinance updates.

- If not already completed, update flood maps to reduce development in flood prone areas (some flood maps have not been updated in 20 years)
- Review/update development codes
 - Complete audits of all development codes in the Basin related to floodplain development
 - Create a model code and provide technical assistance to local jurisdictions to implement flood related development and building code changes
 - Update Critical Areas Ordinances for consistency between local and county ordinances and with other policy elements
 - Update Flood Damage Prevention Ordinances related to developer and shoreline permits, construction, flood protection and subdivision proposals

PL 3: CAPITAL FACILITIES

Cities and counties should update Capital Facilities Plans in concert with Comprehensive Plan updates and other land use planning activities, including a short-term financing plan for receiving areas, prioritizing facilities to serve receiving area development and emergency access projects, as applicable.

PL 4: FUNDING

The LAND Alternative recommendations are all highly conceptual and all will require additional engineering and environmental evaluation to confirm final locations, designs, and costs. But overall, estimated costs for the program range from a low estimate of \$1.25 billion to a high estimate of \$1.9 billion (see Chapter 5 for a more detailed description of cost assumptions). Cities and counties could consider identifying existing or new funding sources for LAND projects and programs including:

- Real estate excise taxes
- General obligation bonds
- Impact fees
- Local improvement districts
- Connection fees and “latecomer” charges
- State and federal grants

Investments in infrastructure, Safe Structures and other community policies and programs are expensive but help avoid costs generated by flood damage to both public and private structures, reduce insurance costs, enhance property values, and generate direct economic benefits in the Basin.

5

Implementation

The LAND Alternative proposes short, medium, and long-term strategies to reduce flood damage within the Chehalis Basin. Some actions can occur today, building upon existing projects and programs, while others will require additional studies and design refinement. Table ## (page ##) describes the anticipated timing and next steps for each of the major elements of the LAND Alternative.



THE LAND ALTERNATIVE INCLUDES THREE MAJOR ELEMENTS:



PROJECTS:

- PJ1: Critical Roads and Bridges
- PJ2: Levees and Floodwalls
- PJ3: Improved Channel Conveyance
- PJ4: Channel Diversion
- PJ5: China Creek Daylighting



PROGRAMS

- PG1: Safe Structures
- PG2: Community Resiliency
- PG3: ASRP/LAND Alignment
- PG4: Equity Set Aside
- PG5: Floodplain Restoration



POLICIES

- PL1: Economic Development, Land Use, and Growth Management
- PL2: Building and Development Codes
- PL3: Capital Facilities
- PL4: Funding

The elements include recommendations for infrastructure projects, programs, and policy changes to reduce damage from flooding within the Chehalis Basin. Implementation of LAND requires action from all local jurisdictions, many of which can be undertaken separately and under local control. These include decisions about future growth and where capital facilities, such as sewer and water, are planned. Broader coordination is also required to address the need align basin-wide efforts, including:

- Expanding CFAR or creating a new Safe Structures program to address the scale of need within the Chehalis Basin.
- Evaluating, coordinating, and expanding resiliency programs.
- Aligning non-structural interventions, such as floodplain restoration, to reduce flood damage from smaller flood events with the goals of the Aquatic Species Restoration Plan (ASRP)
- Evaluating and implementing a phased package of levees, diversion, and conveyance, to reduce flood damage to areas where there are high concentrations of structures.

Many of these recommendations will take time to implement.

Preliminary Infrastructure and Safe Structures Costs

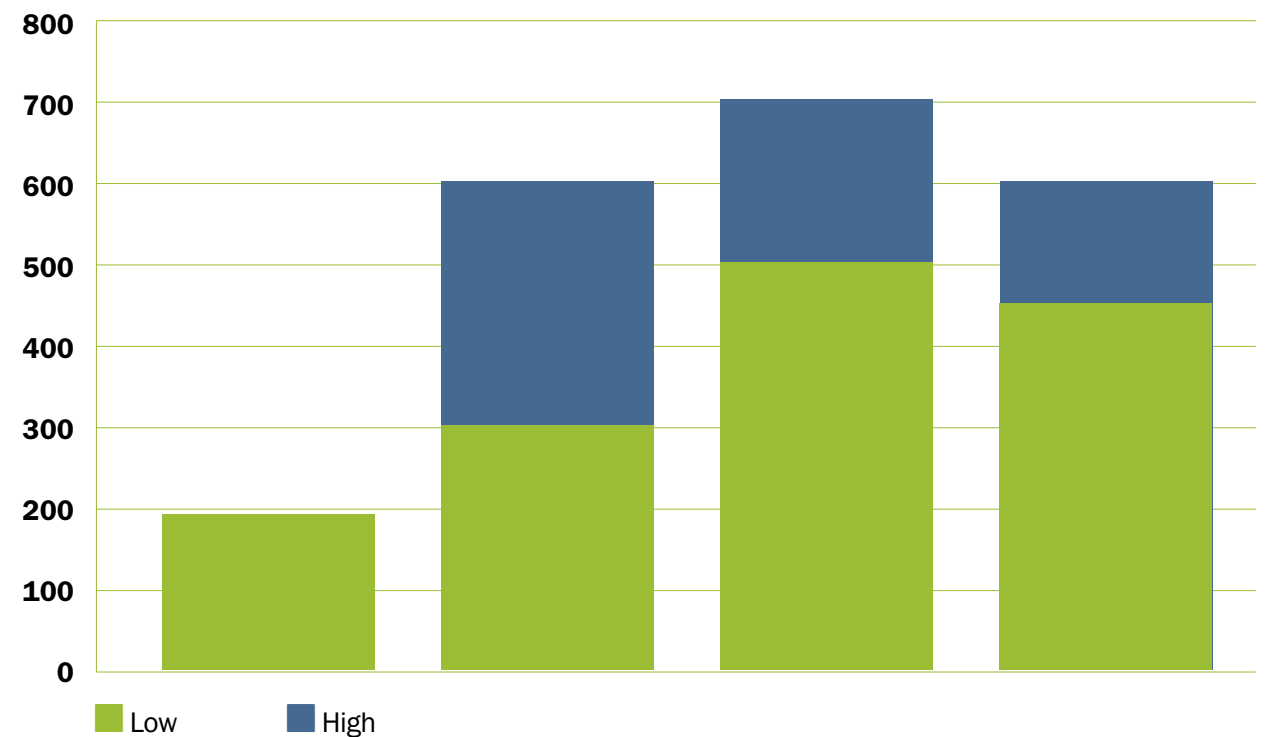
The LAND Alternative infrastructure interventions are all highly conceptual and all will require additional engineering and environmental evaluation to confirm final location and design. There are also current and planned land development projects throughout the basin in various stages of development that could affect future development of the interventions. Estimated costs for infrastructure interventions range from a low estimate of \$1.25 billion to a high estimate of \$1.9 billion. Cost estimates are for construction only and do not include funding for operations, maintenance, or long-term management.

Costs assumed for the LAND Alternative could be funded through a number of funding mechanisms, including local, state, and federal options.

The LAND Alternative also identifies known current and planned roadway and bridge projects that could provide emergency-access if modified to be accessible during a catastrophic flood event. Improvements to some of these facilities are already included in existing local capital improvement programs, but none account for the level and extent of flooding assumed under the modeled late-century 2080 flood. Cost estimates for local projects are not included in the total estimated cost because those projects are not required to complete the structural interventions proposed specifically under the LAND Alternative even though they could improve emergency access as part of a more resilient transportation network. Additional coordination should occur to maximize the potential for current projects to improve emergency access during a catastrophic flood.

Cost assumptions for Safe Structures

in millions



CORRIDOR FLOODPLAIN MANAGEMENT: (\$300M TO \$600M)

Corridor floodplain management includes flood management through nonstructural interventions that reduces flooding from smaller storm events, while also continuing to implement the Aquatic Species Restoration Plan (ASRP) goals within the Chehalis Basin. Costs for these types of projects are independent of structural interventions and could be funded separately. These projects are not focused on addressing the catastrophic flood, rather, they are designed to reduce more frequent flooding provided they are also supported by local landowner(s). Also, any mitigation work conducted to support the LAND would be separate from the restoration work undertaken via the ASRP.

The LAND Alternative program recommendations include a recommendation to develop an ASRP/LAND Working Group to align the flood management and flood damage reduction goals of the LAND Alternative with the restoration goals of the ASRP. The ASRP does not include specific flood damage reduction goals but could be coordinated with the LAND Alternative to provide multiple watershed benefits and identify permit streamlining opportunities where the flood damage goals of the LAND Alternative align with the restoration goals of the ASRP.

Cost estimates for the LAND Alternative assume that work is aligned with the goals of the Aquatic Species Restoration Plan and is complimentary rather than overlapping. These types of projects are assumed to include those similar to ASRP projects, such as surface contouring, removal of human caused barriers, reconnecting off channel flood plain habitats, large woody debris installation, recreating beaver ponds and side channels (see page 42 of the Aquatic Species Restoration Plan). Other potential projects related to flood damage reduction could include berms and flood fencing, with preference for projects on larger parcels or smaller contiguous parcels where large (50 acres or larger) flood management interventions could be constructed. Specific locations have not been identified and would depend on landowner interest. Given the general assumptions for the location and scale for this type of intervention, the LAND Alternative assumes a cost range of \$300M to \$600M, the same assumption as ASRP Scenario 1 (ASRP, Table 8-2, page 225). For comparison, ASRP Scenario 1 includes 222 miles of channel and 9,027 acres of floodplain restoration. If aligned, these costs for corridor floodplain management could be reduced if they also meet ASRP goals.

WATERFLOW DIVERSION AND IMPROVED CONVEYANCE: (\$500M - 700M)

The LAND Alternative includes a diversion channel and conveyance improvements. While these projects could be constructed separately, the planning level-level cost estimate assumes that they would be constructed at the same time given each project's proximity to one another.

West Diversion

The west diversion would be constructed south of Mellen Street, running west of the Centralia Hospital to reconnect with the Chehalis River downstream of the hospital. The west diversion is an approximately one mile long, 700-foot-wide excavated channel that would remain dry during normal weather events but would be inundated during major flood events. The diversion channel would be graded to allow water to drain as flood water recedes to avoid trapping fish. The diversion channel and immediate vicinity would include floodable features that when dry, would provide recreation, habitat, and trails that would connect to a larger trail system. The area could also be used for green stormwater treatment for surrounding roadways and other impervious surfaces (pollution generating impervious surfaces) during traditional weather patterns. Existing roadways currently discharge untreated to the Chehalis River.

Constructing the west diversion would require excavation of approximately 1.3 million cubic yards of soil, which could potentially be used for other projects (such as levees or berms, if suitable) or hauled off by truck or rail. There are three existing arterial streets that would cross the proposed west diversion channel that would require new bridges to maintain connectivity. Utilities would also be reconfigured. The current alignment assumes that approximately 65 properties could be affected,

although refinement of the location and scale of the west diversion, if pursued, would likely change the number of affected properties.

Improved Conveyance:

The LAND Alternative would improve water conveyance on the Chehalis River at approximately the same location as the existing Mellen Street Bridge, which was constructed in 1911. This section of the Chehalis River is narrow and restricts river flow. Improving conveyance would include the following structural interventions:

- Remove the aging Mellen Street Bridge and relocate it approximately 2,000 feet to the south of its current location. The eastern approach would connect to the existing Ellsbury Road/Airport Road overpass which is above the elevation of major flood events. The western approach would connect to Military or Scheuber Roads.
- Widen the Chehalis River channel near the existing Mellen Street Bridge by removing approximately 1.3 million cubic yards of soil immediately upstream and approximately 3,000 feet downstream of the existing Mellen Street Bridge location.

In addition to the conveyance improvements, the area adjacent to the Chehalis River near the existing Mellen Street Bridge is currently used as a public training facility, sewer pump station and WSDOT Park and Ride. There are two sanitary sewer force mains running north from the pump station. The pump station and force mains would be protected or rerouted to another location. Previous studies have also indicated the need to protect or reroute these facilities away from Chehalis River. Other changes to the area would include relocating the existing park and ride and demolishing the training facility buildings.

NEW AND EXPANDED LEVELS (\$450-600M)

The LAND Alternative includes constructing new levees or expanding existing levees, totaling approximately 22.1 miles of potential levee projects. The type, alignment and height of the levees are conceptual at this phase. There are some existing levees in the basin that would be modified to address water surface elevation assumptions for the Late Century 2080 flood. Planning-level budget estimates used historic bids for similar project types to identify a per mile cost assumption. Future analysis and refinement will determine specific location considerations, such as urban and rural applications, pump station requirements, road/railroad/driveway crossings, location in public right-of-way vs private property, number of storm drain crossings, and level of mitigation required. This will also include additional coordination with WSDOT on levee

alignments and flood duration and depths for the levees closest to the highway. Levee location and design would also be considered WSDOT's 2014 study of various options to reduce flooding on I-5. Some levee projects could also be coordinated with other road and bridge projects.

The two most recent publicly available levee and floodwall costs are for the Hoquiam and Aberdeen North Shore Levee project and the Mount Vernon (WA) Flood Wall. The Mount Vernon floodwall is reported to be a \$31 Million project and listed as 1.7 miles (\$18.2M per mile). This project also included riverfront park improvements. The North Shore Levee West Segment is listed as \$40M for 4.7 miles (\$8.5M per mile). The HDR project website lists \$182.6M for 9.6 miles and includes the Fry Creek Pump Station. Based on these referenced costs, the LAND Alternative assumes a \$20M per mile planning budget, given the uncertainties of levee location and size.

Source: Office of Chehalis Basin



Source: Office of Chehalis Basin

#	Action	Description (as needed)	Related Projects/ Programs/ Policies	Timeframe			Champion		Primary Funding Source(s)			Comments
				Short 1-5 yrs	Mid 6-10 yrs	Long 11+ yrs	Lead	Support	Federal	State	Local	
PJ 1 CRITICAL ROADS AND BRIDGES												
PJ 1.1	South Scheuber Road Bridge	Install a new bridge from Fords Prairie across the Chehalis River to provide an alternative route for I-5 in the event of closure.	PJ 1.2, PJ 1.3	■	■	■	Lewis County	Cities of Centralia, Chehalis, WSDOT	■	■	■	Listed in the current Lewis County Transportation Improvement Plan Lewis County has studied this alignment in previous years. The new bridge would be located between South Scheuber Road and Oakland Avenue.
PJ 1.2	South Scheuber Road (Graf to Military Road)	Raise South Scheuber Road from near the Graf Road/Military Road intersection to approximately 700 feet north of the intersection to maintain access to the hospital.	PJ 1.1, PJ 1.3		■	■	Lewis County	Cities of Centralia, Chehalis, WSDOT	■	■	■	Listed in the current Lewis County Transportation Improvement Plan This project, in combination with PJ 1.1, PJ 1.3, will complete an alternative route for I-5.
PJ 1.3	South Scheuber Road (West Connection)	Raise sections of South Scheuber Road between State Route 6 and the Graf Road/Military Road intersection.	PJ 1.1, PJ 1.2		■	■	Lewis County	Cities of Centralia, Chehalis, WSDOT	■	■	■	Listed in the current Lewis County Transportation Improvement Plan This project, in combination with PJ 1.1, PJ 1.2, will complete an alternative route for I-5.
PJ 1.4	Cooks Hill Road	Raise Cooks Hill Road with structural fill to maintain access during a flood event. This project would also include raising utility castings and surface utilities.				■	City of Centralia	Lewis County	■	■	■	Future improvements could include widening shoulders for a regional bike route and installing a fish-friendly culvert or bridge at Scammon Creek.
PJ 1.5	State Route 6	Replace the existing bridge constructed in 1939 and elevating sections of SR 6 to improve floodplain connections and minimize upstream raised water surface elevation.			■	■	WSDOT	Lewis County	■	■	■	
PJ 1.6	West Main Street	Raise West Main Street or construct a levee system in coordination with BNSF to provide a transportation connection from Chehalis to I-5 during flood events.				■	City of Chehalis	BNSF	■	■	■	This could require BNSF to raise its tracks or construct a levee with a pump station and flood, floodgates across the tracks.
PJ 1.7	National to Kresky	Raise National to NE Kresky Avenue between its intersections with N National Avenue, or provide a series of levees, to maintain the roadway for emergency vehicles during a flood event.				■	Cities of Chehalis and Centralia	City of Centralia	■	■	■	While the road is currently one-way northbound, it could also accommodate two-way traffic between Chehalis and Centralia during flood events.
PJ 1.8	State Route 507 Through Centralia	Provide levee protection or raise the roadway to provide emergency access.	PJ 1.9 and PJ 1.12	■	■		WSDOT	City of Centralia	■		■	Could be coupled with other projects that are already scheduled for big (PJ 1.9)

#	Action	Description (as needed)	Related Projects/ Programs/ Policies	Timeframe			Champion		Primary Funding Source(s)			Comments	
				Short 1-5 yrs	Mid 6-10 yrs	Long 11+ yrs	Lead	Support	Federal	State	Local		
PJ 1.9	Pearl Street and Bridge	Replace the existing 1928 bridge and raise the roadway to allow for vehicle passage.	PJ 2.3	■	■		City of Centralia	WSDOT			■	■	Scheduled for bid prior to 2027 Bridge height would be determined in concert with Skookumchuck Levee configuration
PJ 1.10	Reynolds Road	Raise the roadway with structural fill. Utility castings would be raised to the new asphalt road surface finish elevation. Surface utilities (fire hydrants, communication and power cabinets and overhead utilities) would also be raised to the new roadway elevation.		■	■		Lewis County	City of Centralia				■	Reynolds Road provides an important east/west connection across I-5, but regularly floods near the Skookumchuck River There is a current project to widen the roadway and add a center turn lane. A levee would be needed near the Reynolds and BNSF undercrossing of I-5. A Skookumchuck levee north of Downing Road would be needed to keep flows from entering Coffee Creek unless Skookumchuck flows are mitigated upstream. An alternative to raising the roadway would be to install a levee south of the roadway.
PJ 1.11	New Mellen Street Bridge	Construct a new bridge across the Chehalis valley from the Ellsbury Overpass to Military/Scheuber Road to provide an operational vehicular connection during the storm events.	PJ 3, PJ 4		■	■	WSDOT/ Lewis County	City of Centralia			■	■	This project would be required if additional conveyance projects are constructed in the general vicinity of the existing Mellen Street Bridge.
PJ 1.12	Raise SR-12	Raise or protect SR-12 between the Chehalis Reservation and Rochester to the west to preserve emergency access routes for the area.				■	WSDOT	Lewis County			■	■	
PJ 1.13	Raise Anderson Road	Raise the roadway to maintain access during a flood event.				■	Grays Harbor County				■	■	Anderson Road is the primary access road to the Chehalis Reservation and is inundated during flood events, limiting access to key facilities off of the Reservation.
PJ 1.14	State Route 107	Evaluate SR 107 between Montesano to the north side of the Chehalis River to address flooding potential and potentially raising this section of the highway while maintaining access to the boat ramp and nearby lumber mill.				■	WSDOT	Grays Harbor County				■	
PJ 1.15	Montesano Bypass	Analyze bypass to existing ramps or reconfigure ramps to allow access to SR 12 for emergency vehicles.	PJ 1.14			■	Grays Harbor County				■	■	SR 12 appears to be dry and raised above flood, although on ramps and off ramps are flooded. Could be completed in concert with project 1.14.

#	Action	Description (as needed)	Related Projects/ Programs/ Policies	Timeframe			Champion		Primary Funding Source(s)			Comments
				Short 1-5 yrs	Mid 6-10 yrs	Long 11+ yrs	Lead	Support	Federal	State	Local	
PJ 1.16	Monte/Elma Road	Evaluate potential for bypass route and associated improvements to Monte/Elma Road to allow freight and emergency vehicles access through that area during flood events.				■	Grays Harbor County					
PJ 1.17	Old Highway 603	Raise road between SR 6 and to the east of Twin Oaks Road to provide an additional connection across the Chehalis River Valley.				■	Grays Harbor County					
PJ 2 LEVEES AND FLOODWALLS												
PJ 2.1	Adna	Construct new ring levee in Adna around the new high school and commercial area (1.7 miles)	PG 2 (Resiliency Hub)			■	Lewis County, USACE	School District	■	■	■	This project should coincide with the development of a resiliency hub for the upper basin
PJ 2.2	East bank of the Newaukum and Chehalis Rivers	Construct new levee on the east bank of the Newaukum and Chehalis Rivers east of I-5 near (1.2 miles)				■	Lewis County, USACE	City of Chehalis	■	■	■	
PJ 2.3	Skookumchuck River	Construct new and expand levees on the north and south sides of the Skookumchuck River (6.6 miles)	PJ 1.8, PJ 1.9			■	City of Centralia, USACE	Lewis County	■	■	■	The height of these levees will be determined by the height of the Pearl Street Bridge replacement. Management of the Skookumchuck Dam for flood management could affect the size and location of levees along the river.
PJ 2.4	Fort Borst Park	Construct new levee on the north bank of the Chehalis River from north of Fort Borst Park downstream to Galvin Road (2.7 miles)	PJ 1.1, PJ 1.2			■	City of Centralia, USACE	Lewis County	■	■	■	The height of this levee will inform the height of the future Scheuber Road Bridge and approach ramps. Both the levee and the bridge should be considered concurrently.
PJ 2.5	China Creek	Construct new levees on the north and south sides of China Creek from I-5 to the railroad tracks (2.3 miles)	PJ 5			■	City of Centralia, USACE	Lewis County, WSDOT	■	■	■	The City of Centralia should complete an alternatives analysis to determine the location, extent, and size of project, including impacts to stormwater collection in the area This project is an opportunity to consider future economic development and water-oriented development in the vicinity of China Creek.
PJ 2.6	I-5 from China Creek to Salzer Creek	Construct new levee on the east side of I-5 from China Creek to Salzer Creek (3.3 miles)	PJ 2.5, PJ 5			■	City of Centralia, USACE	Lewis County, WSDOT	■	■	■	
PJ 2.7	Chehalis-Centralia Airport	Expand levee around the Chehalis-Centralia Airport (4.3 miles)	PJ 3, PJ 4			■	City of Chehalis, Chehalis-Centralia Airport, USACE	Lewis County, WSDOT	■	■	■	This project is also assumed in the DEIS for the flood retention facility

#	Action	Description (as needed)	Related Projects/ Programs/ Policies	Timeframe			Champion		Primary Funding Source(s)			Comments
				Short 1-5 yrs	Mid 6-10 yrs	Long 11+ yrs	Lead	Support	Federal	State	Local	
PJ 3 IMPROVED CONVEYANCE												
PJ 3.1	Remove Pinch points along the Chehalis River in the Chehalis/Centralia area	Increase conveyance near the existing Mellen Street Bridge by removing approximately 1.3 million cubic yards of soil immediately upstream and for approximately 3,000 feet downstream of the existing Mellen Street Bridge.	PJ 1.11, PJ 2, PJ 4, PJ 5			■	Cities of Chehalis/Centralia, USACE	Lewis County			■	PJ 2, PJ 3, and PJ 4 are related projects that should be considered comprehensively, even if construction is phased. At the request of the Chehalis Basin Board, OCB will further evaluate PJ 2, PJ 3, and PJ 4 to determine the feasibility of these projects.
PJ 4 CHANNEL DIVERSION												
PJ 4.1	Construct a new diversion to increase water flow	Construct a new 700-foot-wide, one mile long, waterflow diversion by excavating approximately 1.3 million cubic yards of soil west of the existing Mellen Street.	PJ 1.11, PJ 2, PJ 3, PJ 5			■	Cities of Chehalis/Centralia, USACE	Lewis County			■	
PJ 5 CHINA CREEK DAYLIGHTING												
PJ 5.1	Day light China Creek	Day light China Creek to create additional conveyance and amenity to encourage redevelopment of adjacent parcels for higher density, mixed uses.	PJ2.5, PL 1, PL 2, PL 3			■	City of Centralia				■	This project provides localized flood protection in areas where the City of Centralia has purchased repetitive loss structures. The City of Centralia should complete an alternatives analysis to determine the location, extent, and size of project, including impacts to stormwater collection in the area This project is an opportunity to consider future economic development and water-oriented development in the vicinity of China Creek.
PG 1 SAFE STRUCTURES												
PG 1.1	Assist local jurisdictions to update flood maps to access Safe Structures funding within their jurisdictions.					■	City/County	OCB			■	OCB has selected a consultant to assist with CFAR-related projects and land use assistance for local jurisdictions
PG 1.2	Pursue funding opportunities to address program scale and phasing.					■	OCB	City/County			■	
PG 1.3	Provide additional project management and technical assistance for landowners, renters, and local jurisdictions to implement the program.					■	OCB	City/County			■	
PG 1.4	Prioritize flood prone areas where interventions are not proposed.					■	OCB	City/County			■	
PG 1.5	Include programs for renters to secure new housing.		PG 4			■	OCB	City/County			■	

#	Action	Description (as needed)	Related Projects/ Programs/ Policies	Timeframe			Champion		Primary Funding Source(s)			Comments
				Short 1-5 yrs	Mid 6-10 yrs	Long 11+ yrs	Lead	Support	Federal	State	Local	
PG 2 COMMUNITY RESILIENCY												
PG 2.1	Organize a working group to develop an Upper Chehalis Basin Community Resiliency Plan to increase capacity and coordination among public agencies.			■			City/County	OCB				■
PG 2.2	Update emergency access plans, including planning for livestock and machinery in rural areas (e.g., Adna High School accessibility and as a resiliency hub).			■			City/County	OCB				■
PG 2.3	Identify potential sites for establishing resiliency hubs in both urban and rural locations			■			City/County	OCB				■
PG 3 ASRP/LAND ALIGNMENT												
PG 3.1	Create an ASRP/LAND Working Group to identify potential synergies between the two programs			■			OCB			■	■	
PG 3.2	Identify potential permit and regulatory streamlining opportunities to speed ASRP/LAND projects			■			OCB			■	■	
PG 3.3	Focus LAND-related strategies on projects to reduce damage from smaller floods on agricultural uses			■	■	■	City/County	OCB		■	■	
PG 4 EQUITY SET ASIDE												
PG 4.1	Establish a program to provide resources to assist low-income households that are impacted by flooding.	Resources could take the form of funding assistance, low interest loans, and technical assistance to assist households to better understand their options for coping with flood risk.	PG 1	■			OCB	City/County				■
PG 5 FLOODPLAIN RESTORATION												
PG 5.1	Identify potential floodplain restoration projects through more detailed investigations of parcel size, ownership, and connectivity to the river. Analysis should consider the following: <ul style="list-style-type: none"> Lands that are currently in public ownership should be first priority candidate sites. Where private land is involved, floodplain restoration efforts should only be undertaken with willing cooperation of the private landowners 			■			OCB	City/County				The LAND process has developed an initial methodology and has identified potential locations where floodplain restoration and management could occur. Consistency with the ASRP and further analysis is needed.

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				Short 1-5 yrs	Mid 6-10 yrs	Long 11+ yrs	Lead	Support	Federal	State	Local		
PL 1 ECONOMIC DEVELOPMENT, LAND USE AND GROWTH MANAGEMENT													
PL 1.1	Through the Comprehensive Plan update process, consider the following: <ul style="list-style-type: none"> Update future land use maps to limit development in the floodplain. Evaluate Urban Growth Areas to incorporate receiving areas with planned city services. Refine receiving area locations through subarea planning that also incorporates infrastructure requirements. Incorporate comprehensive flood hazard management planning into comprehensive plans Update equity and affordable housing needs/policies, assuming updated floodplain maps and future land use designations are included in comprehensive plans. 			■			City/County	OCB				City and county jurisdictions within the basin will be required to update their comprehensive plans and development code to address state requirements, providing an opportunity to reduce development in the floodplain and direct development to more suitable locations. OCB has hired a consultant to provide technical assistance to local jurisdictions to assess their flood related development codes.	
PL 2 BUILDING AND DEVELOPMENT CODES													
PL 2.1	Revise building and development codes to address the following: <ul style="list-style-type: none"> Update flood maps within the Upper Basin to reduce development in flood prone areas (if not already completed). Complete audits of all development codes in the Basin related to floodplain development. Update Critical Areas Ordinances for consistency between local and county ordinances. Update Flood Damage Prevention Ordinances related to developer and shoreline permits, construction, flood protection and subdivision proposals. 			■			City/County	OCB				OCB has hired a consultant to provide technical assistance to local jurisdictions to assess their flood related development codes.	
PL 2.2	Create a model code and provide technical assistance to local jurisdictions to implement flood related development and building code changes			■			OCB					■	
PL 3 CAPITAL FACILITIES													
PL 3.1	Update Capital Facilities Plans in concert with Comprehensive Plan updates and other land use planning activities		PL 4.1	■	■	■	City/County					■	Capital facilities plans are typically updated as part of the comprehensive planning process every 10 years, but project priorities are often revisited every 5 years, as funding changes.
PL 4 FUNDING													
PL 4.1	Identify and prioritize appropriate funding sources for capital infrastructure and floodplain management projects.		PL 3.1				City/County	OCB				■	

Chehalis Basin LAND*

*LOCAL ACTIONS NON-DAM ALTERNATIVE



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