



Chehalis Basin today



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

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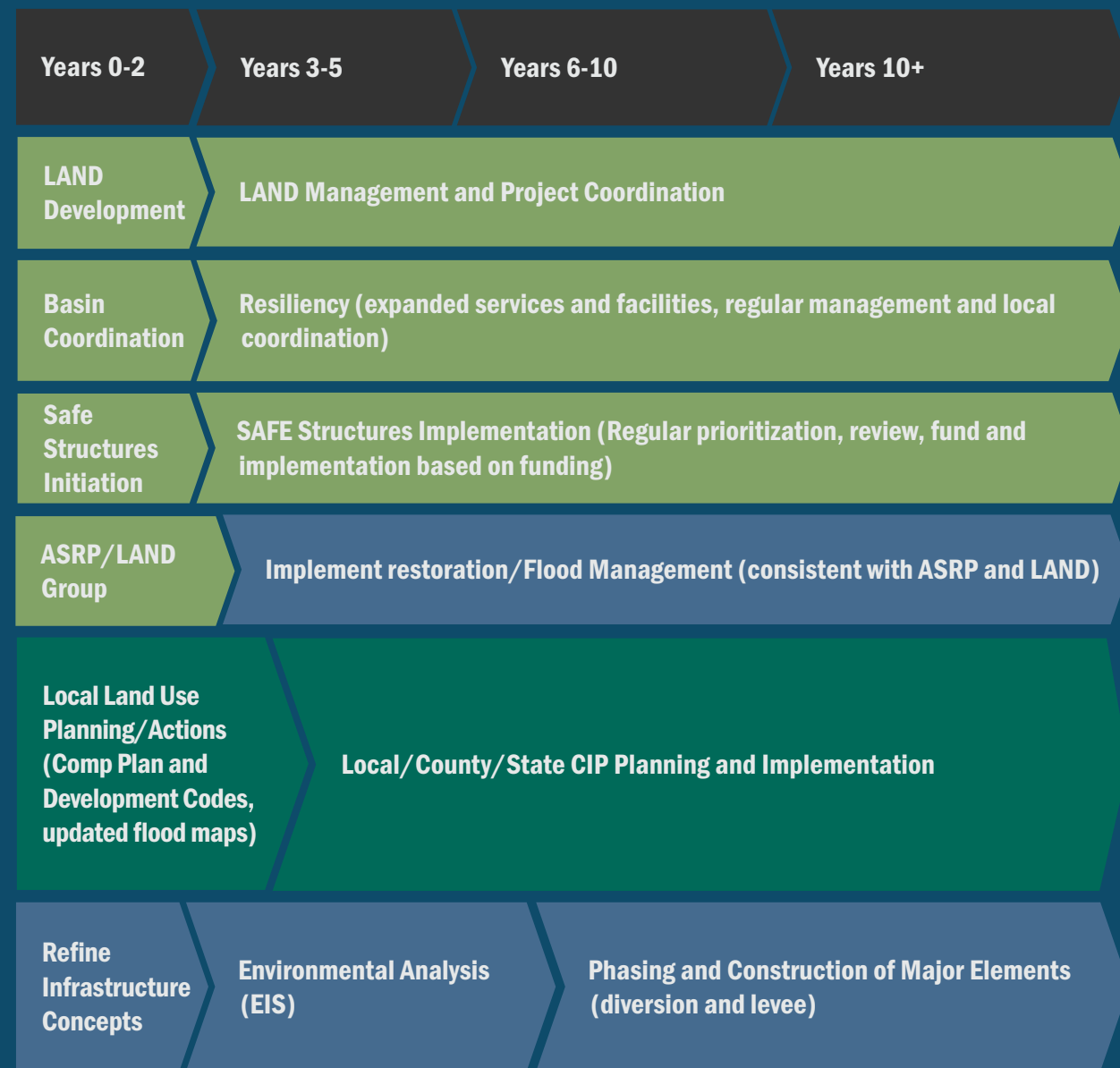
The LAND Alternative

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, based on the best available information. 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.



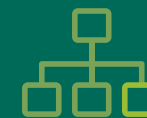
The proposed projects, programs, and policies are designed to generate equitable outcomes for individuals and businesses living and working in all communities throughout the Chehalis Basin. The strategies include:



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.

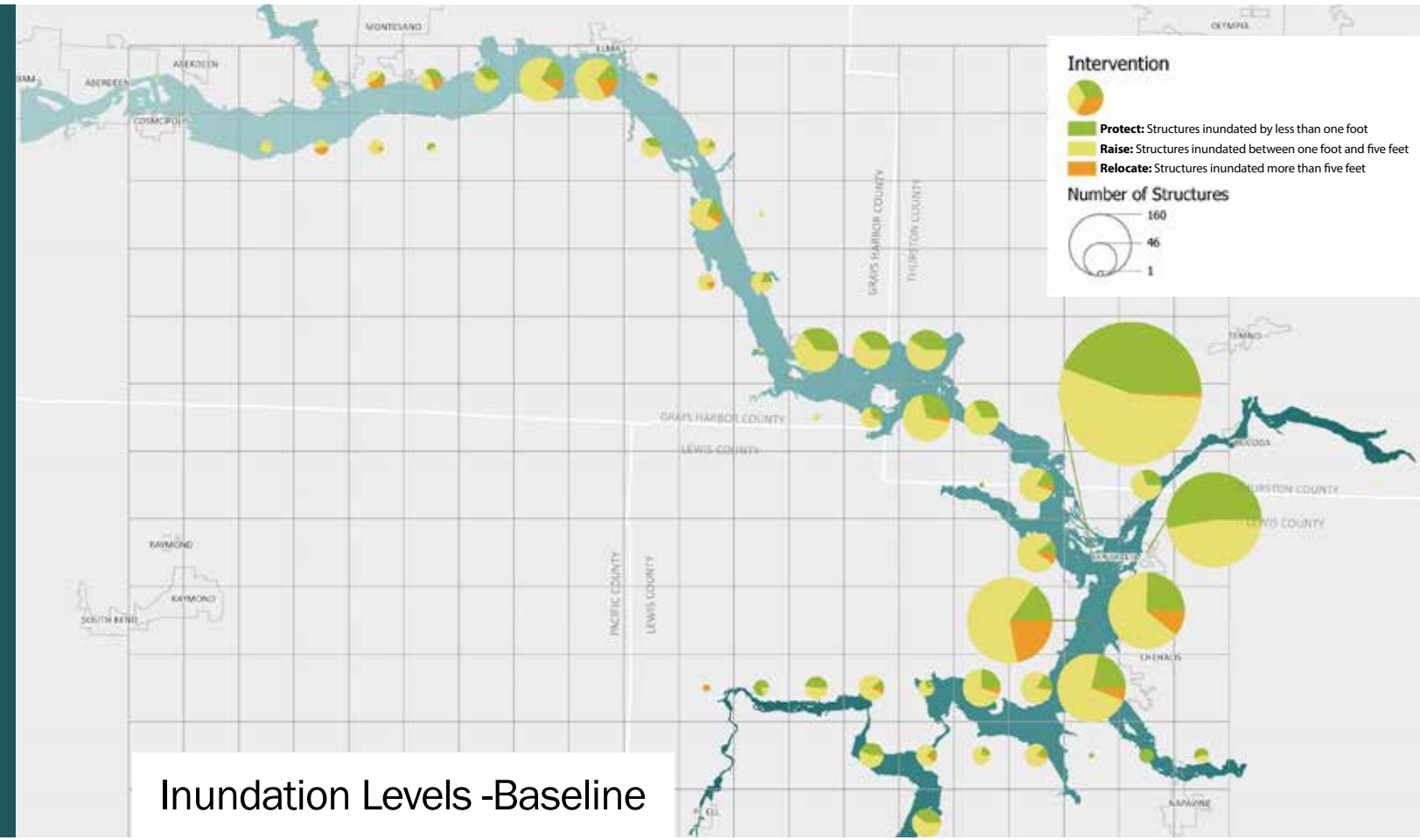
Source: Office of Chehalis Basin

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:

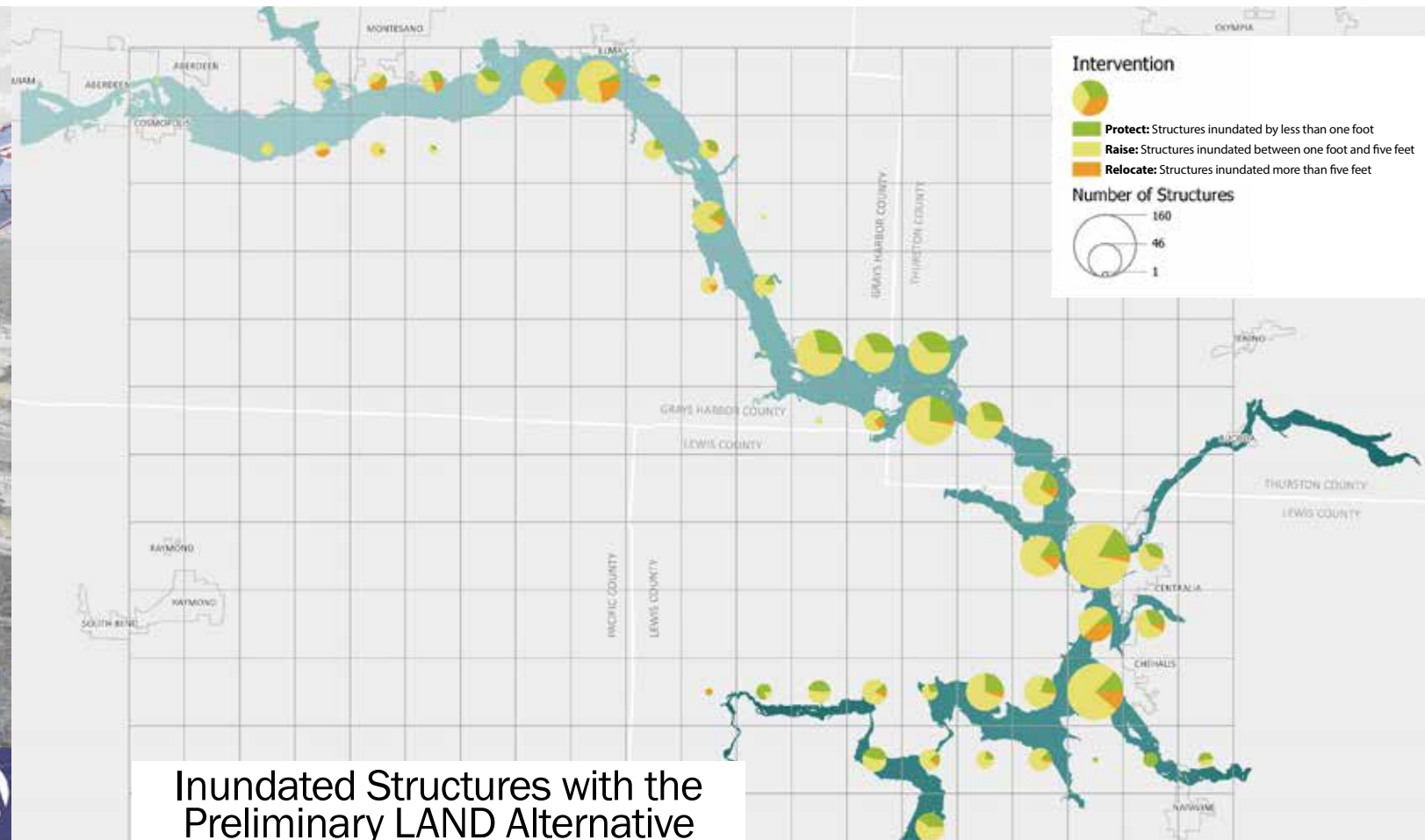
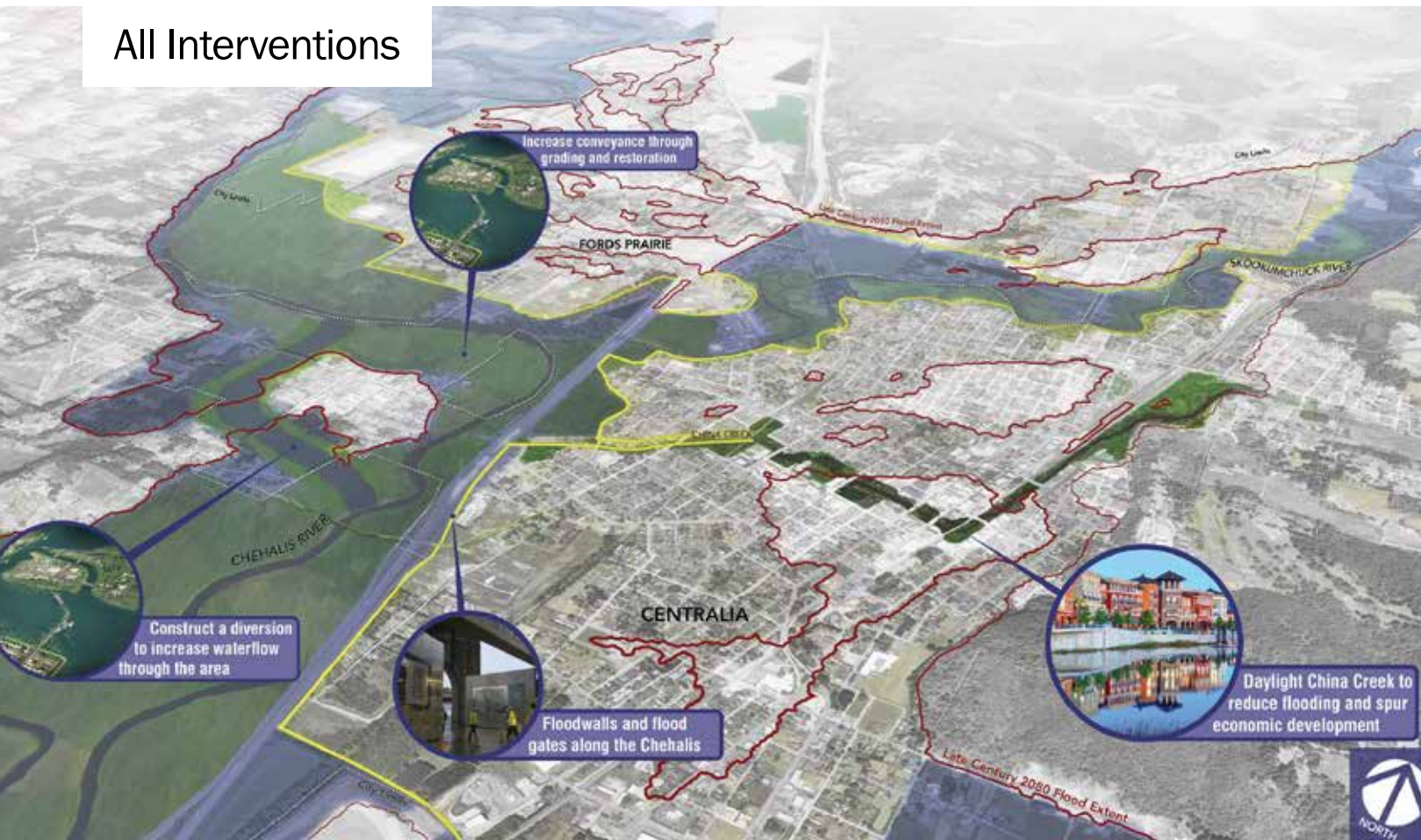
- The potential for flood damage would be reduced in higher population centers where high concentrations of structures are located and cannot be moved.
- The levee around the Adna commercial center and high school would reduce flood damage and also provide a site for a resiliency hub in the upper Basin 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

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 (\$\$\$)

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 removing and relocating the existing Mellen Street Bridge and approaches.

12. RAISE SR-12, CHEHALIS RESERVATION TO ROCHESTER (\$\$\$)

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 (\$\$)

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 (\$\$\$)

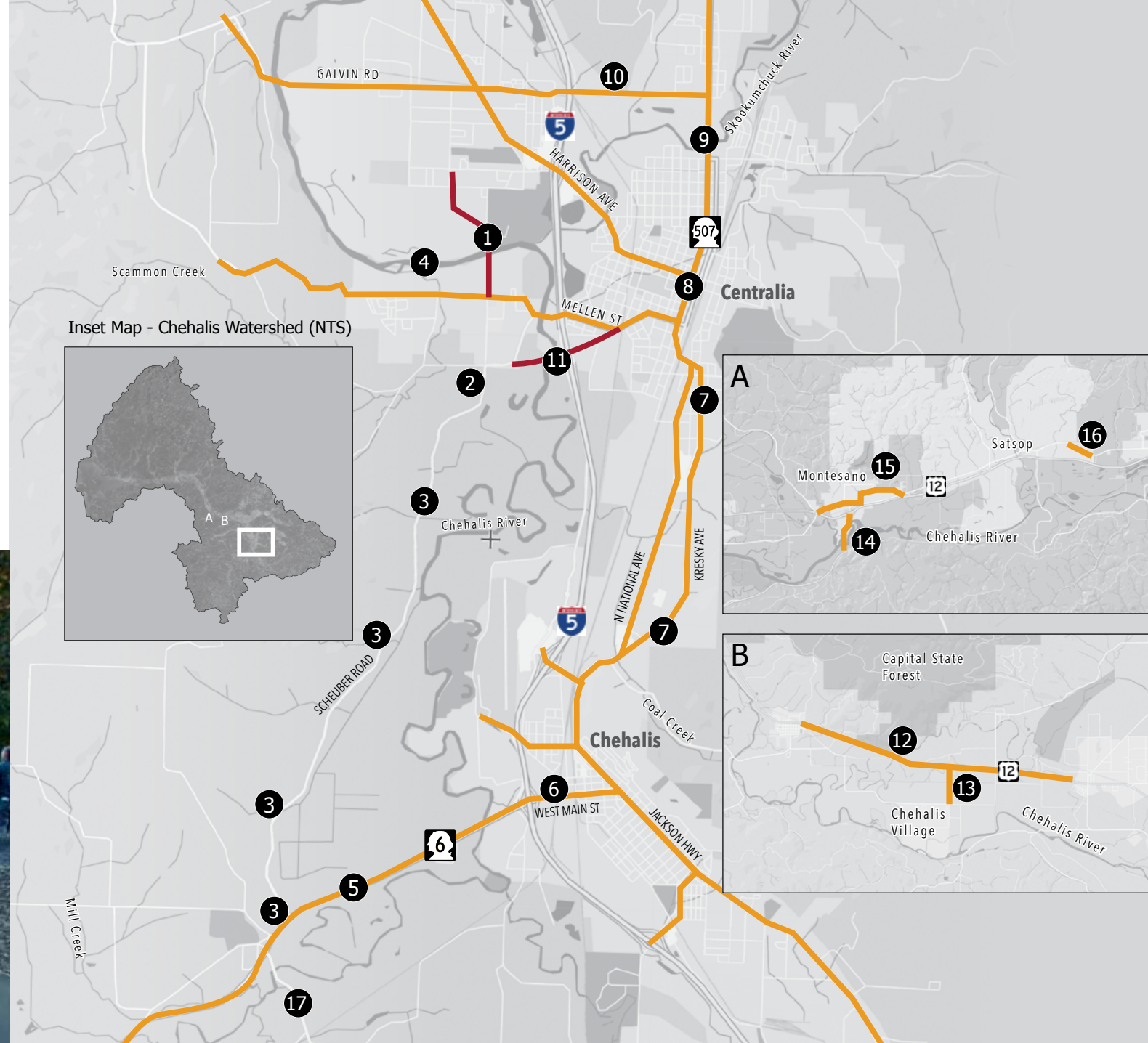
Raise road between SR 6 and to the east of Twin Oaks Road to provide an additional connection across the Chehalis River valley.

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

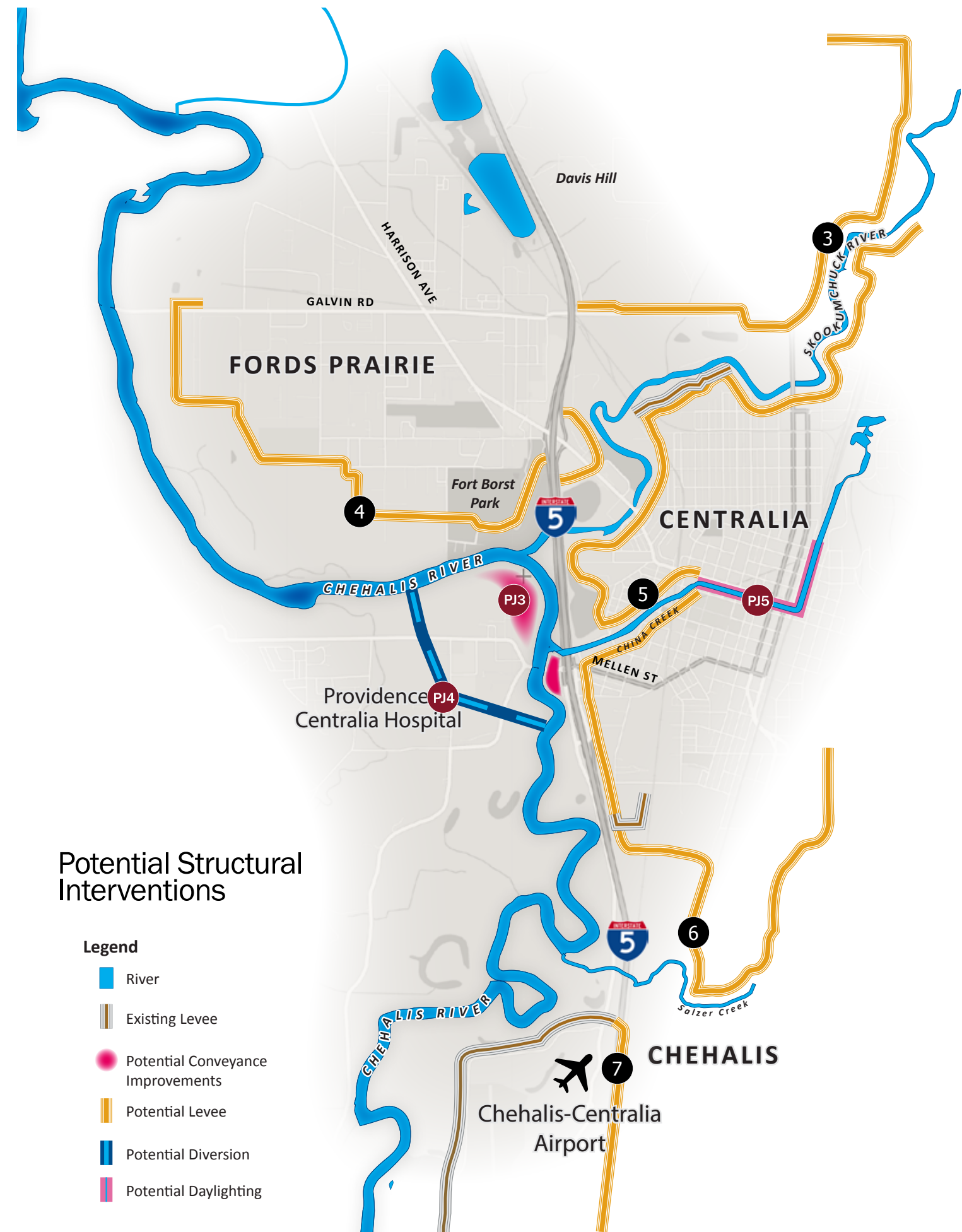
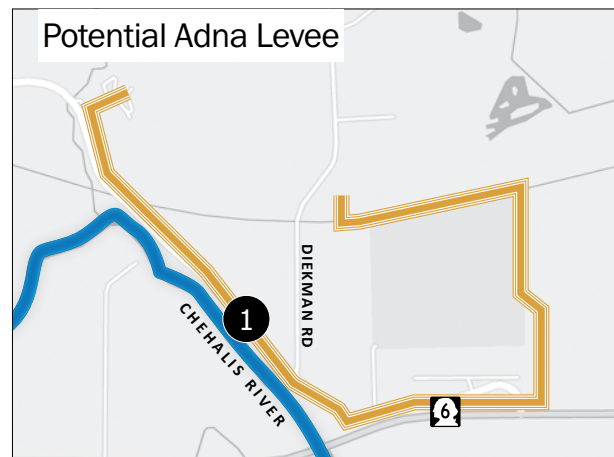
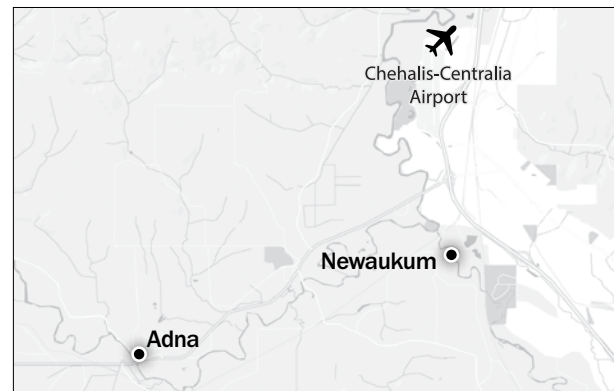
PJ 2: New and Expanded Setback Levees and Floodwalls

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 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 along the southern boundary 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. See page 64 for locations of these interventions.

PJ 4: Channel Diversion

This Chehalis River Diversion intervention would reduce peak flood elevations by providing another path for floodwaters. 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. See page 64 for locations of these interventions.



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 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

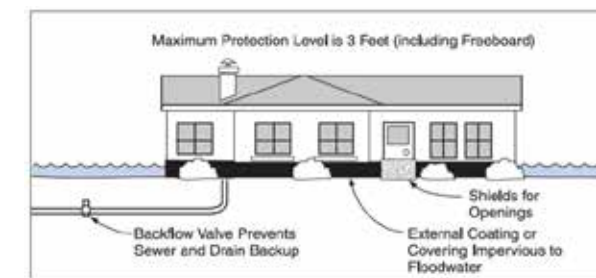
LEVEL 1: INSURANCE

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.

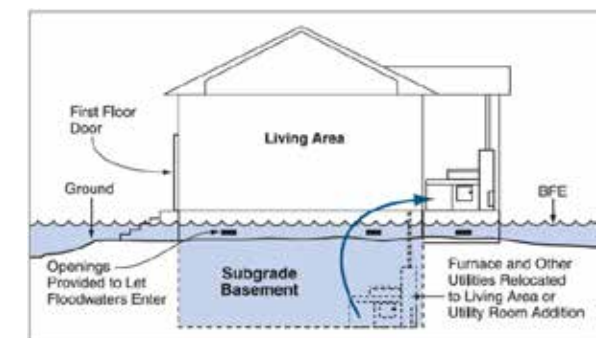
LEVEL 2: RELOCATE UTILITIES

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

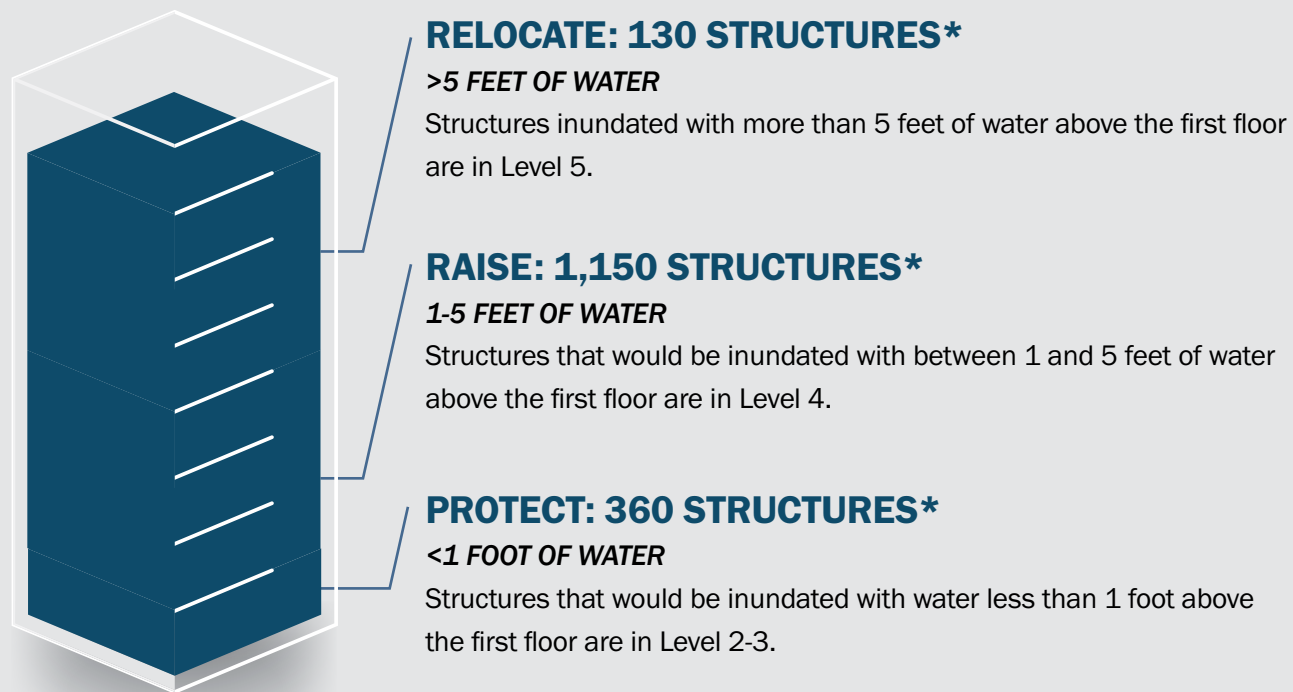
For homes that can't be raised, property owners could voluntarily participate in a buy-out with fair compensation and relocation assistance. The structure could be demolished and the property owner could purchase or construct a new home outside the floodplain. Or the house could be physically relocated 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 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 to 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 choosing to 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

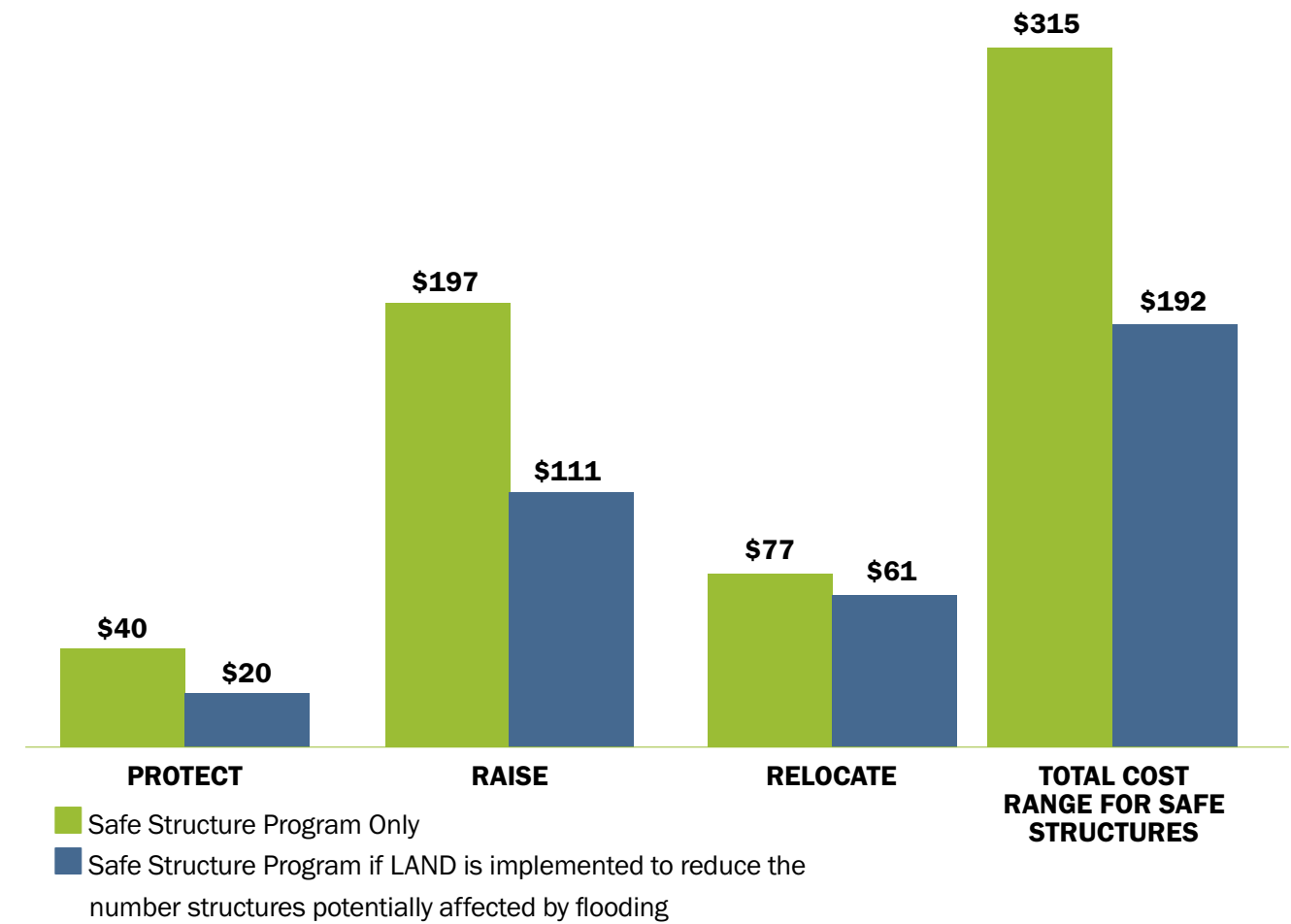
At the moment, there is no distinction between costs for building replacement homes versus relocating existing homes. The rough costs for implementing the program on its own are \$315 million. But when combined with capital projects and non-structural programs that take many properties out of the floodplain, 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; however, that cost 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 events, fostering the development of strong and supportive relationship networks. Meanwhile, the resilience hubs' physical location becomes a place for the 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-based 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 mutual benefits 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 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 affected by flooding. Resources

could take the form of funding assistance, low interest loans, and technical assistance to help 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 on 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 future development in flood-prone areas:

- 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.