Localizing Hazard Mitigation

Recommendations for Westport's Comprehensive Plan Update

Prepared for the City of Westport, WA, by the University of Washington Urban Design & Planning Studio "Community Engagement for Coastal Resilience," URBDP 508B, Autumn 2018

UNIVERSITY of WASHINGTON

A Report based on Community Responses to Tsunami and Sea Level Rise Scenarios for purposes of Integrating the Grays Harbor County Multi-Jurisdiction Hazard Mitigation Plan with the City of Westport Comprehensive Plan

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Table of Contents

List of Figures

List of Tables

Preface and Report Contributors

As the first community in North America to build a tsunami vertical evacuation structure (at the Ocosta Elementary School), the Ocosta School District and larger Westport-South Beach community has demonstrated extraordinary political will, community spirit, and long-term thinking. In one of the lowest-income areas of the state, taxpayers voted overwhelmingly to approve the bond that funded the extra cost of designing and building this unprecedented structure. Westport's achievement has since inspired federal authorities to enable new funding for additional such structures, and thus has led the way for many other coastal communities to build similar structures. It has also inspired the University of Washington (UW) team that prepared this report to assist the community to broaden its efforts in planning for a safe and resilient future. The team thanks all the members of the public from Westport, South Beach, and Grays Harbor County who participated in the community workshops and otherwise shared their local knowledge with each other and the team. This report is dedicated to them and their community.

The UW Autumn Quarter 2018 Urban Design & Planning 508B studio team consists of the course instructor, Prof. Daniel Abramson; doctoral research assistants Katherine Idziorek and Lan Nguyen, who researched and provided a framework for hazards integration into comprehensive planning; and the students who each researched and drafted an element of the recommendations as follows:

- Helen Stanton (Master of Urban Planning): *Land Use Element*
- Yiran Zhang (PhD in Civil & Environmental Engineering): *Transportation, Circulation and Telecommunications Element*
- Pegah Jalali (PhD in Environmental and Forest Sciences): *Economic Development Element*
- Sreya Sreenivasan (Master of Urban Planning): *Community Identity and Natural Resources Management Element*
- Charlotte Dohrn (Master of Marine & Environmental Affairs): *Area-Wide Development Element*
- Lauren Kerber (Master of Marine & Environmental Affairs): *Shoreline Master Program Element*
- Catharina Depari (PhD in Urban Design & Planning), *Health and Well-being Element*

Dan Abramson (lead), Katherine Idziorek (asset mapping) and Lan Nguyen (community engagement and disaster preparedness) designed the workshop protocol. Community, Environment & Planning (CEP) major Sophia Nelson provided GIS expertise and WeTable support, and also produced the City's first set of GIS data layers and sea level rise hazard maps. CEP alumna Kiana Ballo provided community outreach support. Charlotte Dohrn and Dan Abramson compiled and edited the report for consistency.

The team is grateful for the support, guidance and contributions of many people, and would like particularly to thank the following partners and participants: Mayor Robin Bearden and the City Council of Westport; Kevin Goodrich, Westport Director of Public Works, and other members of the Westport Tsunami Safety Committee, Paula Akerlund, Molly Bold, Harry Carthum, Leslie Eichner, Kurt Hilyard, Tracy Rosenow and John Shaw; Ocosta High School Principal Heather Sweet and science teacher Jon Harwood; South Beach Regional Fire District Chief Dennis Benn; Grays Harbor County Emergency Manager Hannah Cleverly; Shoalwater Bay Tribe Council Chair Charlene Nelson, and Emergency Manager Lee Shipman; WA State Parks Ranger Miles Wenzel; WA State Emergency Management Division Earthquake, Tsunami and

Volcano Program Manager Maximilian Dixon and Mitigation Strategist Derrick Hiebert; and Glenn Coil. UW Institute of Hazard Mitigation Planning and Research Co-Director Bob Freitag coordinated his Floodplains Management course with the studio, and provided expertise based in the experience of Project Safe Haven tsunami vertical evacuation and other community resilience planning in the region. UW Prof. Alison Duvall and other M9[1] project faculty supported the participation of doctoral student Lan Nguyen, and contributed time and expertise themselves, including the following: Frank Gonzalez, Randy LeVeque and Loyce Adams ran GeoClaw models of tsunami scenarios, produced maps of tsunami flooding depth and land subsidence, and helped interpret them for community use; Brian Atwater helped interpret coastal geo-history and assisted with community outreach; Ian Miller of WA Sea Grant provided localized probabilistic data on sea level rise and helped with its interpretation; Ann Bostrom and David Schmidt provided insight on the communication of seismic scientific uncertainty and risk, and assisted with WeTable setup. Cynthia Chen and Xuegang Ban provided transportation systems expertise and supported the participation of doctoral students Katherine Idziorek and Yiran Zhang.

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[1] The M9 Project is a UW-based team of experts whose goal is to reduce catastrophic potential effects of a Cascadia megathrust earthquake on social, built, and natural environments through the advancement of seismic ground motions simulation and co-seismic hazards for early warning, structural design, and community planning.

Localizing Hazard Mitigation

DRAFT Recommendations for Westport's Comprehensive Plan Update

1. Introduction

This report provides recommendations for updating the City of Westport Comprehensive Plan (Comprehensive Plan) to increase community resiliency by identifying opportunities to integrate hazard mitigation strategies with planning goals. An interdisciplinary group of students and faculty from the University of Washington's Department of Urban Design and Planning (UW team) developed these recommendations as part of a collaborative Coastal Resilience Project conducted with the Westport Tsunami Safety Committee, which comprised of the local Steering Committee for this project, and other community members. The UW team conducted this project as the focus of an Autumn 2018 urban planning studio class. The UW team developed these recommendations by reviewing the Comprehensive Plan and the Grays Harbor County Multi-Jurisdiction Hazard Mitigation Plan (Grays Harbor County HMP), conducting additional research, and orchestrating an extensive, quarter-long community engagement process. The community engagement process included Coastal Resilience Workshops held in Westport in November 2018 that served as an opportunity for collective visioning of community resilience. Appendix A includes detailed documentation of the workshops; however, we integrated input from the workshops, follow-up meetings, and pre-workshop site visits throughout this report.

1.1. Project and Report Goals

This section provides a brief overview of overarching Coastal Resilience Project goals and the goals of this report. Project goals were established in a Memorandum of Understanding signed in September 2018 by Westport Mayor Robin Bearden and Prof. Abramson on behalf of the UW Department of Urban Design and Planning and studio team. The goals include:

- Engage a broad range of local community members as well as municipal and agency stakeholders, including residents, the City of Westport, Shoalwater Bay Tribe, Grays Harbor County, Pacific County, State and local emergency management agencies, Federal representatives, and other stakeholders representing coastal ecology, transportation, public health, education, local businesses and historic resources
- Support ongoing efforts to improve community resilience in the City of Westport and surrounding areas, including collaborative efforts among multiple coastal communities
- Identify opportunities for integrating equitable and just localized hazards planning with general community development planning, urban design and public health via the City's Comprehensive Plan update and other infrastructural improvements, including transportation and telecommunications
- Learn from successes won and challenges faced by the City of Westport and its residents to inform ongoing policy decisions around hazard planning and to share lessons learned with other communities both within our region and beyond

As a primary output of the project, this report is intended to guide the City of Westport when updating and/or implementing the current Comprehensive Plan. The report provides recommendations for localizing hazard mitigation strategies identified in the Grays Harbor County HMP and aligning these strategies with the broader goals and values of the Westport community to increase resilience. It is important to note that the scope of the Comprehensive Plan is broader than hazard mitigation; however, this report focuses on opportunities to incorporate hazard mitigation into the plan and highlights potential co-benefits of these strategies. The recommendations should be viewed as possible answers to the question: How can mitigating coastal hazards in Westport also help the community achieve its everyday goals for development? Westport will need to complement these recommendations with other considerations related to community development and resilience when updating the Comprehensive Plan.

1.2. Report Overview

This section outlines the content of this report, provides an overview of how recommendations were developed, and describes the information included in each report section. The current Comprehensive Plan includes six elements: Land Use, Transportation and Circulation, Economic Development, Community Appearance and Natural Resources, Area-Wide Development, and Shorelines Goals and Policies, as well as additional chapters focused on overarching goals and objectives and implementation. This report includes a section providing recommendations for updating each of the six existing elements, as well as a proposed new element; an overview of each section update is provided below.

- **Land Use Element:** Highlights opportunities to utilize land use-related tools and approaches to increase the resiliency to flooding and other hazards. The section emphasizes approaches including land acquisition and strategic location of critical facilities, hazard-resilient buildings and infrastructure, and water management as key opportunities to integrate hazard mitigation into the Comprehensive Plan.
- **Transportation, Circulation, and Telecommunications Element:** Identifies opportunities to strengthen existing transportation plans and infrastructure to support evacuation and disaster response. In addition, this section recommends including telecommunication as a component of this element of the Comprehensive Plan and proposes innovative technologies for improving internet access and other forms of communication.
- **Economic Development Element:** Describes areas of alignment between hazard mitigation and Westport's economic development goals, including proposing new opportunities for bolstering the local economy while enabling hazard mitigation. Recommendations include renovating existing structures to provide multi-purpose benefits including vertical evacuation and conference/event space.
- **Community Identity and Natural Resources Management Element:** Recommends dividing the current Community Appearance and Natural Resources Element into two new elements focused on community identity and natural resources management. Recommendations related to these topics describe creative opportunities for introducing new development and infrastructure that improves hazard resilience while maintaining Westport's character.
- **Area-Wide Development Element:** Highlights the importance of incorporating regional considerations into hazard mitigation planning and opportunities for accessing regional assets to increase hazard resiliency.

- **Shoreline Master Program:** Outlines opportunities to update the Shoreline Master Program to incorporate sea level rise projections while promoting best practices for conservation and use of Westport's shoreline.
- **Health and Well-Being Element:** Proposes a new element focused on health and well-being of Westport residents, including identifying key health and well-being considerations of hazard mitigation and long-term community resilience.

The recommendations presented in this report draw from four primary sources: the Comprehensive Plan, the Grays Harbor County HMP, community input, and other relevant cases and research. Westport adopted its Comprehensive Plan in 1998 and updated it in 2013; the plan provides a policy guide for the physical, economic, and social development of the city. Grays Harbor County updated its HMP in 2018; the plan describes county-wide hazards and mitigation initiatives and also includes a Westport-specific annex (and annexes for other jurisdictions). The Grays Harbor County HMP identifies earthquake, tsunami, erosion, and flood as the top hazards of concern for Westport (Table 10-7 in the HMP Westport Annex), though Steering Committee members asked the UW team to consider severe weather and climate change as possibly also deserving high priority attention. To mitigate the risks associated with these and other hazards, the Westport annex listed six initiatives, which are referenced throughout this report: Vertical Tsunami Evacuation Structure; Public Outreach Program; Emergency Management Plan; Emergency Communications Plan; Critical Facilities Evaluation; and Transportation and Right of Way Improvements.

To further localize these initiatives, and consider what additional ones may be desirable, the UW team gathered input from the Steering Committee and community members during site visits, in-person and telephone interviews and meetings, and community stakeholder and public workshops. The UW team facilitated two Westport/South Beach Coastal Resilience Workshops on November 16th and 17th, 2018. The workshops used an "appreciative inquiry" and asset mapping approach to encourage participants to first identify community values and assets before discussing the impacts of different hazard scenarios and what mitigating strategies would be appropriate for them. While the studio did not focus on assessing community needs and priorities for development in general, beginning the workshop discussions with an appreciative inquiry provided a "reality check" on the validity and priority of both Comprehensive Plan goals and HMP strategies, and also helped to prompt new and creative ideas for recovery and resilience.

In the workshops, each table of discussants focused on one of three specific hazard scenarios – sea level rise, and two potential near-source Cascadia Subduction Zone (CSZ) earthquake scenarios with tsunami flooding and ground subsidence. The sea level rise scenarios showed participants projections for the years 2060, 2080 and 2100 with probabilities in each year of the sea rising to different elevations. The earthquake scenarios included a moderately severe magnitude 8.9 (M1), CSZ earthquake similar to what last occurred in 1700, and a more severe "maximum considered" magnitude 9.0 (L1), CSZ earthquake that is currently the basis for the State's tsunami inundation maps, evacuation planning, and critical facilities structural design. Both scenarios showed maximum tsunami wave depth and post-earthquake coastline change due to seismic ground subsidence (see *Appendix A* for more information regarding the workshops). Although the workshops did not equally consider all relevant hazards (e.g. coastal erosion, distant-source tsunamis, and many seismic hazards including shaking, liquefaction and landslides), the outcomes are broadly relevant to hazard mitigation. The UW team also gathered input through feedback on draft recommendations presented to the Westport Steering Committee and other key stakeholders on December 7th, 2018, and at a community open house on December 8th. A full timeline of community engagement activities prior to and during the studio is included in Section 1.3 below.

In addition, the UW team engaged hazard experts and conducted additional research throughout the quarter to inform the development of recommendations. Each section of this report follows the same general structure, described below.

- **Introduction:** provides an overview of the current Comprehensive Plan Element, including goals and objectives
- **Opportunities for Integration:** highlights opportunities for integrating the existing six hazard mitigation initiatives from the Westport Annex of Grays Harbor County HMP with the Comprehensive Plan Element
- **Community Input:** summarizes community input relevant to the specific Comprehensive Plan Element gathered during workshops and other engagements
- **Recommendations:** presents synthesized recommendations based on integration opportunities and input for updating the Comprehensive Plan Element
- **References Cases and Further Relevant Information:** describes relevant examples and/or case studies and provides references for the sources cited within each section

1.3. Timeline of 2018 Engagement Activities

July 19 – Collaboration proposal to Westport City Council
August 3 – Collaboration proposal to Westport Tsunami Safety Committee
September 5 – Mayor Bearden and Prof. Abramson signed Memorandum of Understanding
September 26 – Public forum on Japanese experience of 2011 earthquake and tsunami
October 12-13 – Workshop mid-planning meeting and community site visit, McCausland Hall
November 5 – Scenario review and protocol design meeting, via Zoom
November 16 – Partners Workshop w/ WeTable, McCausland Hall
November 17 – Public Workshop, Ocosta Elementary School
December 7 – Presentation to Steering Committee, McCausland Hall
December 8 – Poster Open House, Tackle Box

1.4. Overarching Considerations

While each section of this report provides targeted recommendations for updating each element of the Comprehensive Plan, there is significant overlap in the strategies that emerged from the Grays Harbor County HMP initiatives and integrating community input across elements (see Table 1). The overlap among sections illustrates the importance of taking a comprehensive, integrative approach to increasing community resilience and mitigating hazards in Westport. The overlap also illustrates the principle that a robust and effective strategy should not only mitigate a hazard (and ideally more than one hazard) but also provide multiple benefits to the community on an everyday basis, regardless when or whether the hazard manifests itself. In this way, robust strategies account for the uncertainties and unpredictability of the timing and severity of future possible hazardous events and ensure the protection of the highest community values (e.g. human life), while allowing the community to realize other values (e.g. economic development) under normal "blue sky" conditions. Finally, the integration of mitigation strategies with everyday life helps to ensure that such strategies are well-understood and internalized by community members, and thus enhances their effectiveness.

In sum, we asked the following questions, based on the above overarching considerations and principles, and after reviewing the Grays Harbor County HMP, the Comprehensive Plan, and all community input:

1) How many different hazard scenarios does each strategy mitigate, given the nature, severity, timing and likelihood of the hazard? (The more hazards it mitigates, the more robust the strategy.)
2) Which Comprehensive Plan Element goals can each mitigation strategy help to achieve? (The more, the better.)
3) What additions or revisions to the Comprehensive Plan goals does each mitigation strategy suggest? (The more alignment, the more resilient the community's development will be.)
4) What additions or revisions to the Comprehensive Plan goals would better reflect community values? (Not the main focus of the studio, but an important reality check to inform the validity of the answers above as well as priorities for implementation.)

For example, one key hazard mitigation consideration for the city may be the acquisition or annexation of land (or at least emergency access to it) at higher elevations within or outside the city limits, such as the dune ridges on the Westport peninsula, uplands in Bay City across the Elk River or east of Grayland. Relocation of important public and emergency facilities, and possibly some housing, to the dune ridges would help protect them from the more likely but less severe hazards such as sea level rise or moderate tsunamis. Building these facilities as vertical evacuation structures would allow them to serve at least as life-saving protection in a severe tsunami. Combining vertical evacuation with frequently used facilities such as the school, City Hall, the fire and police stations, clinics, hotels, etc., would also help community members and visitors become familiar with where to go in such an emergency, and potentially support the Grays Harbor County HMP's Public Outreach Program initiative. Including vertical evacuation in new hotel and event space construction could lever economic development to support mitigation, and vice versa. Designing such a facility to function as a highly visible landmark could both enhance Westport's city image (community identity and appearance) and also raise awareness of where to evacuate.

Acquiring even higher ground outside the current city limits would function as a form of "insurance" against a future with higher water caused by sea level rise, or by the rare but possible inundation and subsidence associated with an earthquake and tsunami. This is a nascent idea that would require considerable research into the feasibility and community desire to pursue it. Several sections below reference this idea, as summarized in Table 1, and it is important to note that at this stage, land acquisition is not recommended for relocating Westport now; rather, the city could pursue options including annexation, land swaps, easements, or other mechanisms to gain access to higher ground for a variety of uses, as discussed in more detail in the Area-Wide Development element. As detailed in the recommendations for each Element below, higher ground outside the city limits could be developed to provide economic opportunities in the near-term and used more directly by the city over the long-term, depending on the needs. What might be useful (and even profitable) in normal times as an ecologically low-impact camping area, hunting lodge or resort development, may serve as an emergency refuge and resettlement area after a major earthquake and tsunami. As an example of this approach, the nonprofit Ducks Unlimited recently partnered with the Washington Department of Fish and Wildlife to acquire 1,100 acres of land just south of the Westport city limits for habitat and recreation. Westport is working with the nonprofit and the state to ensure that the city can maintain easements on this property for critical water infrastructure and aquifer access for residents and businesses now and in the future. This case provides one example of how the city can leverage land access to help ensure a sustainable, resilient future while enhancing daily life in the community according to its values.

Table 1. Summary of Alignment and Overlap between Comprehensive Plan Goals and Grays Harbor County HMP (and other) Resilience Strategies/Initiatives

Crosscutting Recommendations	Land Use	Transportation, Circulation & Telecommunication	Economic Development
Implement climate-smart and hazard resilient development and zoning using best-available sea level rise/flood data	Climate/hazard resilient building codes and infrastructure investment		Resilient infrastructure in the Marina; new cultural district
Build multi-use vertical evacuation structures that are integrated with community and economic development goals	Additional multi-use vertical evacuation capacity		New or retrofitted vertical evacuation infrastructure (e.g., Chateau Westport)
Develop innovative transportation and accessibility solutions		New ferry routes and vessel technology	New ferry and high ground trail network
Consider securing access to higher ground, including assessing feasibility and identifying possible near-term uses	Purchase, acquisition, or annexation of higher land		Acquisition of higher ground land
Identify and implement creative adaptation solutions and land uses for low lying areas	Funding to change use patterns in flood prone areas		Relocation of homes and restoration of flood-prone areas
Improve evacuation/emergency response planning, training, preparedness, and communication		Evacuation drills and route planning, emergency radio infrastructure, and emergency planning	
Support transportation infrastructure improvements (e.g., critical roads, bridges, airport) and transportation management		Improvements to key routes	Reconstruction of key roads/bridges
Strategically site/relocate critical facilities to low-risk areas within Westport	Research and evaluation of critical facilities siting		
Improve drainage and stormwater infrastructure	Improvements to storm and wastewater drainage		
Improve communications capacity and technology		Telecommunication improvements (e.g., LTE, low power radio)	Improved internet and cellular connectivity
Implement economic, community, and cultural development initiatives			Improved web presence and local art shops
Promote sustainable land and natural resources management			Conservation of open space for public use and ecosystem services
Establish community health center	Co-locate with vertical evacuation structure	Co-locate with broadband internet access	
Improve availability of community demographic and health needs data		Enhanced disaster medical response	
Support resilient, local food systems	Zoning for community food gardens		Community garden produce market

Community Identity and Natural Resources	Area-Wide Development	Shoreline Master Program	Health and Well-Being
Flood-smart building design	Zoning and policies that promote resilient development; evaluate critical facilities exposure	Inclusion of sea level rise projections and focus on adaptation opportunities	Land use planning updates and protection of important habitat (e.g., oyster beds)
Retrofitting existing and/or building new vertical evacuation structures	Network of vertical evacuation structures		Community health center with vertical evacuation capacity
New ridge trail	New ferry, ridge trail system, logging/forest road access	Earthquake resistant beach access and trail connections	Opportunities for physically active living
Development of resorts on hilly land outside the city	Assessment of feasibility and possible uses for higher ground outside city		
Wetland resort development and open space	Identification of new economic development opportunities	Preservation of coastal vegetation	
Emergency evacuation route signage	Regional collaboration with county and private sector on evacuation planning		Coordinating volunteer organizations to support emergency aid
	Transportation infrastructure improvements	Incorporation of sea level rise into infrastructure planning	
Relocation of critical facilities	Feasibility of relocating critical facilities		
Blue-green stormwater infrastructure		Vulnerability assessment of wastewater treatment and mitigation needs	
	Improved cellular and internet connectivity		Regional telehealth programs
Potential aerial tourism opportunities			Walking-friendly environment; affordable housing
Coastal resources mapping	Protection of open spaces and ecosystem services		
			New telehealth system and improved health outreach
			Health service providers and knowledge of community needs
Gardens and markets for neighborhood identity			Increase healthy food options and local self-sufficiency

2. Land Use Element

2.1. Introduction

The Land Use Element is perhaps the most important element of the Comprehensive Plan as it guides the desired distribution of land use, population growth, and urban/economic development. The Land Use Element addresses land use issues that apply to the area within the Westport city limits. The Land Use Element is found in chapter four of the plan and is described as representing the foundation to the entire plan. Land use goals, objectives, and policies identified in this element consider long-term implications of land use decisions and work towards a pattern of development that can be sustained for future generations. This chapter identifies opportunities to shape the physical development of Westport while considering the community's history, existing land use patterns, characteristics of the existing built environment and aesthetics, and long-term safety and hazard mitigation strategies of the community.

The Land Use Element is currently presented in two parts in Westport's Comprehensive Plan. Sections A through H contain general goals, objectives, and policies divided into broad land use categories; overall goals and objectives, residential, commercial, industrial, public and semipublic, land use policies, and groundwater, storm water runoff/drainage. Section I discusses the land use map and zoning classifications. There is also reference to the land use map in Appendix A of the Comprehensive Plan. The overarching goals of the section listed in Section A are:

1. To promote the establishment of appropriate population densities and concentration that will contribute to the wellbeing of persons, the city, and the preservation of the environment.
2. To promote an efficient and orderly pattern of land use which protects the unique seaside character of Westport, its environmental amenities, and the integrity of its residential neighborhoods while providing a flexible approach to the development of commercial and industrial lands.

An additional 13 more goals are detailed in subsequent sections relating specifically to the relevant subsections.

Sections A through F are comprised of goals and objectives relevant to each subsection, section G states ten land use policies, and section H includes goals, objectives and strategies related to groundwater, storm water runoff/drainage. Hazard mitigation strategies, in particular with reference to emergency preparedness for a tsunami, are already discussed in sub-section E, in public and semipublic land use, with goals related to development of additional mixed-use vertical evacuation structures. This aligns with Initiative #1 of the Westport Annex of the Grays Harbor County HMP: Vertical Tsunami Evacuation Structure. There is also mention of improvements to storm water drainage systems in the groundwater, storm water run-off subsection that is intrinsically linked to hazard mitigation and aligns with Initiative #5 of the Westport Annex of the Grays Harbor County HMP: Critical Facilities Evaluation. Further opportunities for integration of hazard mitigation strategies with the Land Use Element are discussed below.

2.2. Opportunities for Integration

The Westport Annex of the Grays Harbor County HMP identifies ten possible hazard types for the city of Westport. The top five are earthquake, tsunami, erosion, flood and severe weather, all with high or medium vulnerability rankings. It should be noted that climate change is also listed in sixth position, but is given a low vulnerability ranking. Of the identified hazard types in the Comprehensive Plan, only tsunami and flooding are acknowledged in the Land Use Element. There is an opportunity to expand on these hazard types and incorporate the other hazard types identified in the Grays Harbor County HMP.

Tsunami hazard mitigation is incorporated into the Land Use Element through goals of development of elevated evacuation structures with mixed-used capacity. This could be further integrated with location-specific goals for these structures. The Grays Harbor County HMP defines the Marina District as the location for the planning and construction of a vertical evacuation structure. The Comprehensive Plan could include this as well as strategies to revisit the location decision-making process for additional future structures. Based on walking speed radius coverage for the entire Westport-Grayland South Beach area, Project Safe Haven in 2011 identified nine sites for vertical tsunami evacuation structures, including those at Ocosta School and the Marina. A more detailed feasibility study would likely refine the locations for such structures, based on additional factors including: locally specific walking conditions; neighborhood characteristics and identity (e.g. which groupings of residents would be most able to help each other reach safe evacuation sites); more detailed models of wave behavior and impacts (e.g. current speeds, locally specific flooding depths, scouring of ground surface, effects of vegetation and buildings, and impacts of debris, hazardous materials and fire, etc.); geotechnical requirements for seismic structural design; property ownership and access; and opportunities for investment that could include vertical evacuation, such as a new combined police-fire-city services building, a berm for a playfield, a hotel and event space, etc. Project Safe Haven provides a model for the kind of public activity (e.g. design charrette) that could test the feasibility of these ideas, but at a more site-specific scale.

Flooding hazard mitigation is also incorporated into the Land Use Element in the storm water runoff section with the goal of an efficient and effective storm water drainage system. This aligns with the mitigation strategy in the Grays Harbor County HMP of "Conduct analysis of existing storm water drainage system and implement recommended improvements". This could be further elaborated upon to include planning for impacts of flooding due to SLR and coinciding storm water surges. This would also incorporate the hazard of climate change, which although identified as a low vulnerability ranking, is closely related to flooding, as well as other high-vulnerability hazards for Westport such as erosion and severe weather, through increased storms, rainfall and tidal surges. Mitigation for these types of events would involve many similar practices for flood mitigation. (There are other possible threats to Westport's future sustainability related to climate change that do not manifest themselves as flooding, erosion or severe weather, such as ocean warming and acidification, which still affect economically important sea life, but this report does not address those.)

Earthquake hazard mitigation strategies are in some circumstances tied to tsunamis, but whether they generate tsunamis or not, earthquakes involve other hazards of shaking damage to buildings, roads, bridges and other infrastructure; landslides; and liquefaction. This type of hazard is less incorporated into land use planning in Westport. The Grays Harbor County HMP's liquefaction susceptibility map for Westport (Figure 10-3 in the Annex of the HMP) is based on a simplified classification of soil type. More

detailed studies of differential seismic behavior of filled areas, wetlands, dune ridges (Figure 2), and areas of varying histories of sediment deposit are required in order to determine locally appropriate earthquake mitigation actions, including structural requirements for critical facilities, evacuation routes and refuge sites, restrictions on development and refinements to building codes. Overlaying more nuanced maps of seismic landslide and liquefaction hazards with maps of flood- and erosion-prone areas would further help identify priority sites for restricting development and even buying out at-risk properties.

Erosion can be tied to climate change impacts because SLR can cause soil erosion and coastline change. However, erosion due to non-climate-change-related forces, such as ocean and river currents, have always posed a threat to settlement in Westport. This is not currently addressed in the Comprehensive Plan. There is the opportunity to integrate this into the Land Use Element when addressing issues of land vulnerable to SLR and coastal erosion. Strategies such as buy out of at-risk properties in low-lying areas help address the hazard of erosion.

As well as incorporating new strategies and goals into the land use section of the Comprehensive Plan to address the hazards identified in the Grays Harbor County HMP, it is important to discuss how the initiatives from the Grays Harbor County HMP can be integrated into the Comprehensive Plan. Table 2 below summarizes how the existing hazard mitigation initiatives identified in the Grays Harbor County HMP may align with goals in the Land Use Element, as well as what conflicts or obstacles they face with respect to land use goals.

Table 2. Aligning hazard mitigation initiatives and the Land Use Element

Hazard Mitigation Initiative	Opportunities for Alignment with Land Use	Conflicts with or Obstacles to Alignment with Land Use	Hazards Mitigated
Vertical Tsunami Evacuation Structure	• Existing overlap with goal under public/semipublic subsection: "*Pursue improvements in emergency preparedness, such as the development of elevated evacuation structures which provide mixed recreational or commercial uses during regular day to day activities, to better meet the health and safety needs of the city if an emergency should occur.*" • Specify locations for future vertical evacuation structures	• Appropriate locations and uses of structures may be in conflict with existing/proposed uses and/or ownership • May require public acquisition of private land, demolition of existing structures, provision of public access or infrastructure service, and other interventions	• Tsunami • Flooding • Severe Weather
Public Outreach Program	• Create publicly available maps to be included in the comprehensive plan showing locations of high ground and vertical evacuation structures • Create public outreach programs to assist with accessing where people spend time in Westport and where vertical evacuation structures should be constructed • Public workshops to identify community assets that can be enhanced and made more resilient	• May be difficult to determine which community assets require most attention to improving resilience • Timely and costly to plan multiple evacuation towers that are accessible to all in Westport	• Earthquakes • Tsunami • Flooding • Coastal Erosion • Severe Weather

Hazard Mitigation Initiative	Opportunities for Alignment with Land Use	Conflicts with or Obstacles to Alignment with Land Use	Hazards Mitigated
Emergency Management Plans	• Include a map of community assets that will be utilized during an emergency • Relocation of critical facilities to higher ground within the city limits and consider options outside city limits • Consider improved access to uphill areas outside city limits	• Difficult to include all possible assets on one map, some assets not able to be mapped • Many assets may be outside Westport city limits (land use only covers within city limits) • Limited higher ground within city limits • Relocation can incur high costs	• Earthquakes • Tsunami • Flooding • Coastal Erosion • Severe Weather
Emergency Communications Plan	• Include map identifying evacuation routes, shelter locations and emergency facilities	• Will need to be maintained and frequently updated	• All Hazards
Critical Facilities Evaluation	• Existing overlap with goal under public/semipublic subsection: *"To ensure that public facilities and services are high quality, fully maintained and cost effective"* • Overlap with groundwater, stormwater runoff/drainage goal: *"An efficient and effective storm water drainage system, which is safe, and which eliminates or reduces the problems and inconveniences associated with the existing system"* • Identify and map hazard prone areas and critical facilities located within these areas	NA	• All Hazards
Transportation and Right of Way Improvements	• Coordinate with updated tsunami evacuation map • Encourage development in areas more accessible to tsunami evacuation routes • See Transportation, Circulation and Telecommunications Element for routes that require seismic reinforcing	• Difficult to determine areas for development with no/low hazard risk of any sort	• Earthquakes • Tsunami • Flooding

2.3. Community Input

Existing land use patterns in Westport greatly affect how space is used, where people gather, and places of significant importance to the community. Existing land use maps for Westport show clear divides between the marina industrial district, mixed used tourism commercial zones, residential zones, and parks, recreational spaces and natural landscapes. There are also many places and zones outside the City of Westport's borders that although outside of the city limits are within the community space that is in the wider Westport/South Beach area. The city limits are not immediately obvious when entering Westport, the school and many residential housing units lie outside the city limits without a clear distinction. Therefore, when community members talk about Westport, they do not refer to an area

defined by the city limits even though the Comprehensive Plan applies only to space within the city borders.

From the community workshops it became clear strong values associated with land use included access to nature and state parks; forward thinking of city officials to create safe spaces from natural hazards such as the vertical evacuation structure; opportunities for employment, entrepreneurship and access to seafood in the Marina District; and the quiet, safe and laid-back life style of the community. Table 3 summarizes these themes.

Table 3. Community input related to the Land Use Element

Strategy Theme	Strategy Examples
Community Safety	• Ensure vertical evacuation structures are accessible to all members of the community • Start planning for SLR of one foot now and look at relocating at-risk properties • Expansion of city limits to include uphill areas for evacuation • Ensure wetlands, parks, and outdoor green spaces are protected from development
Community Identity	• Relocation of critical facilities within Westport on higher ground along the dunes • Limit high rise buildings and consider medium rise for vertical evacuation structures • Maintain rural seaside community character with development • Elevate roads with marina access to ensure key asset of the community is protected as best possible
Asset Enhancement	• Protect the Marina District by improving infrastructure such as floating docs and building elevations • Purchasing of land vulnerable to sea level rise and convert into wetlands/public space • Encourage development that can include infrastructure such as hotels with conference centers that can also be used as vertical evacuation structures

2.4. Recommendations

Based on discussions within the class studio; analysis of the Westport Annex of the Grays Harbor County HMP; the community workshops on November 16 and 17, 2018; presentations to City of Westport staff on December 7; and a public open house on December 8; the following recommendations for updates to the land use section are summarized in Table 4. These recommendations are specific to the Land Use Element. Although they may overlap with other recommendations provided later in this report (such as the Area-Wide Development Element), the Land Use Element helps guide the rest of the chapters in the Comprehensive Plan.

Table 4. Recommendations for updating the Land Use Element

Source	Recommendation	Hazard Mitigation Benefits	Co-Benefits
Community Workshops	Purchase/acquire land outside the Westport city limits that is on higher ground and less likely to be flooded by a tsunami.	• Provides access to safe areas during a tsunami • Allows for emergency supplies to be stored at a higher ground • Lays foundation for retreat to higher ground	• Land can have multiple uses (e.g. hiking trails, campground, hunting) • New tourism opportunities with land development (e.g. hotel, viewpoint, Seabrook-like housing)
Community Workshops	Research and evaluate relocation opportunities of Westport's critical facilities to higher ground within the city limits along dune ridges.	• Allows critical facilities to stay within city limits • Keeps critical facilities safe during tsunami or flooding events	• Concentration of public facilities for easier access • Modernization and integration of public facilities for possible smoother operations and communications between services • Opportunities for new facilities such as health care providers
Community Workshops/Studio Discussions	Research federal and state funding opportunities for purchase or land exchange of at-risk properties in lowland coastal areas at risk of sea level rise and convert space to wetlands/public open space or to flood-resilient non-essential facilities.	• Relocates at-risk home and business owners to safer land • Retreats from SLR; adapts to changing coastline	• Allows for creation of more pervious surfaces from acquired land; improves stormwater drainage • Additional public/open space • Natural habitat restoration • Potential revenue generation
Grays Harbor County HMP/ Westport Comprehensive Plan	Continue to develop additional multi use vertical evacuation structures in other parts of the city and encourage future medium/high-rise development to include vertical evacuation opportunities in infrastructure.	• Provides safety during tsunamis and flooding events • Provides access to more community members, tourists and temporary workers	• Benefits of multiuse structures such as new parking lot or hotel • New facility for the community • Opportunity for investment with private/public partnerships
Studio Discussions	Adoption of climate/hazard resilient building codes and development restrictions in hazard prone areas.	• Restricts development in low lying areas prone to SLR • Restricts restorations that are below climate resistant building codes • Encourages development that has mixed use capacity of a vertical evacuation structure	• Stronger, safer infrastructure for the community • Additional vertical evacuation structures

Source	Recommendation	Hazard Mitigation Benefits	Co-Benefits
Studio Discussions/ Community Workshops	Reinvest in resilient infrastructure in the Marina District such as floating docks and elevated/amphibious infrastructure.	• Strengthens marina infrastructure making it more resilient to SLR, extreme weather events, earthquake shaking, and minor (distant-source) tsunamis • Protects the key economic seafood industry of Westport	• Creates a safer environment in the Marina District • Job creation for renovations • Improves climate change vulnerability of Marina District
County HHMP/ Westport Comprehensive Plan	Improvements to drainage systems for storm and wastewater with attention to increasing water levels as a result of SLR.	• More pervious surfaces land coverage to improve drainage • Counters some of natural land loss from coastal erosion and sea level rise • Better equipped system to handle increases in extreme weather events and subsequent flooding	• Protects infrastructure from flooding • Creates more wetlands and open space for the public. • Improves excess water and pooled water on path and roadways
Community Workshops	Consider expanding Westport's city limits to annex land further south of city including Ocosta High School and other areas along the higher dune ridges.	• Allows for more high ground to be utilized in hazard mitigation planning • Provides more opportunities for relocation	• A larger tax gathering revenue for the city • A more inclusive comprehensive plan for the wider Westport community

2.5. Reference Case and Further Relevant Information

An example of excellent integration of a county hazard mitigation plan and a city comprehensive plan can be seen in the case study of Snoqualmie, Washington. Snoqualmie 2032 is the official comprehensive plan adopted by the Snoqualmie City Council with most recent updates being in 2014. The plan contains detailed overlap with the King County Hazard Mitigation Plan in particular with sections of flooding hazard management.

Several of the hazard mitigation plan's forty-five strategies coincide with strategies in the Snoqualmie 2032 plan. Flooding is the biggest hazard of concern for the area and overlapping strategies between the plans in this area include: at risk property acquisition, participation in a community rating system, exceeding National Flood Insurance Program standards, floodplain map updates, and funding mechanisms for elevating houses. In addition, upland timber industry property has been developed for new housing and neighborhood services, providing the town with an increased tax base and a new outlet for growth and possible retreat/relocation options. (Further study on the impacts of this development on community identity may also provide information useful for Westport's reference.) Many of these strategies emerged in the comprehensive plan under a separate subsection under the land use element specifically for flood hazard mitigation. The City of Westport has an opportunity to learn from integration such as seen in Snoqualmie to update sections of the Comprehensive Plan and help envision a stronger and more resilient city in the future.

2.5.1. Westport Topography

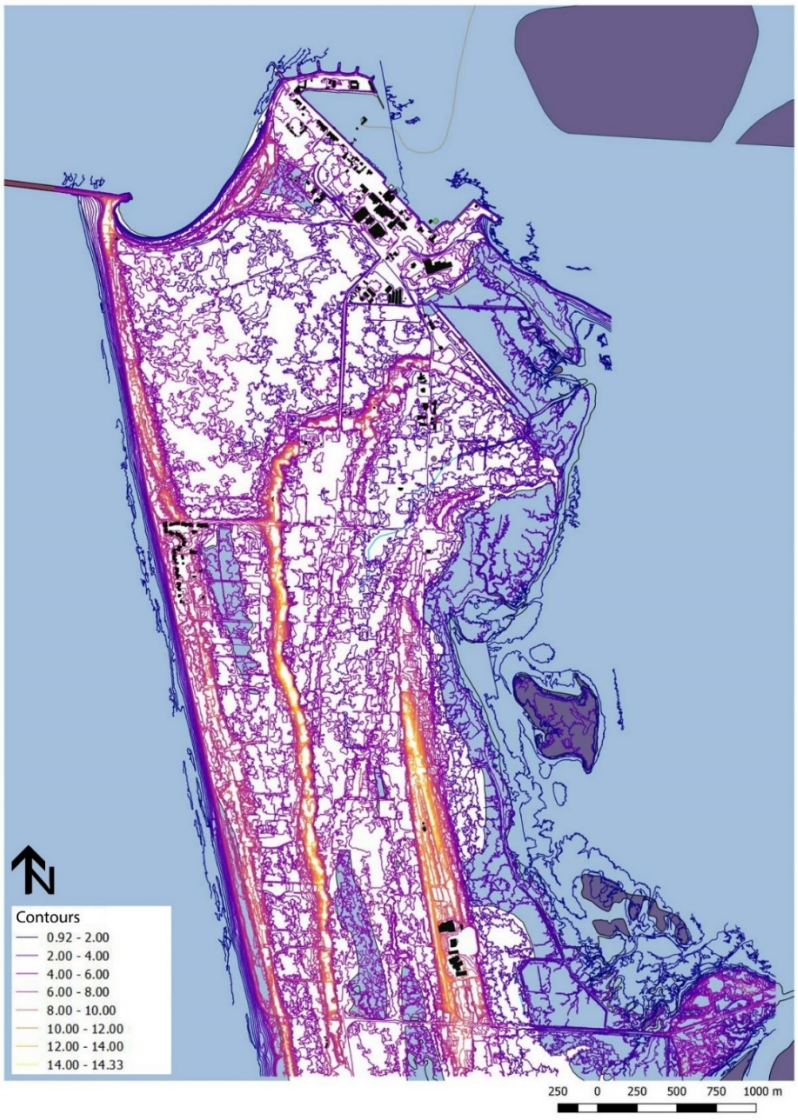

Figure 1. Relief map showing high ground areas on the Westport peninsula including ridgelines and dunes

2.5.2. Section References

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3. Transportation, Circulation, and Telecommunication Element

3.1. Introduction

Transportation and circulation is a vital and major determinant of land use development within an area and should be addressed when updating the Comprehensive Plan. The smooth operation of the transportation system provides an opportunity to improve the effectiveness of emergency response and hazard mitigation. This section covers two major parts of the Comprehensive Plan: Transportation and Circulation (including both general traffic and airport circulation) and proposes a new sub-element: Telecommunications. Telecommunication is highly linked with transportation, as both are essentially forms of connectivity within the community and between it and other places. This new sub-element guides future development of wireless communication, and helps maintain connectivity during a disaster. New technologies of transportation and telecommunication increasingly affect each other's demand for services and both function for many similar goals.

The design, plan and construction of transportation and telecommunication requires coordinating with land use planning, economic development, and urban design. This section also provides suggestions for relocation and/or reinforcement of current transportation facilities. One obvious benefit of this is to ensure safety and efficiency in the event of an evacuation (e.g., tsunami, earthquake). However, the cost of reconstruction might be a barrier to achieving some suggested goals.

The current goals of Transportation and Circulation Element are:

To maintain and improve the City of Westport's circulation and traffic to address the following:

1. Provision of safe, adequate, and improved access;
2. Improvement of traffic flow;
3. Needs of those using differing modes of transportation are served;
4. Compatibility of transportation types is enhanced;
5. Provision of efficient access for Police, Fire and EMS response;
6. Transportation and circulation is coordinated with the goals and objectives of the other elements of this plan, especially land use; and
7. To develop a transportation and circulation system which serves all types of users in the most economical, efficient, and compatible manner possible, and which minimizes the costs of transportation facilities to the taxpayer.

Current goals of airport circulation:

1. An all-weather airport facility with adequate length to accommodate the needs of area businesses and aviation-based tourism traffic that is located in an area compatible with an airport and its associated activities;
2. Ensure that individuals who live, work, or own property near the airport enjoy a reasonable amount of freedom from noise and other undesirable impacts;

Proposed goals of telecommunication:

1. Develop city-wide communication tools to improve efficiency of local public services and private sector activity
2. Increase regional data connectivity to reduce dependence on out-of-town trips for some services;
3. Increase diversity and redundancy in wireless communication options, both to enhance daily life and to ensure functional telecommunication during emergencies when normal connections are compromised.

3.2. Opportunities for Integration

Table 5 below displays the six hazard mitigation initiatives from the Grays Harbor County HMP and describes opportunities and obstacles for aligning hazard mitigation strategies with the transportation, circulation, and telecommunication goals.

Opportunities and obstacles described below focus on aspects of hazard mitigation that are relevant to transportation, circulation, and telecommunication, including the goals which exist in the current Comprehensive Plan (e.g., evacuation route, pedestrian safety, conflict between pedestrian and vehicle, the transportation design associated with EMS, etc.). The Grays Harbor County HMP has addressed the importance of reliable evacuation during a disaster. Hence, we recommend addressing emergency response planning during evacuation in the Comprehensive Plan.

In addition, Westport should also consider the reliability of the current transportation infrastructure. For instance, the Elk River SR 105 bridge would be damaged based on current tsunami models; hence, reinforcing the existing infrastructure in the transportation system is necessary.

Table 5. Aligning Hazard Mitigation Initiatives and the Transportation, Circulation, and Telecommunication Element

Hazard Mitigation Initiative	Opportunities for Alignment with Transportation, Circulation, and Telecommunication Goals	Conflicts with or Obstacles to Alignment with Transportation, Circulation, and Telecommunication Goals
Vertical Tsunami Evacuation Structure	• Identify evacuation routes both internal and external for vehicles and pedestrians. • Install resilient telecommunications hubs at vertical evacuation sites	• The evacuation route to vertical evacuation may not be reliable due to ground shaking, liquefaction, flood and wave force during tsunami.
Public Outreach Program	• Educate the public regarding evacuation (evacuation route, method), including vulnerable populations (the elder, ADA, , non-English speakers) (revised) • Improve tsunami evacuation street and trail signage • Use official website/Facebook/Twitter in Westport to spread information about evacuation, tsunami/storm warning (revised)	• The outreach program may fail to reach all of Westport and the wider community.
Emergency Management Plans	• Transportation facilities should apply appropriate design principles to protect adjacent residential areas. Design of transportation facilities should include input from representatives of the Public Safety and Emergency Management staff to improve access for these services.	• High cost for reinforcement/re-engineering.

Hazard Mitigation Initiative	Opportunities for Alignment with Transportation, Circulation, and Telecommunication Goals	Conflicts with or Obstacles to Alignment with Transportation, Circulation, and Telecommunication Goals
	• Design new evacuation route for new vertical evacuation building. • Consider Police, Fire, Coast Guard and EMS roles in transportation management after disaster • Plan transportation improvements for emergency events, e.g. upgrading of Elk River Bridge	
Emergency Communications Plan	• Consider applying telecommunication technology for emergency communication inside/outside of City of Westport during disaster.	• The quality and service of wired and cellular connections may be limited under emergency situations such as disaster (tsunami, earthquake).
Critical Facilities Evaluation	• Ensure the location of new transportation infrastructure not within the hazardous area (e.g., erosion, inundation).	• The cost of new transportation infrastructure will increase.
Transportation and Right of Way Improvements	• The City of Westport should develop and maintain a pedestrian system providing safe, adequate, and efficient access to all areas of the community, particularly to major nodes and centers of activity. • Pedestrian and vehicular flow should, be improved in the business district, with particular attention to minimizing vehicular and pedestrian conflict.	• Expanding development and public facilities/infrastructure into new areas would require additional coordination with Grays Harbor County, WSDOT (e.g., signal control, crosswalk).

3.3. Community Input

Citizens of Westport are resilient, hard-working, self-sufficient, and many have outdoor survival experience. They have practical skills to repair boats, cars, houses, and other equipment. During a disaster, residents will likely be able to fix equipment (e.g., ham radio, boats). Many residents know how to hunt, fish, and live outdoors. In addition, the social bonds are tight, people are willing to help each other, and they have a strong sense of belonging, which is an asset in a disaster response and evacuation situation. Westport is abundant in seafood, berries, mushrooms, and other natural food resources for the community. These resources will help provide supplies for residents during disaster, which also requires a sound logistics transportation system. All these elements make it possible for the community to survive during disasters in Westport. The following quote from a Westport resident highlights these values:

> *"We value our small community, the feeling of closeness that you can only have in a small town. We value our fishing industry and the jobs that it provides, diverse cultures and people coming together, the cranberry industry, our schools, and our community gardens."*

We obtained many helpful suggestions from Westport residents regarding transportation, circulation, and telecommunication during the community engagement activity. Participants in Westport suggested ideas, including: strengthening the bridge over the Elk River; using a ferry to travel to Ocean Shores/Hoquiam/Aberdeen; elevating the current land area; building higher buildings; and relocating the current airport because it is at risk of flood impacts under many hazard scenarios.

Community members also suggested using a hovercraft for ferry transport since it can prevent issues with stranding in shallow areas that ferries may experience. The route of the ferry to Ocean Shores is suggested to be modified from the north of Ocean Shores to Downtown Ocean Shores due to the low elevation of northern Ocean Shores and the high possibility it may be inundated during the tsunami. In addition, community members provided suggestions regarding telecommunication including apply broadband internet in the rural areas, use 600 MHz to bring extended range LTE[2]; improve the LTE coverage and capacity in Westport; use HughesNet.com as Satellite internet for communication during disaster. Table 6 below summarizes the community input we gathered.

Table 6. Community input related to the Transportation, Circulation, and Telecommunication Element

Strategy Theme	Strategy example
Strengthen weak points in existing regional transportation connections	• Relocate the Westport airport to higher ground • Supplement airport with emergency use of other potential airfields, as in Grayland • Rebuild the SR 105 bridge over Elk River to withstand earthquake and tsunami impacts
Diversify regional transportation connections	• Use 'hovercraft' (capacity with 40-46 persons) to deal with the shallow draft needs • Widen SR 105 bridge over Elk River to increase foot and bicycle capacity • Develop upland bike and foot trail to Grays Harbor College and Aberdeen
Supplement and integrate transportation systems with telecommunication	• Expand broadband internet in rural area • Establish 600 MHz LTE to increase LTE coverage and capacity, lay the foundation for 5G to increase the network quality • Use HughesNet.com satellite (Gen 5 satellite system) for internet communication when regular broadband or cellular systems are disrupted • Support and train ham radio operators for emergency communications

3.4. Recommendations

3.4.1. Transportation and Circulation

One of the key tsunami evacuation routes is along Montesano Street (the red solid line shown in Figure 2) from the Marina District to the north residential area in Westport. However, the route may be vulnerable to liquefaction and/or ground subsidence from a CSZ earthquake. Furthermore, the route as it passes the airport is vulnerable to the more extreme CSZ earthquake subsidence and SLR scenarios due to its low elevation.

[2] Long-Term Evolution; a 4G mobile communications standard.

Figure 2. Key evacuation route along Montesano St in L1 CSZ earthquake subsidence (right) and SLR (left)

We recommend testing the soil composition and liquefaction hazard under this section of Montesano St., for possible need to reinforce, rebuild and/or elevate the road with deep-pile structural support to ensure its function under impacts of strong ground motion, tsunami wave force and scouring/erosion, liquefaction, and flooding due to storms, sea level rise, and co-seismic subsidence. Additionally, we recommend arranging supplemental support for emergency situations from the nearest neighboring airfield site on high ground (above 200 feet elevation) in Grayland, shown in Figure 3.

The ferry route could be redesigned to support rescue efforts after an earthquake and tsunami. However, some concerns remain including impact to shellfish beds and other natural resources along the ferry route, as well as stranding in shallow areas.

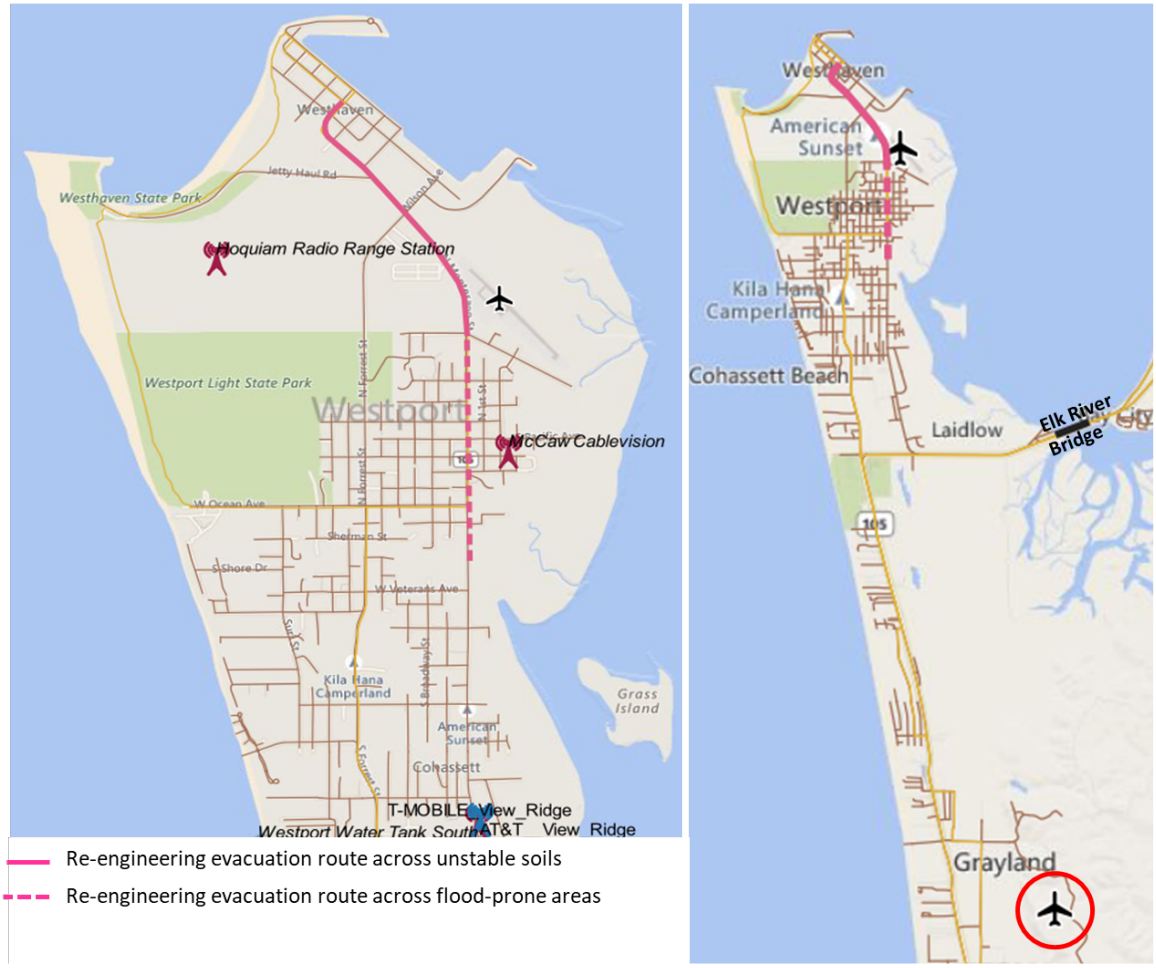

Figure 3. Suggested reengineering area (left) and suggested auxiliary airport in Grayland (right)

3.4.2. Telecommunication

Figure 3 also displays the current locations of cell and communication towers in the City of Westport. Given that these networks may be vulnerable in a major earthquake, we recommend augmenting them with a range of alternative technologies. Residents may use ham radio to transmit SOS messages and call for search and rescue from the state, county, and neighboring cities, as well as to receive information about the regional situation. In addition, the Federal Emergency Management Agency (FEMA) recommends one method to support state and local emergency communication functions: the ARRL (American Radio Relay League) for amateur radio operators to offer electronic communications for state and local government (Coile, 1997).

For additional diversity of communication inside the City of Westport, Low Power FM radio (LPFM) can serve as emergency communication during/post disaster. LPFM stations can be heard about 3.5 miles if there is no blocking from topography, a bigger station or other obstacles. Washington state has the second-highest concentration of low-power FM radio stations in the country with 68 stations for 7.4 million people. LPFM is low cost and low-tech, and easily managed by small groups of enthusiasts, students and other amateurs. The establishment of a LPFM station at a vertical evacuation site would enhance communication in the community. It is important to consider the daily function of such a station,

in order to build familiarity with the technology. The Ocosta School, for example, might incorporate the station in its vertical evacuation building, and also use it to train students in the technology and practice of broadcast media, announcing events and providing the community with sportscasting, news and other educational information including occasional emergency tips.

Higher-tech wireless or mobile ad hoc networks can also add options to strengthen a community's self-sufficient and adaptable communication when regional systems with fixed hubs or routers break down. "Sonnet" is one technology being developed as the most advanced off-grid mobile mesh network; it brings the long-range wireless communication of the walkie-talkie to the smart phone, allowing the user to send text message, voice recording, and GPS coordinates between smartphones up to 9 miles apart, even without cellular coverage or satellite internet access. This section recommends exploring a range of such options, that in combination with lower-tech ham radio and LPFM, may increase the community's resilience to telecommunication disruption, even as the region overall experiences improved normal connectivity through rural broadband.

The introduction of rural broadband, including the possibility of a trans-Pacific fiber-optic cable landing station in Grays Harbor County, will greatly increase normal connectivity in the region. Westport/South Beach should consider how this connectivity may change every day social and economic activity in the community, including changes in travel behavior, and how connectivity (and the activities it supports) may be disrupted in a disaster. For example, healthcare access (recommended as a new Element in the Comprehensive Plan), may benefit from rural broadband by participating in regional telehealth systems, reducing residents' need to visit health clinics and hospitals. Telehealth may also facilitate long-distance triage and other emergency medicine provision in a disaster. To do so, however, it is dependent on a robust telecommunications system. The integration of locally self-reliant and robust systems as described above with new regional connectivity technologies can reduce such vulnerabilities.

Based upon the opportunities from the Grays Harbor County HMP integration and community input described above, as well as case study and advanced practice research, Table 7 below summarizes recommendations related to transportation, circulation, and telecommunications.

Table 7. Recommendations for Updating the Transportation, Circulation, and Telecommunication Element

	Strategies	Hazard Mitigation Benefits	Co-Benefits for Community Values
County Hazard Mitigation Plan	Provide education and training of evacuation information (e.g., evacuation route, ham radio operations) for local residents, students and employees in Westport	Increase Public knowledge of evacuation	• Promote neighborhood social ties
	Include support/backup from Fire, Police, Coast Guard and EMS in transportation management	Complete and clarify the responsibility of each department	• Clarify the duty and correlation of each department during emergent event
	Explore increasing capacity, reliability and geotechnical strength of existing key evacuation and access routes (e.g. Elk River bridge)	Increase the reliability of the current evacuation route	• Increase the resilience and sustainability of the transportation infrastructure
	Make telecommunication access more robust in the event of cellular disruption during disaster (Low-power FM radio, ham radio, Wi-Fi direct/WMN)	Ensure basic telecommunication functions during disaster	• Better wireless connection in Westport • Promote neighborhood social ties • Enhance telecom technology literacy among community members
	Explore ferry routes to Ocean Shores, Hoquiam and/or Aberdeen	Additional evacuation options for climate change, erosion, tsunami, earthquake, flood	• Greater connectivity to other Grays Harbor communities • Tourist and recreational attraction • Increased diversity of port function
	Arrange emergency/auxiliary service by neighboring upland air field in Grayland	Additional evacuation and supply option for tsunami, earthquake, flood	• Increased accessibility for possible new upland development
Community Input	Relocation of airport to upland site in Grayland	Improve the sustainability and resilience of the airport when facing climate change, erosion, tsunami, earthquake, flood	• Improve the traffic connection (e.g., new route/trail will be built towards the airport)
	Use 'hovercraft' for ferry evacuation to prevent stranding in shallow area	Safe, smooth and efficient ferry evacuation during tsunami, earthquake and flooding	• Possible increase in tourism • Diversity in transportation modes
	Establish 600 MHz LTE to increase LTE coverage and capacity; lay the foundation for 5G to increase the network quality	Improve the reliance and quality of telecommunication during disaster (tsunami, earthquake, flood)	• Increase the quality of services and enhance the signal of the cell phones for daily usage
	Apply HughesNet.com as satellite (Gen 5 satellite system) internet for telecommunication	Ensure basic telecommunication with satellite during disaster	• Increase the quality and resilience of satellite-connection
	Establish evacuation plans for elder/ADA people, in coordination with enhanced public transit	Ensure the safety of the elder/ADA people during disaster	• Diversify transportation service in Westport (e.g., shuttle, bus)
	Road re-engineering for current key evacuation and access route. (e.g., Montesano St)	Improve the sustainability and resilience of the road when facing climate change, erosion, tsunami, earthquake, flood	• Mitigate traffic congestion

	Strategies	Hazard Mitigation Benefits	Co-Benefits for Community Values
Other Cases/Practices	Provide education and training of evacuation information (e.g., evacuation route, use of ham radio, LPFM radio) for local residents, students, employees and vulnerable population (the elder, ADA, tourists, non-English speaking natives)	Increased awareness from people in Westport of the evacuation information to ensure their cooperation during tsunami, earthquake, flood evacuation as well as their safety	• Promote neighborhood social ties • Improve community inclusivity
	Mobilize Ham Radio network for communication between Westport and state/county/neighbor cities in the event of cellular disruption	Ensure communication with places outside Westport during earthquake, tsunami (sending SOS message, asking support request from state/county/neighbor cities)	• Enhance regional and global connectivity • Provide outlet for or training in technical expertise
	Explore establishing LPFM Station	Provide disaster warning information and maintain broadcast function within Westport during earthquake, tsunami and other events of cellular disruption	• Enhances community identity and strengthens community relations • Provide outlet for or training in technical expertise
	Explore applicability of mobile mesh networks, direct or ad-hoc Wi-Fi and other off-grid networks for smartphones and personal computers, such as Sonnet, WiFi-Opp, etc.	Provide person-to-person communication within Westport during earthquake, tsunami and other events of cellular disruption	• Improve the network quality and service • Promote the development of e-commerce
	Use telecommunication systems to participate in regional telehealth programs	Ensure a reliable telemedicine system during tsunami, earthquake, flood	• Improve regular access to healthcare

3.5. Reference Cases and Further Relevant Information (Telecommunications)

Below are two case studies from the UK and Japan. The studies were selected based on two published examples of a small rural community employing a Wireless Mesh Network (WMN) and the major role FM stations can play during a disaster. These examples provide more detailed information on how WMN (known as a communications network made up of radio nodes in a mesh topology) can be applied to improve the local internet connection at low cost, adding telecommunications system redundancy to enhance resilience in case of a disruption to normal telecommunications.

3.5.1. Case Study - WMN (Wireless Mesh Networks) applied in Wray

In 2003, residents of Wray, a small village community in Lancaster, England, cooperated with Lancaster University to explore solutions for obtaining broadband internet access. The village's houses are clustered within one square mile, approximately 8 miles from Lancaster town. Initially, satellite, dial-up, or the school's radio link were the only choices for internet connectivity. The team decided that the radio connection could both handle interactive and high-bandwidth services as the school was on a hill, from which a signal could propagate across the whole village. Mesh nodes were placed as shown in Figure 4.

Within three years of deployment of community WMN, the network usage pattern of Wray changed from relatively low traffic to long-lived, high-bandwidth flow. The WMN technology not only developed broadband connectivity, but also enabled many social benefits. For example, e-commerce websites were initiated, transforming the local businesses into international markets. The farmers now use IT to register newborn calves.

This case study may be a good example for telecommunication development in the City of Westport. The implementation of WMN is low-cost and promises a more reliable internet quality and service. With a more reliable and sustainable system, people in Westport could open up online markets which can also develop the economy simultaneously.

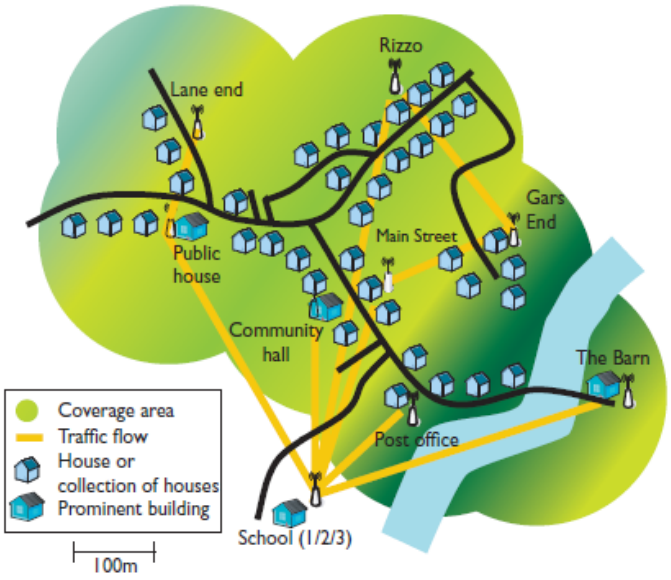

Figure 4. WiFi network topology and coverage area in Wray, UK

3.5.2. Case Study – Community Radio (Wireless Mesh networks) applied in Tohoku

On December 1, 2011, the Japanese Ministry of Internal Affairs and Communications granted permission for the operation of emergency-broadcast FM stations, which are used to offer earthquake-related information to residents of 27 communities in the Tohoku and North Kanto regions (10 stations have used existing FM radio frequencies in the community for emergency broadcasting, 15 stations are newly set up by local government). FM stations play a vital role as a key source of detailed, real-time, disaster-related lifeline information for survivors and may help to unite people. The successful operation of FM stations helped make efficient disaster recovery more efficient following the Tohoku Earthquake of 2011. Having more such stations and programs in place before the earthquake may have helped mitigate the disaster.

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4. Economic Development Element

4.1. Introduction

Economic development is a critical aspect of urban development that improves the well-being and quality of life of the community by creating jobs and business opportunities and building a tax base that supports social services.

Westport's economy traditionally has been heavily dependent upon commercial, charter and sport fishing and boating industries and the tourism activity associated with them. There is a need to diversify the city's economic base to reduce its reliance on seasonal sectors, as well as bolster its existing economy.

The current Comprehensive Plan has pointed out four general objectives for maintaining and improving the economy of the city:

- Work toward re-establishing the local economy while maintaining the seaside character and the maritime industries, especially those related to yacht/boat building, maintenance and repairs, commercial, and recreational fishing.
- A diversified tax base, as well as more diversified employment and industry, consistent with other elements of the comprehensive plan and community needs.
- A local economy which is stable, provides employment opportunities for all workers, and improves the community's standard of living.
- Encourage industry and businesses that will provide employment opportunities to attract and retain the younger populations, while reducing the outmigration of current populations.

To achieve these general goals, the comprehensive plan provides eight objectives and several policy recommendations.

This section summarizes recommendations for integrating the Grays Harbor County HMP and the Comprehensive Plan, in consideration of the values, assets, and strategies proposed by community members during two workshops held in Westport November 16-17, 2018. It also discusses the recommended strategies synthesized from community input and other research along with their co-benefits. This section concludes with the planning process that the City of Cedar Rapids, Iowa has gone through following the 2008 major flood and summarizes the lessons learned from that case.

4.2. Opportunities for Integration

Table 8 below lists the six initiatives from the Grays Harbor County HMP and describes opportunities and obstacles to alignment with the economic development goals currently outlined in the Comprehensive Plan .

Table 8. Aligning Hazard Mitigation Initiatives and the Economic Development Element

Hazard Mitigation Strategy	Opportunities for Alignment with Economic Development	Conflicts and Obstacles to Alignment with Economic Development Goals
Vertical Tsunami Evacuation Structure	Building vertical evacuation structures can diversify the economic base by creating new jobs and business opportunities. They can also be designed to have everyday functions such as parking garages, shopping centers, hotels, event spaces, medical clinics, recreation, etc. Private sector investment can therefore cover some of the cost of land acquisition, design and construction. The presence of a vertical tsunami evacuation option in a neighborhood may also increase surrounding property values. Such structures may also function as landmarks and attractions in their own right, enhancing the City's image and "brand" as a destination.	• Costs of design and construction are high, adding upwards from 10% to the normal cost. • Funding and approval process can be lengthy and challenging, given special regulatory requirements
Public Outreach Program	Designing a new website for the city of Westport can enhance the city's competitive position within the region, especially in relation to tourism. It can also be used as a powerful tool to communicate to the public about hazards and disaster preparedness.	• Care must be taken to present hazards and disaster preparedness information in a positive, proactive way to residents, visitors and investors without obscuring the real risks to life and property
Emergency Management Plans	Consider relocating businesses from hazard prone areas in the long term to avoid possible damage costs. New businesses in areas that are exposed to the more probable SLR or tsunami scenarios should account for those risks in calculating return on investment. (Flood insurance does apply.)	• Moving businesses can be costly, more detailed feasibility studies will need to be done for each site • Business owners may resist moving
Emergency Communications Plan	Improving broadband internet and cell phone coverage can contribute to better emergency management as well as improve citizens' quality of life and encourage new businesses to invest in Westport. Improving the website can also contribute to emergency communication, especially if coordinated with the development of robust telecommunications as described in the Transportation, Circulation and Telecommunications Element.	• Same as above for Public Outreach
Critical Facilities Evaluation	Critical facilities that can service the development of industrial marina area are essential to ensure long-term economic vitality of Westport	• Complex multi-jurisdictional task; requires coordination with Port of Grays Harbor
Transportation and Right of Way Improvements	Improving the bridge, realigning the highways, and building floating docks to make them more resilient to both sudden and gradual changes in sea level will support long-term economic growth of the city as well as provides jobs in the short and medium term. Ferry to Ocean Shores and Aberdeen/Hoquiam can improve accessibility of the area to the tourists	• Costs of implementation may be high • Requires feasibility studies

4.3. Community Input

The community pointed out many natural and social assets in the city of Westport that support quality of life and economic vitality. Scenic ocean views and access to water drive tourism along the beaches and Marina District. The local fisheries provide jobs for fishermen and the seafood is processed at the plants in the Marina District. The fisheries also attract charter companies for tourists who want to do deep sea fishing. The cool, wet climate and farmlands provide a place for cranberry bogs and a robust cranberry industry to thrive. Surrounded by the ocean, the city is an ideal place for boat-building and repair and marine outfitting. Hard-working, self-reliant people contribute to the stability and growth of the economy by providing their labor and skills to the community.

There are, however, challenges that should be addressed, including:

- The economic sector is very seasonal; tourist season is mainly throughout spring and summer, and during winter months, many shops are closed and there is less demand for hospitality
- Vacation rental buildings are prone to flooding and storm damage in winter months
- There are many for-sale and for-rent signs, which indicate a growing stock of residential real estate, but also out-migration and an oversupply of commercial real estate
- People want better cell phone coverage and broadband internet, especially for business purposes
- The seafood industry may also be affected by climate change in the future; oyster beds might also be threatened by SLR

In order to address the challenges stated above and support values that are important to the community, workshop participants suggested a variety of strategies to improve the economy of the city and make the community more resilient to both sudden and gradual coastal hazards. Table 9 and Figure 5 below include these strategies.

Table 9. Community Input Related to the Economic Development Element

Strategy Theme	Strategy Examples
Diversify the economic base	• A vertical evacuation structure in the form of a hotel with a conference room can attract tourists and support local and regional events. Other functionalities of vertical evacuation structures can include a parking garage or small shopping center. • Develop "Seabrook-like" resort community, but in beach town or seaport/marina-compatible style, to generate funds for relocation of critical facilities and long-term housing to higher ground • Improve critical infrastructure including bridges, roadways, highways, and airport. • Improve cellular and internet connectivity.
Retain, stabilize, and strengthen the traditional economic base sector	• Engage hotels, restaurants, and other services throughout the region to provide information about tsunami risk and evacuation. • Prepare to move oyster beds further inland with SLR. • Purchase/acquire land outside the Westport city limits that is on higher ground and consider moving regionally critical facilities there and prepare for post-disaster resettlement there. Explore near/medium-term development of such sites for recreational or resort-type development. • Purchase at-risk properties with federal funds to buy out homeowners to relocate.

Strategy Theme	Strategy Examples
	• Reinvest in resilient infrastructure in the marina district such as floating docks and elevated infrastructure.
Enhance the city's competitive position within the region, especially in relation to tourism	• Make strategic infrastructure investments to improve the resilience of tourist attractions, seafood industry and other key businesses. • Conserve open spaces for ecosystem services and natural resource provisioning and possible future public use. • Maintain rural and seaside character throughout the region. • Develop new campsites at the state park and higher ground. • Develop a regional trail system

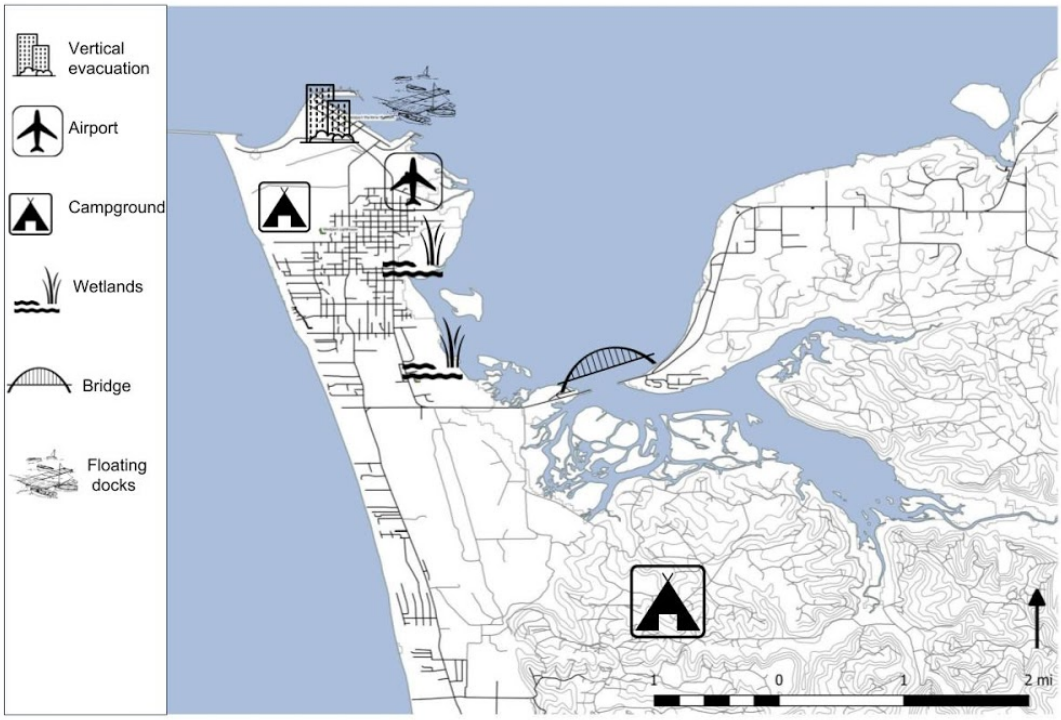

Figure 5. Economic Development strategies from community input

4.4. Recommendations

The city can make use of the strategies recommended by residents, as well as opportunities for integrating initiatives from the Grays Harbor County HMP to update the Economic Development Element of the Comprehensive Plan. These strategies aim at improving Westport's economy as well as making it more resilient in the face of natural hazards such as tsunami, flooding, and sea level rise.

Table 10 summarizes the strategies proposed at the workshops, along with other research-based recommendations, how these strategies help mitigate hazards, and how they can provide economic and non-economic co-benefits to the community.

Table 10. Recommendations for Updating the Economic Development Element

	Strategies	Hazard Mitigation Benefits	Co-benefits for Economic Development
Grays Harbor County HMP	Build multi-use vertical evacuation structures (e.g., Parking garage, hotel and conference center, shopping center or market hall, zipline towers, "camping towers", etc.)	These structures make the city resilient towards earthquakes and tsunamis by providing safe and resistant buildings where people can seek refuge	• Contributes to stabilizing the economy and diversifying the economic base by providing new business opportunities • Serves as landmarks to "brand" Westport as a tsunami-ready destination • May serve as recreational facilities
Community Input	Reconstruct roads and bridges/ relocate the highway	New roads and bridges can provide resilience against sea level rise	• Creates employment opportunities • Improves connectivity
	Purchase land on higher ground outside city limits	Critical facilities can be moved to higher ground to make the city more resilient to tsunami and sea level rise. Can be used as emergency refuge and possible long-term resettlement in case of tsunami	• Can be used as tourist campground, hunting lodge and/or resort community in near/medium term
	Move oyster beds further inland as SLR advances	Oyster beds are threatened by sea level rise and moving them further inland can ensure their performance over the long run	• Strengthens the economic base by maintaining income from oyster beds
	Ferry to Ocean Shores, Aberdeen, and Hoquiam	May provide alternative accessibility in less severe cases of transportation route disruption following an hazardous event.	• Increases accessibility to/from Westport for tourists and residents
	Improve cellular and internet connectivity	Can improve emergency communication during earthquake or tsunami	• Provides incentives for businesses to locate or remain in Westport • Strengthens social ties
	Reinvest in resilient infrastructure in the Marina District	Improve resilience of important economic assets to flooding from sea level rise and less severe (e.g. distant-source) tsunamis	• Supports the economy by ensuring functionality of the marina
	Conserve open spaces for ecosystem services, natural resource provisioning and possible future public use	Makes the city more resilient to flooding, especially storm water floods, by increasing natural drainage	• Provides Ecotourism opportunities such as birdwatching, storm watch
	Purchase at-risk properties with federal funds to buy out homeowners to relocate; restore flood-prone areas to natural open space	Reduces residential and business vulnerability to flooding	• Same benefits as in conserving open spaces, above.

	Strategies	Hazard Mitigation Benefits	Co-benefits for Economic Development
	Retrofit or rebuild Chateau Westport to be used as vertical evacuation	Chateau Westport is located on high ground and can provide refuge in case of tsunami if it becomes retrofitted to resist a large earthquake	• Supports tourism sector • The hotel can provide evacuation and preparedness information for tourists
	Invest in a new Westport website and Instagram page	Can be used for providing educational materials regarding natural hazards, as well as informing residents about public meetings and events	• Attracts more tourists to the area
Other Cases/Practices	Develop new "cultural district" in safe areas	Increases the resilience of artistic and cultural values to sea level rise	• Attracts tourists • Preserves the identity of the city
	Establish farmers market within walking distance of residences, integrated with vertical evacuation or other emergency refuge and supply storage site	Strengthens local social capital; acclimates residents to walking to place of refuge and emergency information and food supply	• Diversifies the economy for both residents and tourists • Provides fresh food options (see Health and Wellbeing Element for more details)
	Develop a new trail system to high grounds with exits to the beach that potentially connects vertical evacuation structures	Helps educate people about evacuation routes	• Provides outdoor recreation opportunities for residents and tourists; can go all the way to Aberdeen and be used as a bike trail

4.5. Reference Case and Further Relevant Information

The City of Cedar Rapids, Iowa (Figure 6) updated its comprehensive plan after a major flood in 2008. Within days of the flood, the City Council outlined a series of strategic recovery goals. The City worked for 11 months with a broad public engagement process to transform flood-prone areas from non-ecologically functioning hazard zones to ecologically functional public amenities (the Greenway), and devised strategies such as a farmers' market along the Greenway to improve the economy.

In the "Business Revitalization" section of the Comprehensive Plan, the City identified the following priorities: Target new business opportunities for young and skilled employees; support small and local businesses; connect downtown with adjacent neighborhoods; strengthen walkable mixed-use districts; make downtown Cedar Rapids a regional destination point; and encourage high tech and industry growth along the Technology Corridor. Using the public feedback, they developed very specific strategies: Commercial District with a diversity of uses; a Mixed-Use Housing District within the Downtown Medical District; Riverfront Industrial Uses as prime riverfront redevelopment sites; and an expanded farmer's market venue.

They also integrated open space and environment priorities. These included the River Greenway which is an expanded buffer to enhance water and habitat quality, a Greenbelt which is a buffer around the City to limit sprawl and provide recreational amenity, a trail network for bicyclists and pedestrians, and a recreation center, which provides a central facility to serve the city from youth to seniors.

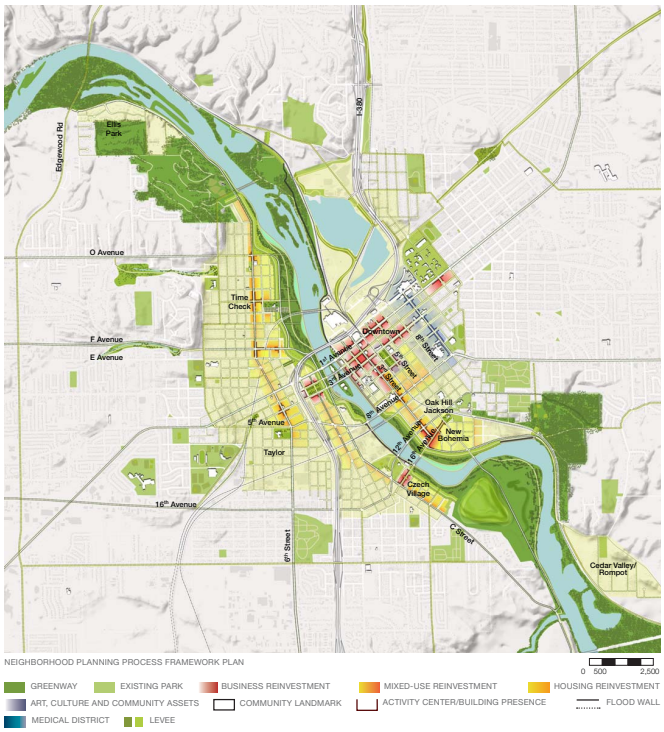

Figure 6. City of Cedar Rapids, IA. Source: City of Cedar Rapids Neighborhood Planning Process, 2009.

4.5.1. Section References

City of Cedar Rapids Neighborhood Planning Process, September 2009, retrieved from: http://www.cedar-rapids.org/discover_cedar_rapids/flood_of_2008/neighborhood_reinvestment.php

5. Community Identity and Natural Resources Element

5.1. Introduction

Chapter 7 of the current Comprehensive Plan is the Community Appearance and Natural Resources Element. This element focuses on the aesthetics and quality of the built and natural environment of the city to enhance the character of the city, quality of life for community well-being, and community attachment to place, as well as promoting tourist-oriented economic development. It also aims to recognize the importance of the natural resources, conserve them, and to improve the public awareness of these natural heritage features. We propose changing "Community Appearance" to "Community Identity," and including the following aspects:

- Community identity (as a social and functional as well as visual and aesthetic consideration)
- Urban resilience
- Hazard mitigation strategies
- Heritage conservation

Using "Community Identity" instead of "Community Appearance" broadens the scope of the Element and would also help to seamlessly incorporate the Historic Preservation for conservation and promotion of local culture into the Comprehensive Plan. The community identity element can also benefit from using urban design methods in various ways. Some of the common urban design methods that can be useful for Community Identity creation and preservation are as follows:

1) Cognitive/memory maps and city-image analysis (Lynch 1960)
2) Transect analysis
3) Placecheck
4) Observation of social life in public places; desire line mapping (Whyte 1980)

Natural Resources are also considered to be part of the community's identity. Therefore, it would remain a key focus of the Element.

The City of Westport's Urban Design Guidelines (UDG) would continue to exist as a separate document. Future updates to the UDG should be made based on the goals, objectives and policies established in the Community Identity and Natural Resources Management Element.

5.2. Opportunities for Integration

The city should consider the use of urban design methods (such as transect analysis, cognitive mapping and city image analysis) to identify and map optimum evacuation routes and places of refuge, to test public awareness of their existence; and to determine how that awareness is related to elements of Westport's urban form, including the layout of streets and other pathways, coastline and topography, land uses and ground cover, prominent buildings and other landmarks, and gathering places (Figure 9). Three key aspects of community identity derive from these elements which are also crucial to successful disaster preparedness:

1) Legibility: the extent to which these elements help residents and visitors understand how the community is spatially organized and orient themselves in it (Lynch 1960)
2) Vitality: the extent to which these elements support social activity and life in general (Whyte 1980)
3) Meaning: the significance that residents and visitors individually and collectively attach to elements of urban form (Hester 1985)

Figure 7. Urban Design Approach, City of Greensburg, Kansas (L); Desire lines to create evacuation route maps (R)

This section includes opportunities and obstacles for integrating hazard mitigation initiatives from the Grays Harbor County HMP with both the Community Identity and Natural Resources element and the Urban Design Guidelines (Table 11).

Table 11. Aligning Hazard Mitigation Initiatives with Community Identity, Natural Resources and Urban Design Guidelines

Hazard Mitigation Initiative	Opportunities for Alignment with Community Identity and Natural Resources, and Urban Design Guidelines (UDG)	Conflicts with or Obstacles to Alignment with Community Identity Goals
Vertical Tsunami Evacuation Structure	● The design of the vertical evacuation structures should correspond with the community appearance goals. These structures could contribute to identity creation of the community as well as serve as prominent landmarks for the city. ● Designing the structure in a setting that showcases or takes advantage of the natural resources of Westport (native plant and animal species, views of the ocean, the wetlands, etc.) could serve an educational function as well as attract visitors. ● If the structure were designed to be iconic, it could promote the economic vitality of the place by bringing in more tourists. ● The design of the vertical evacuation structures should correspond with the visual aesthetic guidelines prescribed by the UDG. ● The appearance of the vertical evacuation structures should correspond with the visual aesthetic guidelines prescribed by the UDG.	● Conflicts with parts of the Objective #3 (To preserve, as feasible, Light, Views, Privacy, Open space, Shorelines, Other natural features) ● Technical requirements of vertical evacuation may present challenges to enhancing legibility, vitality and meaning ● Involving an urban design firm specializing in design of iconic buildings could cause the cost of the vertical evacuation tower to rise. However, the conceptual design of the building could be decided through a design competition.

Hazard Mitigation Initiative	Opportunities for Alignment with Community Identity and Natural Resources, and Urban Design Guidelines (UDG)	Conflicts with or Obstacles to Alignment with Community Identity Goals
Public Outreach Program	● Public outreach and education programs could be conducted at some of the well-designed public spaces including vertical evacuation structures. ● Educational tours or information plaques can be used to inform residents and visitors about the natural capital of the city as well as its hazards, and explain how natural assets and hazards are linked. ● Outreach and education planners should refer to UDG or work with urban designers to plan the outreach and education strategies. ● Include small structures (like pillars/obelisks/totems) into the landscape of Westport that can be used to disseminate information about hazards. These can become unique features (like the warning tower) around Westport, adding more character to the image of the city. ● Activities like "placecheck" or disaster preparedness tours, scavenger hunts or treasure hunts (spot the info obelisk or warning tower, etc.) during tourist season can be good education tools as well as economic opportunities.	● Hazards awareness and preparedness messaging may detract from Westport's image and attractiveness. Outreach messages and activities need to be positive, enjoyable and interestingly informative, and add to the attractiveness and appreciation of Westport by residents and visitors alike.
Emergency Management Plans (EMPs)	● Community appearance guidelines could be leveraged to highlight the location of some of the assets of the city, as identified by the EMP as well as evacuation routes. ● Strengthen natural high-ground such as the ridges and hills to serve as evacuation routes as well as to site evacuation towers. ● The UDG should include guidelines that consider the use of particular surface treatments of walls, pavements and streets that would aid ease of visual access to assets and emergency supplies. ● Urban design analysis methods can be used to identify evacuation routes. ● Find trivial (or seasonal) alternate purposes for back-up equipment that would be needed in an emergency.	● Moving or improving businesses can be costly ● High-ground evacuation sites or trails would require either purchase of multiple parcels of private land or the obtaining of access easements.
Emergency Communication Plan	● Provision to include distress signal devices (beacons, etc.) as part of the general urban design requirements of buildings could be made.	N/A
Critical Facilities Evaluation	● Improvements to capital facilities should incorporate new design guidelines aimed at emergency management and disaster preparedness. ● While retrofitting capital facilities, stormwater management systems incorporating native vegetation and the designation of open spaces for stormwater detention should be encouraged.	N/A

Hazard Mitigation Initiative	Opportunities for Alignment with Community Identity and Natural Resources, and Urban Design Guidelines (UDG)	Conflicts with or Obstacles to Alignment with Community Identity Goals
	● Capital facility design in commercial zones must be in accordance with the new UDG. ● Community identity features to be considered while retrofitting capital facilities.	
Transportation and Right of Way Improvements	● Signage in right of way (ROW) improvements must correspond to Design guidelines. Street-facing surfaces of buildings must also be designed to aid emergency evacuation and highlight the routes. ● ROW improvements must include appropriate green stormwater management measures. ● Make provisions to accommodate for both the commercial needs as well as hazard mitigation while avoiding visual clutter. ● ROW improvements must follow guidelines for streets that would set a hierarchy in aesthetic design for street types in different zones.	● The UDG currently includes no specific guidelines for signage or street-facing surfaces of buildings. ● This could possibly involve widening of streets.

5.3. Community Input

The workshops held in Westport with the community stakeholders in November 2018, provided many valuable insights; Figure 8 includes the most relevant community input that we received for this section of the Comprehensive Plan.

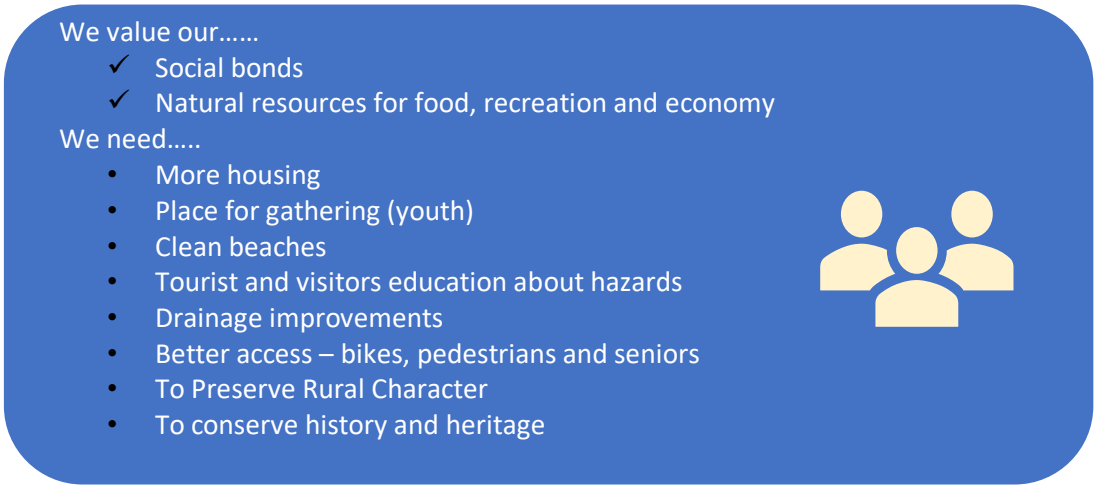

Figure 8. Summary of what we heard at the workshops in Westport

Table 12 below includes themes and examples of strategies relevant to community identity and natural resources emphasized by workshop participants. In addition, at the community report back event on 7th December 2018, community members expressed great interest in seeing a "Seabrook (near Ocean Shores) like development" in Westport. This suggestion can be incorporated but needs to be customized for Westport so as to ensure appropriate development.

Table 12. Community input related to community identity and natural resources

Strategy Theme	Strategy Examples
Connectivity throughout the region	• Establish interconnected trail system network for bikes and pedestrians • Explore the use of seaplanes as alternative air transportation mode. • Improve and demarcate major evacuation routes throughout the city. This would help in easier identification of the routes as well as ease of access for emergency vehicles.
Information-sharing and preparedness	• Using special devices to communicate hazard information and warning. • Using signages and information boards to educate the public. • Integrate vertical evacuation structures and other evacuation sites into everyday routine of the public if possible. This habituates the residents with the evacuation procedures, routes and sites.
Balancing growth and resilience	• Building a community that can accommodate for increasing storm surges to a greater extent and leveraging it for economic growth • Adapt by building more safer housing in the form of mid-rise apartments to keep younger generation within the city once broad band systems are improved
Education of the public particularly tourists	• Installing signages and special devices for information dissemination (e.g., Haz-Mit Totems). • Coding the built environment through color and texture themes for way-finding.
Conservation of resources and identity	• Create programs for beach clean ups after peak tourist season. • Move important historic artefacts to higher altitude facilities. • Protect the natural environment and the character of the built environment.
Economic Improvement	• Improve tourism opportunities (e.g., themed resorts, activities, etc.) • More housing options to attract and/or to retain younger population.

5.4. Recommendations

Table 13 below summarizes recommendations for updating this Element of the Comprehensive Plan based on integrating Grays Harbor County HMP initiatives, input from community members and additional information. Each strategy included in the table is explained in more detail below.

Table 13. Recommendations for the Proposed Community Identity and Natural Resources Element

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community Identity and Natural Resources Values
County Hazard Mitigation Plan	1. Explore the option of designing a vertical evacuation tower as iconic structures	• Easier to locate the evacuation site	• Attracts more tourists and thereby improves the economy
	2. Implement innovative emergency evacuation route signage system	• Easier to identify the evacuation routes even if structures collapse due to an earthquake • Aids in evacuating tourists and visitors faster	• Adds to the unique identity of the city. • The implementation of these interventions can be integrated with regular building and street maintenance measures.
	3. Explore the use of special emergency management devices like Haz-Mit totem poles	• Can be used for information dissemination, as warning devices and to house small emergency supplies.	• Adds to the character of the city. • Can be used as part of tourist activity like 'treasure hunt' etc.
Community Input	4. Wetland resort development in the lowlands	• Acts as a buffer for city center businesses	• Allows maximum economic utilization of the land before sea level rise and/or a natural disaster makes it completely unusable
	5. Explore the option of building mid-rise apartments	• Can act as vertical evacuation structures	• Creates alternative housing options that can be designed to fit the character and design of a coastal community, appropriate to seasonal work and low-income households.
Other strategies	6. Resorts in the hills outside the city limits	• Ensures that a habitable refuge is available during and after major hazards like tsunamis • Can be used as a site for emergency supplies and vehicles including helicopters	• Improves the tourism driven economy. • Can be developed into the new city post a major disaster. • Can be used as the new site for important cultural/historic artefact for social resilience.
	7. Encourage flood accommodative building design.	• Houses are protected from flooding due to storm surges, king tides and possibly from minor tsunami events.	• Elevated resort buildings in the lowlands could be designed in a way which takes advantage of the tidal flooding and storm surges. This could contribute to tourism during storm season.

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community Identity and Natural Resources Values
	8. Chateau Westport retrofit/reconstruction	• Act as a vertical tsunami evacuation option • Strengthen it against seismic forces	• The retrofitting process could be used as an opportunity to include sustainability measures and improve the appearance of the hotel.
	9. Ridge Trail	• Serves as alternative emergency evacuation routes.	• Bike trails can act as green transportation modes. • Bicycle tours can be a tourist activity to get acquainted with the city.
	10. Implementing blue-green storm water infrastructure measures	• Reduces stormwater related flooding	• Contributes to improved appearance of the city. • Improves carbon sequestration • Creates more public spaces
	11. Mapping of natural resources	• Utilized to formulate natural hazard mitigation strategies	• Helps to identify, measure and locate the various natural resources which then helps conservation and prudent use of the resources.
	12. Using Coastal vegetation to mitigate storm surge impacts	• Reduces the impacts of waves	• Aids in the conservation of the local flora and fauna. • Would help in attracting wildlife enthusiasts.

5.5. Reference Cases and Further Ideas

Additional detail and illustration for selected recommendations from the list above is as follows.

Design vertical evacuation towers as iconic structures: Vertical evacuation structures can be designed with iconic or unique forms that serve as tourist attractions and recreational facilities that reinforce the identity of Westport. Designing structures in such a way will also help in 'way-finding' (i.e., help in identifying evacuation destinations during emergency situations). More measures of tsunami resistance through architecture must be explored (Craven 2018).

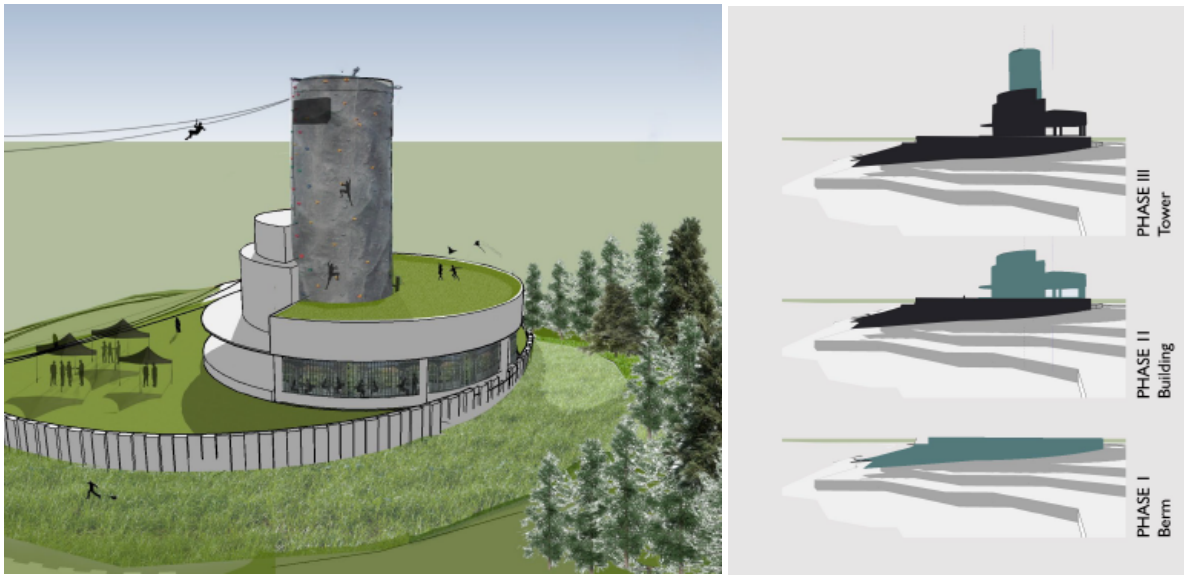

Figure 9. Conceptual image of a vertical evacuation structure as a recreational physical activity center, buildable in phases.

Ridge Trail: Establish bike and hiking trail system that also connect to the vertical evacuation structures (Figure 14 and Figure 10). In the event that roads are inaccessible these could potentially serve as alternate routes. Also, they can be used as an economic resource (bike tours) as well as tourist education tools.

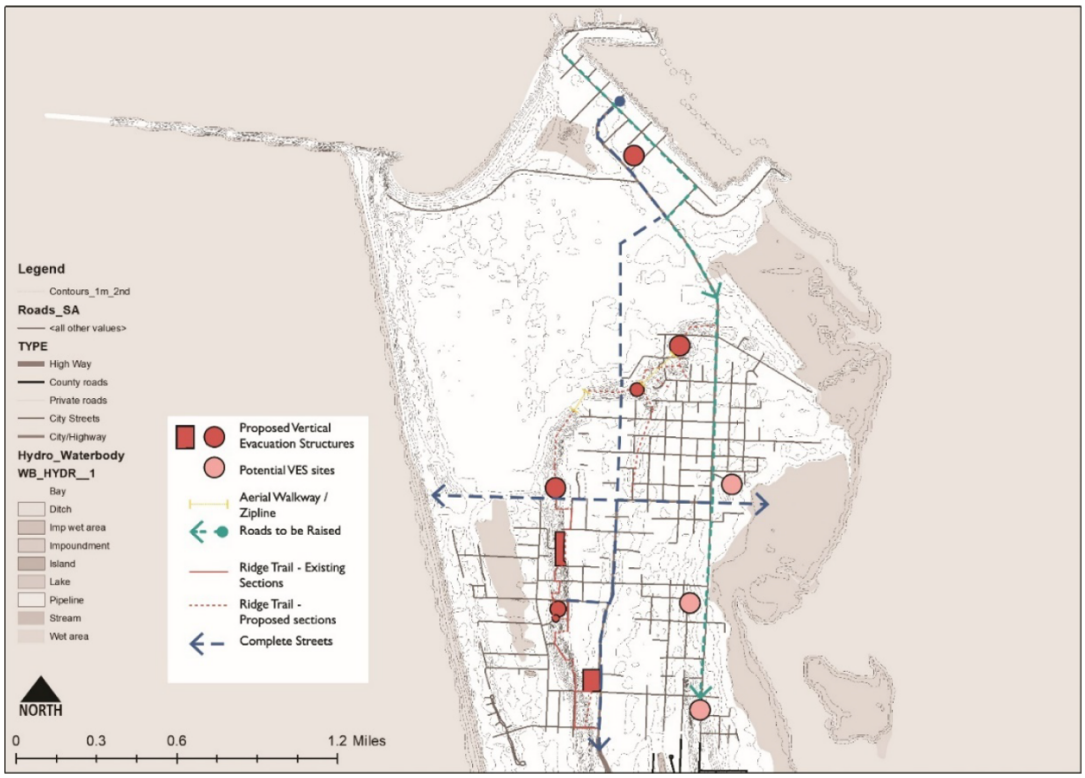

Figure 10. Proposed Vertical Evacuation Network for Westport,WA.

Explore the option of retrofitting hotels (e.g. Chateau Westport) and building mid-rise apartments as vertical evacuation sites: Apartments with four-plus stories can be built to provide affordable housing on limited higher ground. These can also serve as vertical evacuation structures. When building such structures care should be ensured that at least the top two levels of the building are wide enough and accessible to hold as many people as possible during an emergency situation. The city should ensure that such buildings be built only after appropriate geological and seismological studies are conducted. They should preferably be situated on locations on top of the ridges after sufficiently reinforcing the ridges. Care should also be taken in building only limited number of such structures as they can interfere with the small-town charm of the city, which is highly valued by its current residents. Potential sites are marked on Figure 10.

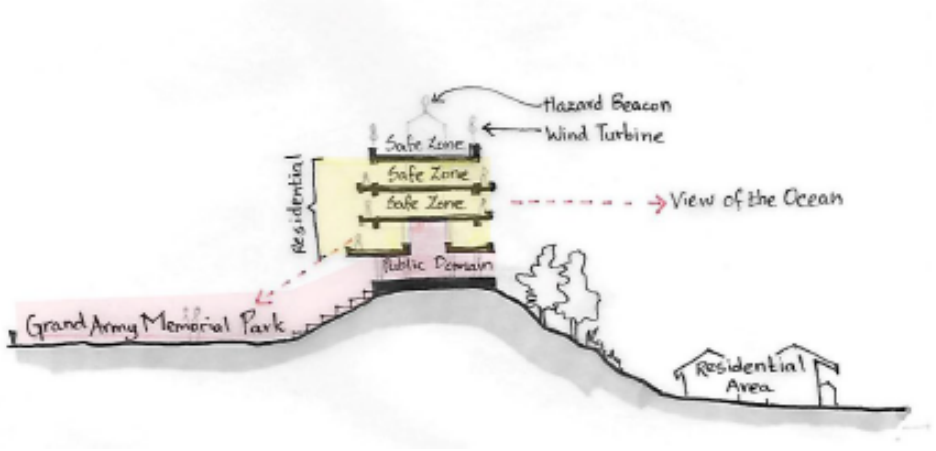

Figure 11. Multi-story housing on high ground as vertical evacuation.

Implement innovative emergency evacuation route signage system:

Figure 12. Right of way interventions

Evacuation route signages should be better integrated into the built environment. Unlike a few sign boards, treating the entire stretch of an evacuation route would help better in communicating its purpose to the general public. For instance, if flooding occurs, it would be easier to tell people to follow the path with roofs painted red (Figure 12). Emergency lamps, powered by solar batteries, can light up the path during the night. Solar (or wind powered) street lamps would be beneficial for the city residents even in the winter months (as was heard during the open house conducted on December 8,2018 at the Tackle Box).

Explore the use of special emergency management devices like Haz-Mit totem poles: These are devices that can be used to disseminate local hazard information. They can also be used to house small emergency supplies like a flare or a torch. If connected to a regional warning system, they may also be used as warning beacons. Totems can be designed and crafted by neighboring Shoalwater Bay Tribe. They can also be incorporated into tourist activities like "Spot the Haz-Mit Totem contest", which would ensure that the tourists are made aware of these structures. It would also draw their attention to the hazard information displayed by the device.

Figure 13. Concept of Haz-Mit Totem Pole (Art installation from Wawa Information center, Ontario, Canada.)

Wetland resort development in the lowlands: The city could consider buying the low-lying lands, especially those that would be most susceptible to sea level rise, and lease back the land to private resort developers. However, the resort should be developed in a way such that it accommodates flooding. This can be achieved through building the resort cottages on stilts or piles. The king tide and storm surge waters would pass underneath the structures.

The benefit of such a development is that during the initial years there would be only minor seasonal flooding. They could even be used as retirement community homes. However, as the years progress and the global sea level rises, the resort land will be inundated with high tide water but the cottages themselves will be dry. This would prove as a unique 'living-on-the-water' experience that could attract tourists seeking such unique experiences. They could also be infused with some tourist focused recreational aquaculture. At this point permanent dwelling in these structures must be prohibited and only tourists/vacationers should be allowed to use these structures. Further into the future, the structures could probably serve as tourist facilities while the elevated pathways can serve as piers and docks. Eventually, the structures could be condemned for any type of housing purposes. For possible locations to site the wetland resort refer to Figure 14 showing potential ridge trail route and locations for wetland resorts.

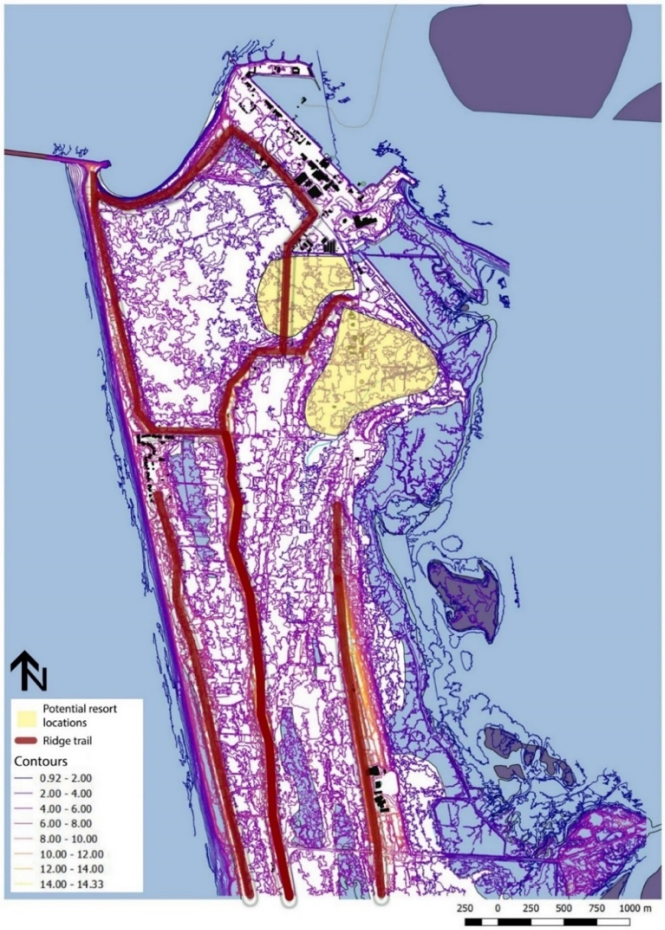

Figure 14. Potential locations for Wetland resort and potential ridge trail routes

Encourage flood accommodative building design: In the most basic sense, this means elevating structures above a minimally-obstructed ground surface. Floodwaters should be allowed to pass under the structure. Buildings within the 100-year FEMA floodplain should be encouraged to be elevated above the base flood elevation. Large sites could also include stormwater detention areas.

Figure 16. A wetland resort in Malaysia

Figure 17. Ecologically low-impact stormwater- and draught-tolerant environmental educational retreat at Islandwood, Bainbridge Island (Berger Partnership)

Figure 15. Moe Yun Gyi Wildlife Sanctuary & Wetlands Resort, Myanmar, when dry (L) and when water rises (R)

Resorts in the hills outside the city limits: The city should also explore the option of locating resorts outside the current city limits, as discussed in the Area-Wide Development Element. These can take the form of forest retreat facilities on what are currently private highlands. This again could be a public-private partnership endeavor. These could be made of a combination of eco-friendly structures and permanent structures. These permanent structures would be serviced by basic infrastructure. The design of the permanent structures could be such that it can be expanded in the future, should there be need for a more permanent residential establishment due to natural hazards. They can also act as temporary refuges during peak storm events for the resident community of Westport. Tree houses can be a potential lower-cost elevated housing option.

Figure 18. A tree house in Skamania County, WA

Mapping of natural resources: This strategy is aimed at taking advantage of the natural resources of the city. In order to be able to leverage the natural topography and vegetation for hazard mitigation purposes. This strategy involves documenting the bio-diversity and the land form of the city and nearby region. This would also help in conserving the natural resources better. Information from these studies and documentation can be used to make advertisement and information material for the tourists and nature enthusiasts.

Using coastal vegetation to mitigate storm surge impacts: Explore the option of using native vegetation for hazard mitigation purposes. Native grass species could be planted on sand dunes to reduce erosion from winds, storm surges and tides.

5.5.1. References and Additional Resources

Craven, Jackie. 2018. Architecture of tsunami resistant buildings. September 26. Accessed December 10, 2018. https://www.thoughtco.com/architecture-of-tsunami-resistant-buildings-177703.

Grays Harbor County Emergency Management. "Project Safe Haven : Grays Harbor County," 2011. https://mil.wa.gov/asset/5ba41ffb35f02.

Hester, Randall. 1985. "Subconscious Landscapes of the Heart." *Places* 2(3), 10-22.

Lynch, Kevin. 1960. *The Image of the City*. The MIT Press.

Whyte, William H. 1980. *The Social Life of Small Urban Spaces*. Washington, D.C.: Conservation Foundation. See also the Project for Public Places, https://www.pps.org/.

Additional resources:

- The recovery plan of the City of Greensburg, Kansas, is a good document to observe the possibilities of use of urban design for hazard mitigation and sustainability. https://archive.epa.gov/region07/cleanup/greensburg/web/pdf/gb_ltcr_plan_final_hires070815.pdf
- Some information of Blue-green infrastructure can be found on the following website: https://ramboll.com/services-and-sectors/planning-and-urban-design/blue-green-infrastructure-design
- Some resources from FEMA for elevating structures in floodplains: https://www.fema.gov/media-library/assets/documents/725
- FEMA manual for coastal construction is available at the following link: https://www.fema.gov/media-library/assets/documents/3293
- An example article that explains the use of desire lines: https://99percentinvisible.org/article/least-resistance-desire-paths-can-lead-better-design/
- A resource for transect analysis: https://transect.org/
- A resource for place check: https://placecheck.info/en/

6. Area-Wide Development Element

6.1. Introduction

Chapter 8 of the Comprehensive Plan includes considerations, goals, objectives, and policies related to area-wide development. The Comprehensive Plan emphasizes that development issues and concerns in areas beyond the city limits are expected to become increasingly important in the future, and notes that many Westport residents and employees currently commute to or from places outside city limits. The chapter focuses on the importance of balancing increasing development and expansion opportunities with the ability to provide services to current and future residents. Figure 26 below shows the Westport city limits and the surrounding area.

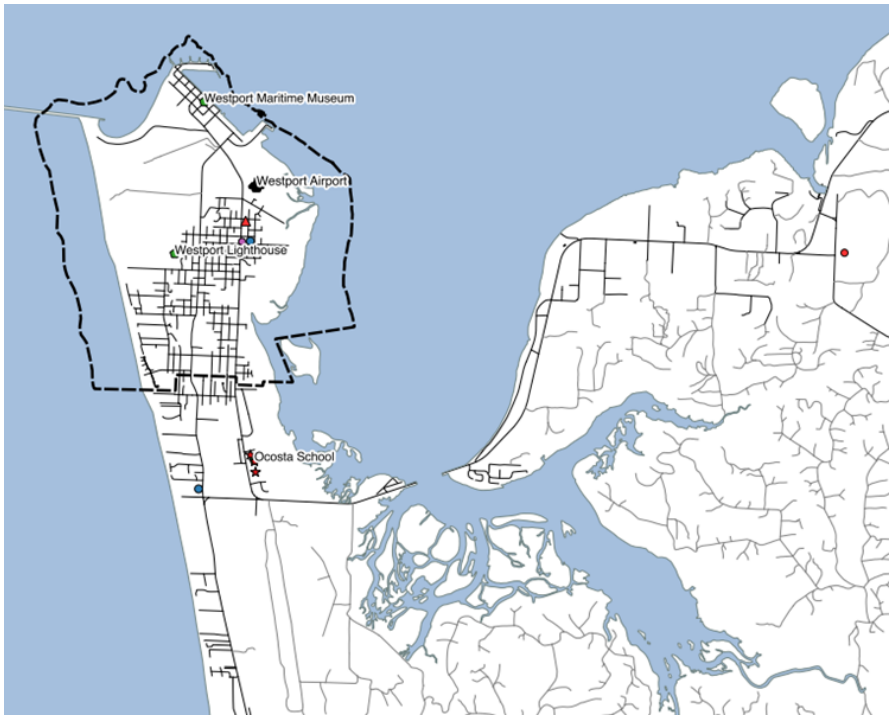

Figure 20. City of Westport indicated in black and surrounding area

The current goals of the Area-Wide Development Element are:

1. To promote an efficient and orderly pattern of development in the unincorporated area south of Westport which protects Westport's unique seaside character, the area's environmental amenities and natural resources, and the City's fiscal capacity.
2. To promote a development pattern in the unincorporated area south of Westport which maximizes the use of, and protects the integrity of the City's public facility investments while providing for efficient expansion and maintenance of the public facilities.

In addition, the plan includes four objectives focused on protecting Westport's important assets, promoting orderly expansion of the City's tax base and public services, and minimizing impact on sensitive areas while enhancing access and safety.

6.2. Opportunities for Integration

Table 16 below lists the hazard mitigation initiatives from the Grays Harbor County HMP and describes opportunities and obstacles for alignment with the area-wide goals currently outlined in the Comprehensive Plan.

Opportunities and obstacles described below focus on aspects of hazard mitigation that are relevant to the wider region. This encompasses areas neighboring Westport such as adjacent census-designated or unincorporated areas (e.g., Grayland, Ocosta, etc.). Grays Harbor County departments (e.g., Planning Department, Emergency Management) are responsible for land use and emergency response in unincorporated areas of the county. However, given the regional scope of hazards highlighted in the Grays Harbor County HMP and residents' ties throughout the region, Westport city divisions should, to the extent possible, collaborate with county and non-county entities to support a coordinated, regional approach to hazard mitigation. Opportunities for collaboration include supporting implementation of vertical evacuation structures for the peninsula, engaging residents throughout the region through public outreach, and including regional considerations in emergency and transportation planning.

Table 14. Aligning hazard mitigation initiatives and the Area-Wide Development Element

Hazard Mitigation Initiative	Opportunities for Alignment with Area-Wide Development Goals	Conflicts with or Obstacles to Alignment with Area-Wide Development Goals
Vertical Tsunami Evacuation Structure	• Consider potential locations and capacity of future vertical evacuation structures in the context of new development • Identify opportunities to incorporate vertical evacuation into future expansion of public facilities and/or renovation of existing structures	• Vertical evacuation structure planning and construction is costly and time intensive • Expanding development in low-lying areas outside of Westport without adequate evacuation possibilities would expose residents/visitors to risk
Public Outreach Program	• Identify opportunities to collaborate with neighboring areas on public outreach regarding hazard mitigation (e.g., workshops in Grayland, materials circulated to South Beach Christian Center or other community gathering places) • Coordinate with county or community facilities that can serve as hubs for public outreach in neighboring areas	• Reaching residents of neighboring areas will require a more extensive public outreach program that will require coordination with county/state agencies (e.g., Emergency Management Planning Committee)
Emergency Management Plans	• Assets and capabilities located in unincorporated areas should be considered in planning emergency response • Key emergency response service providers (e.g., South Beach Regional Fire Authority and Grays Harbor County Hospital) have facilities outside of Westport city limits and should be included	• Population (existing and potential new residents) in unincorporated areas adjacent to Westport may rely on the city for emergency response and could stretch response capacity and resources for Westport residents
Emergency Communications Plan	• Support identifying an institution south of Westport that can serve as the radio point of contact for coordination (e.g., Grayland	• Population of residents and/or businesses (existing and/or new) in neighboring areas could burden

Hazard Mitigation Initiative	Opportunities for Alignment with Area-Wide Development Goals	Conflicts with or Obstacles to Alignment with Area-Wide Development Goals
	station of South Beach Regional Fire Authority) • Collaborate with county to streamline emergency communications plans to ensure alignment and minimize confusion	communication systems during emergence response
Critical Facilities Evaluation	• Many critical facilities are located outside Westport city limits; collaborate with county to secure results of a critical facilities evaluation for adjacent unincorporated areas	• Critical facilities evaluation for buildings outside Westport would be outside the City's responsibility, but would be an important element of minimizing risk to residents and visitors in these areas
Transportation and Right of Way Improvements	• Provide input on county projects regarding tsunami evacuation markers and other transportation signage to align with Westport transportation and right-of-way needs/goals • Unincorporated areas may include critical evacuation and access routes (e.g., forest/logging roads may provide overland access and evacuation) • Advocate for strengthening of the State Route 105 bridge and other critical transportation infrastructure	• Expanding development and public facilities/infrastructure into new areas would require additional coordination with Washington State Department of Transportation (WSDOT) on tsunami evacuation routes and signage • Westport may be dependent on county and state agencies for transportation improvements

6.3. Community Input

Community members emphasized that Westport is not defined by its city limits; people identify with a broader geographic area including South Beach, Ocosta, Grayland and other nearby areas. Many of the values described by Westport and South Beach community members encompass the wider region and are linked to area-wide development considerations. For example, community members highlighted rural character, natural resources contributing to economic vitality, and natural features for recreation among their values. These values could be compromised by unorganized or significant development of unincorporated areas around Westport, which would also pose challenges related to implementing hazard mitigation strategies. Furthermore, community members value the quality of public services they receive, including emergency services, education, and the affordability of housing in the region. These values are potentially vulnerable to expansion and growth in the region. However, expansion of facilities and services could be supported by increasing Westport's tax base through annexation, if appropriate opportunities were to arise.

Community members described clean air and water, undeveloped beaches and natural areas, and lack of traffic and low population as examples of regional assets. In addition, community members highlighted some specific assets located beyond the city limits of Westport, such as South Beach Regional Fire Authority stations, the Grays Harbor Community Hospital, Ocean Spray cranberry processing facilities and

farms, gas stations, a rural airport, Grayland Local Store, Twin Harbors State Park, oyster farms, and other assets.

Community members discussed the vulnerability of values and assets to different change scenarios and potential strategies to mitigate these vulnerabilities. Table 17 below includes themes and examples of strategies relevant to area-wide development emphasized by workshop participants. It is important to note that many strategies identified below are cross-cutting; they may provide hazard mitigation as well as long-term resiliency and immediate co-benefits to residents and visitors.

Table 15. Community input related to the Area-Wide Development Element

Strategy Theme	Strategy Examples
Connectivity throughout the region	• Explore options of "waterproof" transportation (e.g., ferry system) to increase connectivity to Ocean Shores/Hoquiam/Aberdeen, access for Coast Guard and first responders after an event, and long-term flood mitigation • Improve critical transportation infrastructure throughout the region including bridges, roadways, highways, and airport; add regional walking and biking trail system through higher ground, perhaps linking camping sites • Increase opportunities for community-building and engagement among residents of Westport and nearby areas
Information-sharing and preparedness	• Engage hotels, restaurants, and other services throughout the region to provide information about tsunami risk and evacuation • Improve access to emergency supplies throughout the region • Support creation of vertical evacuation structures, multi-story facilities, and evacuation routes to serve the wider region
Balancing growth and resilience	• Explore opportunities and assess community support for securing land on higher ground for the community to use as desired • Consider higher density development to increase capacity in higher elevation areas before and/or after event • Promote affordable housing and employment opportunities as a part of growth strategies • Conserve open spaces for ecosystem services and natural resource provisioning and possible future public use • Maintain rural and seaside character throughout the region (e.g., protect access to pristine natural areas, and prevent traffic/congestion)

6.4. Recommendations

Table 16 below summarizes recommendations to consider when updating the Area-Wide Development Element, based on the opportunities for integrating hazard mitigation strategies outlined in *Section 6.2* and community input described in *Section 6.3.* Recommendations focus on four themes: growth and resiliency, geographic considerations, regional preparedness, and connectivity and transportation.

Table 16. Recommendations for Updating the Area-Wide Development Element

	Recommendations	Hazard Mitigation Benefits	Description of Co-benefits
Grays Harbor County HMP	Collaborate with the county so that new development outside Westport balances regional growth with resiliency and preserves local values/assets, including: • Promote and collaborate on expansion of vertical evacuation structure network • Support evaluation of critical facilities located outside city limits that serve Westport • Work with county on zoning regulations and other development policies that promote resilient development beyond city limits (e.g., higher density/vertical and affordable housing, hazard overlay to encourage appropriate land uses and structures) • Work with county to protect open spaces and important ecosystems outside Westport (e.g. dunes, wetlands, oyster beds, etc.) • Identify potential areas for new development that can create economic opportunities (e.g., wetland resort)	• Evacuation access and critical facilities outside city limits provide for current and potential new residents and visitors in the event of a hazard • New development is planned in consideration of hazards • Protected areas provide ecosystem services (e.g., buffering) that mitigate coastal hazards	• Creates opportunities for expanding rental/ affordable housing, employment access, economic growth without increasing hazard risk • Protection of Westport's character and values (i.e., rural/seaside character) • Healthy ecosystems and natural resources

	Recommendations	Hazard Mitigation Benefits	Description of Co-benefits
Community Input, Additional Cases/Discussions	Explore and consider opportunities and partnerships to gain access to high ground outside city limits that provides near-term uses/co-benefits, including: • Assess community support for securing land on higher ground outside city limits as "insurance" against potential future SLR/tsunami flooding • Identify closest accessible and tsunami-safe high ground areas (e.g., dune ridges, land area immediately south and east of Westport) • Identify opportunities and feasibility of acquiring high ground outside city limits, including potential mechanisms or funding partners (e.g., annexation, land swap, lease agreements, easements, funding for outright purchase) • Identify near-term and long-term use goals of high-ground areas (see co-benefits), including in shortest term securing emergency access rights through currently locked private logging roads • Consider feasibility and desire to relocate critical services (e.g., fire department) to high ground near the city	• Provides access to an area that will be minimally impacted by tsunami or SLR that can be used to stage equipment and provide services to residents before/after an event	• Could be developed in the medium-to-long term for recreational or economic opportunities (e.g., hiking/camping, resort/retreat center, hunting lodge, etc.)
Grays Harbor County HMP, Community Input	Collaborate broadly on hazard mitigation planning and implementation (i.e., "resilient together" mindset), including: • Collaborate with the county to include areas outside Westport in public outreach and planning for emergency management and response (e.g., through South Beach emergency management case study) • Assist with engaging service industry (e.g., hotels and restaurants), community organizations, and emergency services throughout the region to provide information about tsunami risk and evacuation • Ensure that the city has adequate financial and human resources for hazard mitigation and response within Westport and as closest support for residents outside the city • Coordinate on evaluation of critical facilities and development of public facilities that are resilient to natural hazards	• Close collaboration with the county and other jurisdictions will help ensure that emergency response and communication plans are effective for the peninsula • Engaging businesses and organizations will improve communication with visitors and non-residents • Westport residents can access facilities and services outside the city that are resilient to hazards	• Planning efforts facilitate regional communication and network-building • Improved collaboration among hotels, restaurants, and businesses throughout the region • Increased or improved provision of public services and facilities

	Recommendations	Hazard Mitigation Benefits	Description of Co-benefits
Grays Harbor County HMP, Community Input	Promote regional connectivity to increase hazard resiliency and economic and social benefits, including: • Explore opportunities for alternative transportation, including a possible ferry to North Beach (e.g., Ocean Shores or mid-peninsula) and other areas, a ridge trail system providing beach access and connecting to Aberdeen, accessible logging/forest roads • Advocate for improvements to critical transportation infrastructure throughout the region including bridges, roadways, highways, and airport • Pursue opportunities to improve cellular and internet connectivity throughout region • Support efforts to increase tsunami evacuation route signage throughout the region	• New docks, roads, and trails could provide access for Coast Guard and first responders after an event • Improved infrastructure will be less likely to sustain damages and more likely to support evacuation • Improved cellular and internet connectivity support will support hazard response • Clear evacuation routes can improve success of evacuation	• Improved regional transportation can increase opportunities for community-building and engagement among residents of Westport and nearby areas, as well as new economic opportunities • Better cell and internet can increase opportunities for remote work • Better marking of thoroughfares can reduce congestion during busy seasons

6.5. Reference Cases and Further Relevant Information

When incorporating area-wide strategies into local hazard mitigation, Westport can draw from examples of other small communities that are looking outside their city limits to improve resiliency to flooding. For example, in the Skagit Valley, the City of Hamilton is incorporating land acquisition out of the floodplain into their comprehensive plan. The City is outlining a vision of renewed economic vitality, preserved rural character, and flood risk mitigation in their long-term planning process. The plan includes acquiring land and encouraging commercial development outside of the historic town footprint. Hamilton is working with a local land trust, nonprofits, and state agencies on acquiring land outside the floodplain, which could require annexing part of their urban growth area. In this approach, no home or business would be relocated immediately, but access to the land would provide option for the community over time (Terrel 2018). A key difference between Westport and Hamilton is that Hamilton currently floods regularly, so there may be a more immediate need to utilize acquired land rather than holding it as a form of insurance against future needs. In addition, Westport can look to lessons-learned from previous land swap agreements in the area when exploring potential opportunities to acquire land outside the city limits, if the city chooses to pursue this approach. See Section 1.4. Overarching Considerations for a conceptual illustration of such an arrangement.

6.5.1. Section References

Terrel, S. (2018, September 9). Hamilton seeks funding to plan move out of floodplain. Skagit Valley Herald. Retrieved from: https://www.goskagit.com/news/hamilton-seeks-funding-to-plan move-out-of-floodplain/article_2bd86566-ce4c-5986-a556-6656efa2dc52.html

7. Shoreline Master Program

7.1. Introduction

The Shoreline Management Act was adopted in 1972 and requires most towns and cities to implement a Shoreline Master Program (SMP). SMPs are a document of local land-use policies and regulations intended to guide the use of both public and private uses of shorelines to prevent harm caused by uncoordinated development of coastal areas. They are intended to protect natural resources for future generations, provide for public access to public waters and shores, and plan for water-dependent uses.

The Westport SMP is located in Appendix C of the Comprehensive Plan and identifies eight main elements, each with their own goals. The summary goal for each individual element is described below.

- **Economic development:** to maintain and enhance shoreline related industry
- **Public access:** to maintain and improve existing public access to publicly-owned shorelines and to secure additional access
- **Circulation:** to create and maintain a circulatory network capable of delivering people, goods, services and emergency services at the highest level of convenience, safety, reliability and economy
- **Recreation:** to provide proper recreational opportunities for local citizenry and to maintain and enhance tourism resources
- **Land use:** to promote the best possible pattern of land use and devise a pattern beneficial to the natural and human environments
- **Conservation:** to identify the resources of the region, valuable (historic, cultural, scientific, educational) sites and restoration: sites located within the shoreline jurisdiction are identified and preserved
- **Historic, Cultural, Scientific, and Educational Sites and Structures:** Historic, cultural, scientific, and educational value should be preserved and maintained through park use or historic designation.
- **Restoration:** To encourage development in areas which have been previously impacted with development so that such areas may be renewed, restored, and refurbished by compatible new development.

Shoreline Policies in the Shoreline Master Program are organized into four sections:

- Activity and Development Policies (including agricultural practices, aquaculture, mining, landfill, dredging, clearing and excavation, waste disposal, public access, tourist and commercial activities, ports and water related industry, residential development, recreation, utilities, road and railroad design and construction, marinas, shoreline works and structures, and archaeological and historic sites)
- Natural System Policies (including accreted oceanfront lands, estuary, floodplains and marshes)
- Shoreline Environment Policies (including urban environment, rural environment, conservancy environment and natural environment
- Administration Policies.

Because Westport has not yet included sea level rise in their SMP or Hazard Mitigation Plan, there is the opportunity to not only benefit from the best available science and most recent projections available, but to learn from what other cities and counties have already done. Comparing these other strategies with input from their own community and tsunami scenarios creates the opportunity for Westport to optimize their approach and increase resilience against multiple threats.

7.2. Opportunities for Integration

Because of Westport's geographic location and increased vulnerability as compared to inland cities within the same county, it is important to define the different risk scenarios using the best available science to inform hazard mitigation. In additional to maps and projections, including a more in-depth explanation of how each scenario will impact Westport will be valuable to all city planning going forward. For example, in Olympia's annex of the Thurston County HMP, they list what critical infrastructure will be impacted, what measures can be taken to prevent or mitigate the impact to the structure, and the approximate cost of such measures. Including similar risk assessments of Westport's most critical utilities within the shoreline jurisdiction, including roads and bridges, will localize the Grays Harbor County HMP to suit the unique needs as a coastal city and considerations for Westport's long-term planning efforts. Table 19 below lists the six initiatives in the current Westport Annex of the Grays Harbor County HMP and identifies alignment with the SMP as well as obstacles or conflicts.

Table 17. Aligning hazard mitigation initiatives and the Shoreline Master Program

Hazard Mitigation Initiative	Opportunities for Alignment with SMP Goals	Conflicts with or Obstacles to Alignment with SMP Goals
Vertical Tsunami Evacuation Structure	● Constructing one of the future tsunami structures near the beach and including a scenic viewing platform on the top floor would make beach recreation safer and provide opportunities for tourists and locals to enjoy an unobstructed view of the shoreline.	● It may be difficult to find a stable location with quick access to the beach because of unstable sediments and potential liquefaction.
Public Outreach Program	● Building a strong social media presence to educate residents and visitors about hazards and creating individual response plans. ● Having brochures related to tsunami safety easily accessible in hotels and tourist rental properties.	● This may not reach the most vulnerable audiences, such as the elderly and disabled.
Emergency Management Plans	● Include sea-level rise projections and their effect on storm surge and 100-year flood conditions in the risk assessment.	● Could require a costly outside consultant.
Emergency Communication Plan	● Effective signage at all beach access points for tourists and visitors who are unfamiliar with local conditions and navigation.	● May conflict with signage limitations in the SMP
Critical Facilities Evaluation	● Vulnerability assessment of the wastewater/stormwater treatment plant located near the shoreline.	● Associated costs.
Transportation and Right of Way Improvements	● Multiple earthquake-resistant walkways to the beach for better access and quicker evacuation.	● May be costly to engineer and construct walkways to resist earthquake damage.

7.3. Community Input

Interacting with the community of Westport provided context for understanding how the residents prioritize their values and assets. This understanding made it possible to provide recommendations that residents would support implementing.

7.3.3. Strategies Suggested by Community Members

Table 20 below includes overarching themes and examples of potential hazard mitigation strategies recommended by community members during workshops.

Table 18. Community input related to the Shoreline Master Program

Strategy Theme	Strategy Examples
Navigation and evacuation to neighboring communities	• Replace the Westport bridge, which is vulnerable under the 2-3 feet sea level rise scenario. • Reroute State Route 105 and raise/reinforce main evacuation road in Westport. • Relocate the airport.
Emergency Preparedness	• Have information available in hotels and rental homes near the shoreline about potential hazards and evacuation plans. • Build additional vertical evacuation structures that serve multiple purposes.
Balancing growth and resilience	• Tax breaks or incentives for people to build outside of hazard areas and on high ground. • Build a full-service resort near the beach with conference room to attract tourism and boost the economy. • Build an apartment building so that workers have a place to live in Westport without buying a home.

7.4. Recommendations

The following recommendations include changes to the Westport Annex of the Grays Harbor County HMP, policy recommendations, recommendations based on community input and one additional recommendation identified as a gap when comparing the SMP goals with the Grays Harbor County HMP objectives.

The most important of these, as it informs all planning in the shoreline jurisdiction, is to create a new goal in the SMP that addresses sea level rise. The goal should include recognition and monitoring the potential effects of sea level rise as additional scientific information becomes available. It should suggest minimizing the impacts of sea level rise on the shoreline environment with strategies that meet the existing goals of the SMP; to protect shoreline ecological functions, allow water-dependent uses and provide public access.

Including the most recent projections and maps of sea level rise scenarios in the SMP would provide information to planners and developers needed to decide what standards to meet when building in vulnerable areas, or encourage them to build outside of these vulnerable areas. It would also inform any changes to policy, such as incorporating sea level rise projections into the permitting process. For example, having certain elevation requirements or setback requirements for new construction. At the

next major update of the SMP consideration should be given to additional specific policies and regulations based on the newest scientific projections.

Recommendations from the community are based on conversations about the value they place in having easy access to neighboring communities via the Westport bridge and State Route 105. These are both vulnerable to floods resulting from sea level rise or tsunami and it is recommended to assess the feasibility, timeline, and cost of replacing the Westport bridge with one more capable of withstanding earthquakes and liquefaction. Similarly, an assessment of the feasibility of rerouting State Route 105 to a path further inland is recommended.

As an alternative to relying on uncertain future projections of sea level rise, it might be beneficial to devise action items based on benchmarks of sea level rise. This could be put in place as an overall strategy as well as having a timeline of strategies for individual structures. For example, using the wastewater treatment plant as a case study, it might look like:

- At 6 inches of sea level rise, seal the plant with waterproofing and create protective berms.
- At 12 inches of sea level rise, install valves or switches to prevent back flow of water through pipes.
- At 18 inches of sea level rise, elevate the structure and begin researching a new location for the plant.
- At 24 inches of sea level rise, begin construction of the new plant and decommission current plant.

This strategy is most useful when planning for infrastructure that already exists and for incorporating future policies. When building new structures, future projections become more important when mitigating against future conditions.

Finally, to combine the intention of the SMP goal to provide access to the beaches and the Grays Harbor County HMP objective to improve emergency response, it is recommended to construct earthquake resistant walkways to the beach from the main trail/road. Having these walkways go over the top of the dune vegetation will protect it from people cutting paths through the vegetation, which provides the important ecosystem service of strengthening the dunes and protecting from erosion. These walkways will also help people evacuate the beach more quickly and provide a more stable path for those who have trouble walking or require a wheelchair. Table 21 includes recommendations for updating the SMP.

Table 19. Recommendations for Updating the Shoreline Master Program

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community
Grays Harbor County HMP	New goal for SMP: Recognize and monitor the potential effects of sea level rise as additional scientific information becomes available.	Prevents damage to infrastructure by providing building standards that protect against sea level rise. Added benefit of increasing resilience to flooding associated with a tsunami.	Protects community from loss of critical utilities.
	Include most recent projections and maps of sea-level rise scenarios in the Grays Harbor County HMP.	Provides planners with a hazard profile and what they could expect over the lifetime of newly constructed projects.	Prevents loss of access to and benefits of built capital that might have otherwise been damaged by sea level rise.

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community
	Establish benchmarks for sea level rise amounts rather than planning for uncertain timelines.	Creates a framework for planning for existing infrastructure and possible modifications to building codes as needed.	Impacts potential taxes on residents and costs to builders on an as-needed basis rather than preemptively.
Policy	Provide information about sea level rise to development permit applicants or include sea level rise into the permitting process (example: requirements for elevation of structures).	Ensures new infrastructure is built to certain standards and more resilient to sea level rise or tsunami impact.	New buildings and homes more capable of withstanding certain hazards.
	Modify setbacks or encourage location of new or replacement development outside of areas vulnerable to sea level rise, associated flooding and tsunami.	Ensures new infrastructure is built to certain standards and more resilient to SLR or tsunami impact.	New buildings and homes more capable of withstanding certain hazards.
Community Input	Assess the potential timeline of new bridge construction as compared to the sea level rise projections and probabilities from the WA coastal network (www.wacoastalnetwork.com).	Increases the reliability of one of the most crucial evacuation routes.	Ensures that access to neighboring cities will not be cut off.
	Conduct vulnerability assessment of wastewater treatment plant to determine need for mitigation of saltwater intrusion or system overload due to sea level rise and storm surges.	Prevents loss of services and pollution to the coastal waters due to discharge of untreated water if treatment plant is overwhelmed.	Protects community from potential health hazard and ensures availability of wastewater treatment services.
Other Cases/Practices	Construct earthquake resistant walkways to the beach which go over the dune vegetation to provide more convenient beach access and multiple quick routes for evacuation to Westport Light.	Allows residents and tourists to evacuate from the beach more quickly.	More convenient access to the beach and built walkways are more easily traveled by those who are elderly or disabled.

7.5. Reference Case(s) and Further Relevant Information

Adopted in 2015, the current version of Olympia's Shoreline Master Program was their first major update since 1994. This seven-year process involved "extensive public participation." An introductory paragraph in the Olympia Shoreline Master Program states the following:

> *"New scientific data and research methods have improved our understanding of shoreline ecological functions and their value in terms of fish and wildlife, water quality and human health. This information also helps us understand how development in these sensitive areas impacts these functions and values. The new Shoreline Guidelines, upon which this SMP is based, reflect this improved understanding and place a priority on protection and restoration of shoreline ecological functions."*

Below outlines the specific ways that Olympia incorporated sea level rise into their Shoreline Master Program:

Box 1. Excerpt from Section 2.4 of Olympia's Shoreline Master Program Document
Box 2. Excerpt from Section 2.9 of Olympia's Shoreline Master Program Document

SMP Section 2: Goals and Policies; 2.4 Shoreline Use and Development Policies:

D. The City should continue to develop information about the impacts of sea level rise on the shoreline and other affected properties; the City should develop plans to address the impacts of sea level rise in collaboration with impacted property owners, the community and the Department of Ecology. These plans should include at minimum flood prevention approaches, shoreline environment impact considerations and financing approaches. The City should amend the Shoreline Master Program and other policy and regulatory tools in the future as necessary to implement these plans.

E. The City should consider the impacts of sea level rise as it plans for the rebuild of Percival Landing and other shoreline improvements and it should be designed to provide for a reasonable amount of sea level rise consistent with the best available science and the life cycle of the improvements.

SMP Section 2: Goals and Policies; 2.9 Marine Recreation Management Policy:

G. The City recognizes that the Marine Recreation shoreline (Reach 5C) and the adjoining Urban Conservancy/Urban Intensity shoreline in Reach 6A provide a variety of benefits to the community including boat moorage, utility transmission, transportation, public access, water enjoyment, recreation, wildlife habitat and opportunities for economic development. These benefits are put at risk by continued shoreline erosion. The City recognizes that there exists a need to develop a detailed plan for shoreline restoration and stabilization for Reaches 5C and 6A and encourages the Port to partner in this effort.

1. This plan may include:

a. Measures to enhance shoreline stabilization through the introduction of bioengineered solutions.

b. Measures to incorporate habitat restoration water-ward of the OHWM. c. Measures to incorporate public access and use through trails, public art, parks and other pedestrian amenities.

d. Measures to incorporate sea level rise protection.

e. Setbacks, building heights and building design considerations.

Specific projections and maps are not included in Olympia's Shoreline Master Program and are instead grouped in with their "Floods" portion of their annex in the Thurston County HMP. They include an explanation of three scenarios as follows:

- A one-foot sea level rise could result in localized flooding on some city streets and low-lying structures during extreme high tides which occur once or twice a year.

- A two-foot sea level rise combined with a high tide would overwhelm some stormwater utility pipes' ability to handle run-off from storm events causing more widespread flooding. Higher sea levels could cause a reverse flow in stormwater drainage systems resulting in sea water flowing out of some street drains onto city streets.
- A three foot-rise would cause seawater to crest over some shoreline segments during extreme high tides and flood a large portion of the downtown. Higher sea levels could further lead to seawater infiltrating wastewater pipes through infiltration and flows into combined storm drains and stress the treatment capacity of the region's LOTT wastewater treatment facility.

The Olympia Annex of the Thurston County HMP goes on to individually list the most vulnerable infrastructure, including roads, railway, bridges and parks. Each item includes an explanation of the specific impact rising waters would have on the structure, the planned measure for mitigation and the estimated cost. The "Flood" category with sea level rise included is listed with high probability, moderate vulnerability, and high-moderate risk.

7.5.1. Section References and Maps

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Thurston County Hazard Mitigation Plan. (2017. Retrieved from https://www.co.thurston.wa.us/em/Plans_Reports/FEMA_HazardsMitigationPlan_June2017_Final.pdf

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WASHINGTON COASTAL HAZARDS RESILIENCE NETWORK. (2018). Retrieved from http://www.wacoastalnetwork.com

City of Kenmore Critical Areas Regulations and Shoreline Master Program Gap Analysis and Recommendations. (2018). Retrieved from http://www.cityofkenmore.com/sites/default/files/Community_Development/Kenmore%20Final%20Gap%20Analysis%208.30.18.pdf

RELATIVE SEA LEVEL PROJECTIONS FOR RCP 8.5 FOR THE COASTAL AREA NEAR: 46.9N, 124.1W (WESTPORT, WA)

Projected average sea level magnitudes, in feet, for different assessed likelihoods and time periods.

	Assessed Probability of Exceedance:									
	99%	95%	90%	83%	50%	17%	10%	5%	1%	0.10%
2010	-0.1	-0.1	-0.1	0	0	0.1	0.1	0.1	0.2	0.2
2020	-0.1	-0.1	0	0	0.1	0.2	0.2	0.2	0.3	0.4
2030	-0.1	-0.1	0	0	0.2	0.3	0.3	0.4	0.5	0.6
2040	-0.2	0	0	0.1	0.3	0.4	0.5	0.6	0.7	1.1
2050	-0.2	0	0.1	0.2	0.4	0.7	0.8	0.9	1.1	1.7
2060	-0.1	0.1	0.2	0.3	0.6	0.9	1	1.2	1.5	2.6
2070	-0.1	0.2	0.3	0.4	0.8	1.2	1.3	1.5	2.1	3.6
2080	-0.1	0.2	0.4	0.6	1	1.5	1.7	2	2.7	5
2090	-0.1	0.3	0.5	0.7	1.2	1.9	2.1	2.4	3.4	6.2
2100	-0.1	0.4	0.6	0.8	1.5	2.3	2.6	3	4.3	7.8
2110	0.1	0.5	0.7	0.9	1.6	2.4	2.8	3.3	4.9	9.2
2120	0.1	0.6	0.8	1.1	1.9	2.9	3.3	3.9	5.9	10.8
2130	0.1	0.6	0.9	1.2	2.1	3.3	3.8	4.5	6.9	13.3
2140	0.1	0.7	1	1.4	2.4	3.7	4.3	5.1	8	15.1
2150	0.1	0.7	1.1	1.5	2.7	4.2	4.9	5.9	9.2	17.6

For more information about these projections go to www.wacoastalnetwork.com/wcrp-documents.html

Figure 22. Sea Level Rise Projections for Westport (Climate Impacts Group)

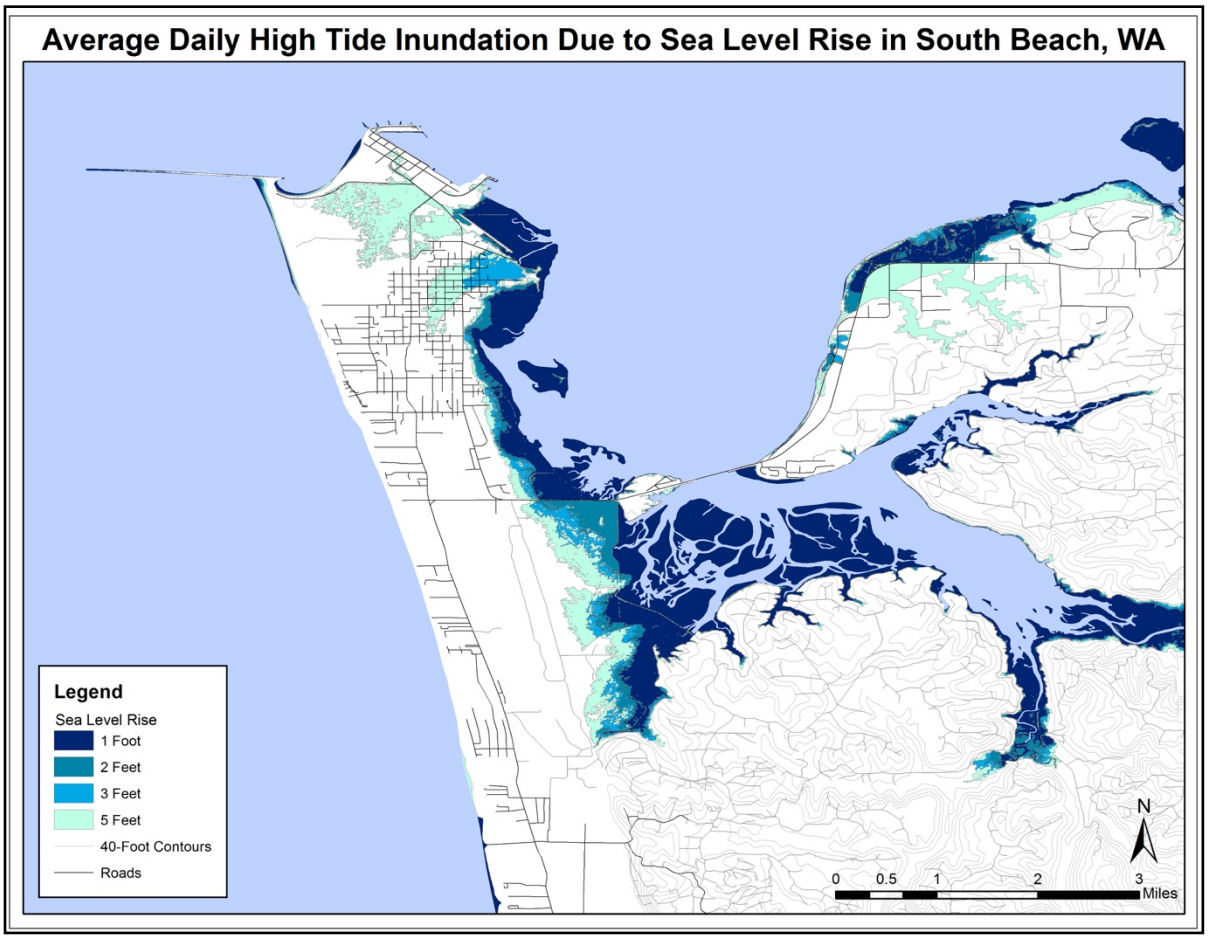

Figure 21. Projected Inundation at Daily High Tide under 1-5 Feet of Sea Level Rise

8. Health and Well-Being Element

8.1. Introduction

Westport has become one of the most hazards-conscious coastal cities in Washington with the highest economic impacts in the county (The Port of Grays Harbor, 2018). However, the community relies only on a few health service providers, and residents often go to hospitals or community health centers outside the city. This convinced our team that Westport should consider the integration of a health and well-being element into the city's future Comprehensive Plan. To improve its resilience toward hazards, particularly tsunamis, the Westport community should strive to expand access to health care, capable of delivering primary emergency aid as well as on-going services to the community effectively.

Community health centers are one focus of this new recommended Element for the Comprehensive Plan Update. Such centers aim to provide multiple health services to a community, particularly those whose members live in poverty and are medically underserved. Having a community health center or clinic that meets the needs of Westport residents and employees will enhance the community's health and well-being, strengthen the City's attractiveness to new residents and workers, and also enhance the City's resilience to uncertain environmental changes and hazards. Given the community's small population and rural and relatively isolated location, however, providing comprehensive health services locally is not feasible. Therefore, this Element also recommends developing a robust telehealth system capable of functioning even in times of transportation and telecommunication systems disruption. Coordination with Grays Harbor County Public Health and Social Services is of course essential for all health-related policies.

8.2. Opportunities for Integration

8.2.1. Health and Well-being as a New Element

To improve the Comprehensive Plan, we recommend Health and Well-being as a new element, particularly after reviewing the post-disaster experience of New Orleans after Hurricane Katrina. New Orleans' Plan for the 21st Century: New Orleans 2030. Although New Orleans is a much larger population center than Westport, its new Master Plan paid particular attention to the viability of small neighborhood-based communities and also emphasized health and well-being. Some potentially useful elements in that plan for consideration by Westport and Grays Harbor County Public Health and Social Services (GHCPHSS):

1. Engage the community clinics and community groups into health and well-being planning
2. Coordinate partnerships between health and human service providers
3. Provide a policy of offering incentives to encourage the community-based health service providers
4. Establish a partnership with health insurance companies to ensure its coverage for all residents, especially for the elderly and low-income communities
5. Develop evaluations and assessment to increase the quality of health services and their delivery

Although health and well-being is not yet included as a chapter of the Comprehensive Plan, the need for this Element has been expressed both in the Grays Harbor County HMP and the Comprehensive Plan. Brief descriptions about health and well-being element can be found in the following sections and pages :

1. In the Grays Harbor County HMP, brief descriptions about health and well-being are located in the *Critical Facilities and Infrastructure Section* on page 3.10 and page 3.14, and the *Community Profile – Defining the Planning Area Section* on page 3.21 and page 3.24
2. In the Comprehensive Plan, the descriptions are located in the *Public and Semi-Public Land Use Section* on page 4.5.

Facilities that accommodate health and well-being include hospitals, clinics, outpatient care centers, and specialized care centers, such as birthing centers and psychiatric care centers (U.S. National Library of Medicine, 2018). Based on our review of the HMP, medical and health facilities in the county are located primarily in the cities of Aberdeen, Elma, Hoquiam and McCleary (Figure 31) (Bridgeview Consulting, LLC., 2018, p. 14). Westport has some health care service providers whose facilities are concentrated in the city center – a physician, pharmacy, optician, dentist, licensed massage practitioner, and alternative medicine provider. For obtaining multiple health services, most of Westport community go to hospital in Aberdeen, which is located about 21 miles from Westport's city center and includes a drive over the State Route 105 bridge.

Table 3-2
Grays Harbor Countywide Critical Facilities

Jurisdiction	Medical and Health	Government Functions	Protective Functions	Schools	Hazmat	Other*	Total
Unincorporated Grays Harbor County	0	6	34	28	24	0	**92**
Aberdeen, City of	3	6	12	27	19	4	**71**
Cosmopolis, City of	0	2	2	1	3	0	**8**
Elma, City of	2	2	2	4	2	0	**12**
Hoquiam	1	6	5	10	9	3	**34**
McCleary	1	1	3	3	1	0	**9**
Montesano	0	9	7	5	4	2	**27**
Oakville	0	1	2	4	0	0	**7**
Ocean Shores	0	1	2	1	2	0	**6**
Westport	0	3	3	0	9	1	**16**
Total	**7**	**37**	**72**	**83**	**73**	**10**	**282**

Figure 23. Number of critical facilities in Grays Harbor County Jurisdictions (Bridgeview Consulting, LLC, 2018)

8.2.2. Identifying the Health and Well-being Element Opportunities for Integration

Table 22 below includes the six hazard mitigation initiatives identified in the Grays Harbor County HMP, as well as opportunities and potential obstacles to integrating these initiatives with health and well-being priorities. The six initiatives of the hazard mitigation strategy became our basis to analyze the opportunities of health and well-being element integration into the Comprehensive Plan. For this new element, we used literature from academic publications and feedback from public engagement to analyze the opportunities for integrating health and well-being considerations.

Table 20. Aligning Hazard Mitigation Initiatives and the Proposed Health and Well-Being Element

Hazard Mitigation Initiative	Opportunities for Alignment with Health and Well-being Development	Conflicts with or Obstacles to Alignment with Health and Well-being Development Goals
Vertical Tsunami Evacuation Structure	• Establishing vertical building structures integrating living wall or garden design can enhance physiological, environmental, and aesthetic benefits that contribute to health (Pérez-Urrestarazu, Fernández-Cañero, Franco-Salas, & Egea, Vertical Greening Systems and Sustainable Cities, 2016, pp. 7-8). In Westport, vertical tsunami evacuation structure with living wall can encourage positive feelings that increase health, enhance people's pride, promote social interaction, provide space for community garden's creativity and movement, increase seacoast biodiversity and environmental quality, and provide alternative foods supplies for resilience in Westport. • Including medical clinic space with telehealth capacity in a multistory building built also as a tsunami evacuation center. Such space could be integrated with any new ambulance and fire department or other critical facility of priority to the city, with capacity to respond to a major disaster and support recovery of people who shelter there or nearby.	• Feasibility study needed to assess green vertical evacuation center installation and sustainability. • City inventory of vegetation is required for green vertical planning. • High cost associated with green infrastructure
Public Outreach Program	• Improving the broadband connection quality and networks to support a telehealth system can ensure access to healthcare, reduce cost of care, enhance quality of care health programs to reach community (Cho, Mathiassen, & Gallivan, 2008, pp. 1-2), and allow hazards warning notification and primary emergency care particularly for people living in remote areas. • Improving the health and well-being program outreach for elderly in Westport by adopting door-to-door outreach can ensure that the elderly obtain health care services information, develop social interaction with social workers, and obtain complete information related to resilience (FEMA, 2014, p. 1).	• Networking with telecommunication service providers can be challenging. • Elderly and other populations less familiar with technology may require social workers or volunteers for outreach programs.
Emergency Management Plans	• Developing integrated care that responds to the unique needs of diverse medically underserved areas and populations in Westport can improve the health service delivery to geographically and culturally isolated communities (minorities), strengthen neighborhood's social bond and pride, and allow the delivery of multiple medical cares to community during and after hazards (Jackson & Gracia, 2014, p. 58). • Developing healthcare systems that meet population's drivers and needs in Westport through Community Health Needs Assessment can help the city to address population health by prioritizing the most vital needs of the community, and help the city to allocate resources in time of needs or hazards (The Center for Health Design, 20I6, p. 4; Centers for Disease Control and Prevention, 2015, pp. 1-4).	• Developing healthcare center requires designers and facility planners. • Encouraging community-based health service providers may need incentives, government's supports related to infrastructures, community-based planning, and

Hazard Mitigation Initiative	Opportunities for Alignment with Health and Well-being Development	Conflicts with or Obstacles to Alignment with Health and Well-being Development Goals
	• Building health service networks and collaborations between health service providers in Westport (e.g. physician, optician, dentist, alternative healers, pharmacies, drug stores), and those outside the city, such as medical and Indian tribal wellness centers in Shoalwater Bay and Tokeland, hospitals in Aberdeen, Olympia, Shoalwater Bay, can promote consortium of health services across all communities, strengthening socio-cultural relationships between cities, increasing high-quality health services for all community and improving coordination in health services delivery during hazards and resilience of wide-scale regions toward hazards (Tasmanian Government, 2018). • Improving the local food pantries by engaging foods producers and stakeholders in Westport: seafood producers, oyster producers, community gardens, and others, to promote food resilience in the face of hazards (Food and Agriculture Organization, IFAD, & World Food Programme, 2015, pp. 2-3; Green & Cornell, Regional Market Analysis of Food Security and Regional Resilience: Whole Community Preparedness through Local Food Production and Distribution in Washington State, 2014, pp. 45-46; Hodgson, 2012).	professionals in health service and have cultural competency. • City's demographic data, categorization of vulnerable groups of people and their population distributions need to be updated. • Cross-regional agency, provide, and insurance coordination for health services networks is complex.
Emergency Communication Plans	• Creating a voluntary database with a web form can help to identify individuals who require primary health assistance in time of hazards. This requires eligible individual or community to voluntarily assist vulnerable individuals/ communities. For Westport, it can help to update its demographic database, decide prioritization for emergency aid, and allocate resources efficiently before, during, and after hazards. For the community, it can strengthen the social bonds based on trust among peers (Centers for Disease Control and Prevention, 2015, p. 6).	• City's demographic data, categorization of vulnerable people, and distributions of high-risk people especially homeless, need to be updated.
Critical Facilities Evaluation	• Establishing a community health evaluation and assessment tool can help policy makers to effectively identify, plan, and implement needed policy, systems, and environmental changes, monitor changes over time, recognize the needs of community in terms of health improvement, and increase the quality of health services in Westport. This tool will help the Westport community to obtain updated health services due to environmental changes and increase resilience to hazards (Community Health Assessment and Group, 2010, p. 1).	• Infrastructure and human resources for running the evaluation tool as periodic activity need to be prepared.
Transportation and Rights of Ways Improvements	• Improving the safety level of the route connecting health care providers in Westport to residential, marina district, critical facilities (fire department, police department), and other areas, improve evacuation during hazards (Weerasinghe, Hokugo, & Ikenouchi, 2011, p. 169). • Integrating pedestrian friendly design into Westport's streets system connecting health care service providers, food resources and other areas can enhance social interaction, positive feelings, and health. (Ewing, 1999, p. 2; Braun & Read, 2015, p. 6).	• Requires extensive assessment of city's street system and infrastructure quality. • Funding and expertise for on-going assessment process is challenging.

8.3. Community Input

8.3.1. Workshops

The Westport community has provided our team with valuable information to help develop our recommendations for the Comprehensive Plan. The community identified important values and assets and suggested inspiring ideas to withstand specific types of hazards. Described below are the themes of community input that we identified relevant to this element in relation to the city's social, built, and natural assets, and community's hazards mitigation strategies.

- **Social Assets:** The Westport community has social assets that include community clinics, community gardens, seafood processing workers, oyster farmers, commercial and recreational crabbers, and people who are generally hardworking, self-sufficient, resourceful, and outdoor survivalists, with strong social bonds, and support from local and regional public agencies.
- **Natural Assets:** Westport community has an abundant amount of healthy foods mainly provided by the ocean.
- **Built Assets:** Westport community has affordable housing.

In addition, the Westport community provided us ideas about how they would adapt to environmental changes particularly sea level rise and tsunamis:

- Update land use zoning due to climate changes/hazards to protect oyster habitats
- Support people's reliance on local clinics and hospital located in Aberdeen
- Improve public access to fresh foods provided by oceans
- Protect critical infrastructures from hazards, including the fire department, water and electrical services

8.3.2. Field and Literature Studies

Westport's Assets and Vulnerabilities

Based on the UW team's observations and discussions with Westport's local government, and workshops in November 2018, we identified professionals in health and human services who have serve the community. Table 23 shows the city's health care services providers in Westport and those in Grays Harbor County.

Table 21. Types of Healthcare and Social Services Providers in the City of Westport in 2018

Group	Services
The Beach Clinic	Physician, family medicine
South Beach Vision Clinic	Optician
South Beach Dental Clinic	Dentist
Massage therapy	Licensed massage practitioner
Star Song Healing	Alternative medicine
Veterans of Foreign Wars Post 2057	Veterans, seniors, community space
Twin Harbor Drug	Medicines, health supplies and prescriptions

Interviews with some of these providers and local residents suggests that the Westport community, whose population in 2017 was about 2,115 people (Bridgeview Consulting, LLC., 2018), needs a broader range of types of health services inside the city limits. To obtain multiple health services, the Westport community goes to health care facilities in Shoalwater Bay and Tokeland, or to hospitals in Olympia, Elma, and Aberdeen. In the time of hazards, this condition reflects a disadvantage in which Westport community cannot obtain adequate emergency care from the available health care service providers in the city. Travelling on land after hazards to reach hospitals outside Westport, could also increase the risks. Westport can improve its resilience to hazards by evaluating its environmental capacity to withstand the worst hazards and establish critical facilities, including a community health care center and/or increased telehealth capacity.

Westport may also have a disproportionate share of vulnerable residents with limited resources to evacuate, stockpile food, store medications, and shelter in place (Bridgeview Consulting, LLC., 2018, p. 27). The median age is about 44 years old, older than the median age of the county and state population. The poverty rate is estimated at 23.5%, with household median income only 53% of the state's (Deloitte, Macro Media, & Datawheel 2018). Mobile homes, trailers and other non-standard housing units account for 10% of all housing units in Westport, but interviews suggest the share of the population living in such units may exceed 27% (State of Washington Office of Financial Management Forecasting & Research Division, 2019, Table 8, p.31). Most such units are concentrated in RV parks in low-elevation locations. Vulnerable populations have limited access to media of communication and knowledge of evacuation routes. Obtaining information on the number and distribution of homeless or transient residents, seasonal workers, and other vulnerable members of the community is challenging, but effective hazard mitigation and emergency preparedness plans must account for these populations.

Community Input for the Health and Well-Being Element

The strategies listed in Table 24 are based on what we learned from community of Westport, field studies, the class studio, and literature studies. The community input was gathered from our workshops in November 2018, final presentation, and open house in December 2018, discussions, while the other findings came from our site visits and additional research.

Table 22. Community Input Related to Health and Well-Being

Strategy Theme	Strategy Examples
Improving access to high-quality health services	• Promote telehealth technology to improve health service delivery especially for elderly, disabled and others facing mobility challenges.
Building networking and social capital in health development	• Establish collaborations between health service providers in Westport with those in Aberdeen, Olympia, and Shoalwater Bay to promote a consortium of health services for all communities, strengthen socio-cultural relationships between cities, and improve resilience of wide-scale regions to withstand disaster • Promote networks with Shoalwater Bay and Tokeland communities in health services, including the Indian Tribe's health services providers to improve coordination during hazards in wide-scale regions, knowledge and lesson learned towards disaster mitigation, social-cultural bond between cities, local knowledge of Tribe's medical and health services • Encourage long-term partnerships between health service providers in the city, employers/business owners, and health insurance companies to ensure affordable and high-quality health services for elderly, low income people, minorities and children

Strategy Theme	Strategy Examples
Engaging the community in comprehensive health and well-being planning	● Provide support for the current health service providers (physician, optician, dentist, licensed massage practitioner, alternative medicine) in Westport to enhance their health services to the community ● Provide opportunities for local people to help with outreach regarding the health programs especially to elderly residents through door-to-door outreach ● Improve the community's involvement in actively updating their information for the city's demographic database to enable resilience planning; updating vulnerable groups of people and categorizations, and prioritizing/allocating resources.
Improving access to fresh and healthy foods	● Increase opportunities for public events especially food festivals, farmers markets, fishing groups to take place in the city center to increase public awareness and appreciation of natural resources ● Increase community awareness of the city's natural resources through cultural/sport events: hunting games, fishing games, or tourism of community gardens, organic farms, seafood processing, oyster beds, crabs, cranberry, mushrooms, to build food resilience
	● Update Shoreline Master Program to protect shellfish habitats and farms from uncertain environmental changes especially hazards
Securing critical facilities and lifeline system	● Relocate community health service providers to high ground area in Westport to ensure health services availability for Westport community before and after hazards ● Relocate critical facilities such as Emergency Medical Services and the fire department to high ground areas within the city limit to cope with sea level rise and liquefaction risk ● Consider establish critical facilities (e.g., Emergency Medical Services, fire department) on high ground areas in vacant land outside the city to cope with tsunami risks ● Evaluate and strengthen the bridge structures connecting cities of Westport and Aberdeen to improve public safety and accessibility ● Secure lifeline facilities: water, electricity, radio telecommunication
Improving the environmental quality to support physical and mental health	● Encourage walking experience and outdoor activities to improve health and well-being, by improving Westport's trail connectivity to the city's important assets: the Marina District, marina seafood, viewing tower, light house, Westport's City parks, and other city's assets, and maintaining the rural characteristics and low traffic-streets ● Improve pedestrian friendly design of the street system, connecting the city's public facilities, especially for elderly (e.g., crosswalks around city's main facilities including Ocosta school)

8.4. Recommendations

The following recommendation for the proposed Health and Well-Being Element of the Comprehensive Plan are based on synthesis of the community's input received during workshops in November 2018, field surveys, discussions, and best practices identified from New Orleans' comprehensive plan. Table 25 presents these recommendations, which are further discussed below.

Table 23. Recommendations for the Proposed Health and Well-Being Element

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community Related to Health and Well-Being Values
Grays Harbor County HMP	Establish vertical tsunami evacuation structures that integrate living wall or roof garden design	Providing alternative foods supplies for resilience	Enhancing positive feelings that increase health, pride, social interaction, biodiversity and environmental quality
	Improve the broadband connection quality and networks to support telehealth	Allowing primary emergency care delivery to reach the isolated and high priority communities	Allowing people-centered health services to reach more isolated and mobility-challenged populations.
	Improve the health and well-being program outreach for elderly through door-to-door outreach	Allowing the elderly to obtain complete information related to improving resilience	Ensuring the elderly to obtain health care services information and develop social interaction with social workers
	Develop integrated care that respond to the unique needs of diverse medically underserved areas and populations in Westport	Allowing the delivery of multiple medical cares to community during and after hazards	Improving the health service delivery to geographically and culturally isolated communities (minorities), neighborhood's social bond and pride
	Develop healthcare systems that meet population's drivers and needs in Westport through Community Health Needs Assessment	Allowing the allocation of resources in the time of hazards	Allow the city of Westport to address population health by prioritizing the most vital needs of the community
	Improve health services and medical care assistance for elderly by promoting affordable housing for elderly with close proximity to the health service providers and involving local's competent workforces	Allowing the delivery of emergency medical cares to elderly during and after hazards	Promoting health, life quality, positive feelings for social interaction
	Build health service networks and collaborations between health service providers	Providing multiple types of primary emergency cares and support recovery	Providing a comprehensive, high-quality and variety of health services
	Encourage partnership between community health center, health service providers, employers, and health insurance companies with supports from the city to state level governments	Ensuring the delivery of affordable and high-quality emergency aids for these groups after hazards	Ensuring the delivery of affordable and high-quality health services especially to low income community, homeless and elderly, improve their positive feelings, and health
	Improve the local's food pantries throughout Westport by engaging the community gardens, seafood, oyster producers, and other food stakeholders	Improving Westport's food resilience in the face of hazards	Reducing malnutrition and hunger for people living in extreme poverty, increasing community's well-being, social bond, and sense of community

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community Related to Health and Well-Being Values
	Improve volunteer database with a web form	• Creating prioritization plan for emergency responses • Improving capability to allocate resources efficiently before, during, and after hazards	• Improving city's demographic database with updated information • Strengthening social bonds based on trust
	Establish community health evaluation and assessment tool	This tool will help the Westport community to obtain updated health services due to environmental changes and increase resilience towards hazards	Improving opportunities to effectively identify, plan, and implement needed policy, systems and environmental changes, monitor changes over time, recognize the community's needs in health and increase the quality health services in Westport
	Integrate pedestrian friendly design into Westport's streets system connecting health care service providers, food resources, and other areas	Supporting evacuation process during hazards	• Enhancing social interaction • Promoting positive feelings and physical activity
	Integrate health services facility with new tsunami vertical evacuation structure on high ground	• Provides safer location for critical medical facilities • Expedite recovery process for its capacity of providing shelter for a large number of people, including medical and lifeline supports.	Upgrades delivery of health services to community
Community Input	Promote telehealth for health service delivery in Westport	Provides emergency remote medical assistance channel, e.g. triage (assuming telecommunications tech is adequately robust)	Improving health service delivery especially for elderly and disabled
	Integrate official hazards warning system to surfers' website forum	Provides hazards warnings to surfers and other tourists on Westport's coastal areas	N/A
	Integrate emergency medical services website to surfers' website forum	Ensuring an effective allocation of first aid/emergency medical services to surfers and other tourists on Westport's coastal areas	Improving self-esteem and trust to authority for having protection and access ton Westport's emergency medical services
	Establish collaborations between health service providers in Westport with those in Aberdeen, Olympia, and Shoalwater Bay	• Improving emergency services care and programs • Improving coordination to withstand hazards regionally	Promoting a consortium in health services, health services programs, and high-quality service delivery to communities

Strategies	Hazard Mitigation Benefits	Co-benefits for Community Related to Health and Well-Being Values
Improve networks with Shoalwater Bay and Tokeland communities in health services, including the Tribal health services providers	Improving regional coordination during hazards to withstand hazards, and share knowledge and lesson learned regarding disaster mitigation	Improving social-cultural bond between cities, local knowledge of Tribe's medical and health services
Encourage long-term partnerships between health service providers in the city, employers/business owners, and health insurance companies	Ensuring emergency medical services delivery during and after hazards	Ensuring affordable and high-quality health services especially for elderly, low income people, minorities, children
Provide support for the current health service providers (physician, optician, dentist, licensed massage practitioner, alternative medicine) in Westport	Improving emergency medical services delivery during and after hazards to the community	Improving the delivery of high-quality health services to the community
Improve the community's involvement in updating their detailed information for city's demographic database	• Improving resilience planning by categorizing people based on vulnerability • Allowing resources allocation based on vulnerability	Improving city's demographic database and updates
Increase opportunities for public events especially food festivals, farmers markets, fishing groups to take place in the city center	Improving social capital to withstand disasters	Increasing community's familiarity and appreciation to local natural resources for healthy foods
Relocate critical facilities and community health service providers to high ground area	Protecting community health service providers to provide assistance and medical aid for the community during hazards, trauma after hazards and expedite recovery process	Ensuring health services availability for the community's well-being
Integrate affordable multi-unit elder housing with new tsunami vertical evacuation structure on high ground	• Provides safer location for elder housing • Improving communications and accessibility to elder residents in time of emergency	Promoting social interactions, well-being and age-appropriate dwelling in Westport
Encourage walking experience and outdoor activities by improving Westport's trail, natural route/ways across the forests, urban areas, parks, beaches, Marina District, and other city's natural assets and maintaining the rural characteristics and low-traffic streets	Improving familiarity to neighborhood and city's environment that will support evacuation	Improving community's health, promoting social interaction, increasing pride, positive feelings, reducing stress, and encouraging aging in the city

	Strategies	Hazard Mitigation Benefits	Co-benefits for Community Related to Health and Well-Being Values
	Integrate pedestrian friendly design into the city's street system connecting city's public facilities especially for elderly	Providing supports for evacuation especially of elderly	Ensuring safety for pedestrians especially for elderly, enhancing walking experience and positive feelings
Best Practice: New Orleans Case Study	Coordinate partnerships between health and human service providers and owners/tenants of publicly-accessible facilities to provide for the location of multiple health and human service providers in shared locations	Improving coordination to deliver health services	Strengthen social bond between the health service providers, build trust in peers
	Support and promote ongoing initiatives to convene a citywide health care consortium and a citywide human services consortium	Improve the quality of emergency services for community	Build trust in peers, improve health services through advanced programs
	Support and enhance efforts to increase health insurance coverage for all residents	Ensure access to emergency cares in time of hazards for low income people	Improve trust in authority, self-esteem, positive feelings, health
	Expand mental health and addiction-care services and facilities to meet current and projected need	Improve patient's recovery before and after hazards	Improve health services quality related to mental health
	Review need for and effective use of hospital facilities and emergency health care services and infrastructure according to data on projected population and need	Improve the facilities' capacity to accommodate emergency cares during and after hazards	Improve the facilities' capacity and capability to accommodate the current needs
	Promote business development for farmers and processors of locally grown food, and establish fresh produce retail outlets within walking distance of all residents	Improve food resilience by encouraging more food pantries and promote familiarity with location and content of foods storage for emergencies	Promote health and positive feelings
	Provide affordable paratransit service for seniors	Improve the quality of emergency services for elderly during and after hazards	Improve positive feelings and trust in community through social interactions, trust in authority

8.5. Reference Cases and Further Relevant Information

8.5.1 Cases Relevant to the Health and Well-Being Element

The Fundamentals of Community Health Centers

Community health centers and associated community clinics aim to provide health and social services to people living in poverty and medically underserved communities. This type of health center is developed based on community empowerment philosophy, and usually funded by the federal government (Taylor, 2004).

Integral Green Buildings and Vertical Farms: New Urban Perspectives

Westport's aquifer-based water supply is limited, and yet its annual rainfall is a relatively untapped but potentially rich resource. There is a broad range of direct and indirect benefits to implementing rainwater catchment and vertical farms in buildings, including in tsunami vertical evacuation structures. Figure 38 depicts a modern conception of what a fully-integrated green building could be. This green construction would include green roofs, indoor and outdoor living walls, advanced monitoring systems, rainwater collectors, and wastewater treatment plants to reclaim greywater and reuse it for irrigation and food production (Pérez-Urrestarazu, Fernández-Cañero, Franco-Salas, & Egea, Vertical Greening Systems and Sustainable Cities, 2016, p. 14).

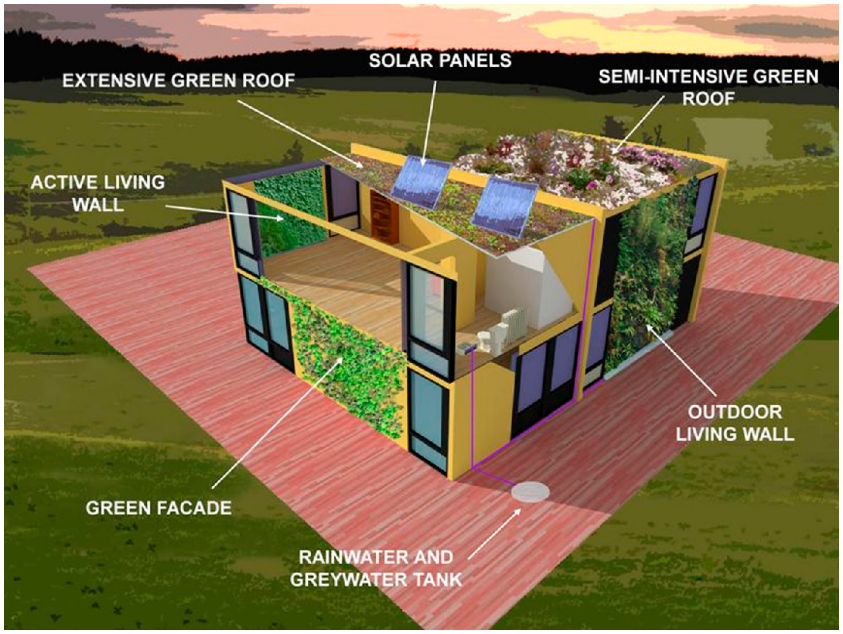

Figure 24. Concept of a green building

Strategies for Identifying At-Risk Groups

Use of Registries

A registry is "a voluntary database of individuals who meet the eligibility requirements for receiving additional emergency response services based on specific needs." Using a registry, you will be able to

identify people who require assistance before, during, or after an emergency. In addition, you will also know the specific form of help these individuals need.

Community Assessments for Public Health Emergency Response (CASPER)
CASPER is a public health tool used to gather information from households within a community. This effective epidemiologic method can be designed to provide planners and responders, such as emergency managers, with household-based information quickly and at low cost.
http://emergency.cdc.gov/disasters/surveillance/pdf/CASPER_Toolkit_Version_2_0_508_Compliant.pdf

Planning for Food Access and Community-Based Food Systems

The American Planning Association published a study of the experiences of 25 local governments in food systems planning (Hodgson, 2012). Food systems have increasingly become an integral part of comprehensive planning as well as emergency preparedness planning. Below are just a couple elements from the case of Minneapolis that may be considered by the City of Westport.

Food Asset Mapping
As part of the Homegrown Minneapolis project, the City of Minneapolis conducted a food asset assessment and created a food system asset map to identify the number and locations of food assets throughout the community, including: fresh food outlets, grocery stores, healthy corner stores carrying fresh fruits and vegetables, farmers markets (mini-markets, municipal markets, public markets), food producing community gardens, community kitchens, wholesale food businesses, mobile food vendors, food pantries, CSA drop-off locations, food co-ops, soup kitchens, and meal delivery programs. In addition to these food assets, the City of Minneapolis also mapped grocery store location, poverty concentration, and bus network data to identify inequities across the system (Minneapolis, MN, Homegrown Minneapolis, 2011).

Equal Access to Healthy Food Sources Analysis
As part of the City of Minneapolis' Urban Agriculture Policy Plan, the City conducted an analysis of geographic proximity and transportation access to healthy food sources (farmers' markets, existing community gardens, and full-service grocery stores) by mapping the location of healthy food sources and other socio-demographic, land use, transportation, and health data, including: population density, population change, location of public transportation network; poverty concentration; concentration of people of color; obesity; and car ownership (Minneapolis, MN, Urban Agriculture Policy Plan, Chapter 4: Issues and Opportunities, page 40-47).

Community Planning for Foods Resilience

Lesson 1. Food Life Line
Food Life Line is an independent non-profit corporation that works with the food industry and its surpluses to redirect food goods from manufacturers, farmers, grocery stores and restaurants that might otherwise go to waste

Lesson 2. Food Pantries

Grays Harbor County is reported to have 16 food pantries (Figure 43), (places where food is regularly distributed to food insecure households.) The report, further explained that towns and cities in this county each have at least one pantry, with Aberdeen and Elma having multiple pantries. However, rural areas not on Routes 101 and 12, including Westport, may have limited access to these pantries due to long travel distances, isolated conditions, especially given damage risks to bridges and roads in major earthquakes or landslides (Green & Cornell, Regional Market Analysis of Food Security and Regional Resilience: Whole Community Preparedness through Local Food Production and Distribution in Washington State , 2014, hal. 30-33).

Figure 25. Food pantries and distribution centers in Grays Harbor County

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