

Thurston County Board Briefing

<u>Briefing Date/Time:</u>	October 30, 2023 9:00 – 11:00 AM
<u>Office/Department & Staff Contact:</u>	<p>Community Planning & Economic Development</p> <p>Andrew Deffobis, Senior Planner, ext. 5467</p> <p>Ashley Arai, Community Planning Manager, ext. 5476</p> <p>Joshua Cummings, Director, ext. 4995</p>
<u>Topic:</u>	SMP Public Hearing Follow-up #7
<u>Purpose:</u> (check all that apply)	<div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Information only <input checked="" type="checkbox"/> Decision needed <input type="checkbox"/> Follow up from previous briefing </div> <div style="text-align: right;"> Optimal Time Frame for Decision is: (dd/mm/yyyy) </div> </div>
<u>Synopsis/Request/Recommendation:</u>	
<p>This briefing is a follow-up to the Board of County Commissioners' (Board) May 2023 public hearing on the Shoreline Master Program (SMP) update. It is an opportunity for the Board to discuss public comments received. Staff will present information to facilitate Board discussion and decisions on elements of the draft SMP. This briefing is the latest in a series of briefings on this topic, including May 24, June 14, July 26, August 30, September 25, and October 16, 2023 Board briefings.</p>	
<u>Background</u>	
<p>The following topics will be explored during the October 30, 2023 briefing.</p> <p><u>Assessment of Matrix Items Which Received Public Comment</u></p> <p>The Board directed staff to include items from the February 2023 SMP decision matrix in the Board's public hearing draft in order to facilitate public comment on these items. These items were intended to ensure consistency with state requirements, increase clarity and internal consistency, reduce redundancy, aid implementation, increase flexibility for landowners, or enhance protections for shoreline resources.</p> <p>The Board provided guidance on several decision matrix items during their October 16, 2023 briefing. At the October 30 briefing, the Board will review the remaining 16 decision matrix items that received some level of public comment. Some comments were substantive, and some expressed support for either the Planning Commission recommendation or for the included changes, depending on the issue. Additionally, the Board received several comments which expressed support of the Planning Commission's recommendation in general, which did not include any items from the decision matrix. An updated version of the decision matrix is included in this briefing as Attachment A.</p>	

The following table lists the 16 decision matrix items which received public comments, the number of comments addressing each item, which public comments addressed each item, and a summary of the comment. The full text of each comment listed here is attached to this briefing as Attachment B.

Decision Matrix Item # (# of comments received)	Public Comment Ref. #	Summary of Comment
6 - References to critical areas within the SMP (2 comments received)	63	“Prefer having specifics in the SMP as directed by the CAO”
	74	Futurewise suggests an edit to draft section 19.100.110 that is related to this matrix item: “Although Washington’s shorelines may contain critical areas, the shorelines themselves are not critical areas by default as <u>unless they meet the definitions in the defined by GMA.</u> ”
7 – Allowing bulkheads for eutrophic lakes (2 comments received)	31	I agree with designation of eutrophic lakes being different.
	63	There are heavy pressures on our shorelines from large waves caused by the new wake boats and by climate change. Not trying to slow down the eutrophication of our lakes is like saying you shouldn’t get bypass surgery for your heart or have Chemo therapy for cancer. Aging and illness is a natural process.
12 - Referencing WAC substantial development permit exemption criteria in Existing Structures regulations (1 comment received)	63	[Supports language in public hearing draft]
14 - Locating structures on constrained lots to prevent need for shoreline stabilization (1 comment received)	63	[Supports language in public hearing draft]
15 - Monitoring requirements for advanced mitigation projects (1 comment received)	63	[Supports language in public hearing draft]
16 - Addressing critical areas in SMP jurisdiction (2 comments received)	55	Comment quotes the Planning Commission minority report. SMP should assure critical areas in shoreline jurisdiction are protected in manner consistent w/CAO & GMA.
	63	[Supports language in public hearing draft]
17 - Shoreline buffer reductions - general proposed changes (2 comments received)	63	Use Planning Commission recommendation.
	118	I encourage you not to reduce the current buffers and not to allow non-essential buffer reductions with unachievable mitigation requirements.
20 - Characterization of shoreline setback (1 comment received)	63	If you remove the statement that the setback is no longer needed after construction except for maintenance essentially says the buffer is 15 ft. wider than stated in the document. Keep the Planning Commission’s wording.

Decision Matrix Item # (# of comments received)	Public Comment Ref. #	Summary of Comment
22 - Providing mitigation sequence context to allowance for decks/platforms in buffers (2 comments received)	44	Concerned with short notice change/does not support minimizing the size of decks and viewing platforms.
	63	Use the Planning Commission recommendation. Properly designed decks and platforms function much like grass in the buffer.
24 - Waiver of public access requirements (2 comments received)	31	I agree with PC. How is spending more money for public access ever ecologically prosperous? This seems an overstep via Ecology as this would entail construction inside buffers.
	63	Use Planning Commission recommendation
25 - Use of "E" for projects that are exempt from SDP requirement (1 comment received)	63	You should at least make an attempt to make it easy for the public to understand. Maintain the PC recommendation (i.e. call projects Exempt in permit table if they may be exempt from a Substantial Development Permit).
26 - Permit standards for dredge disposal (1 comment received)	63	[Supports language in public hearing draft]
38 - Inserting a preamble for nonconforming uses (1 comment received)	63	Use PC recommendation (i.e. call all existing structures 'conforming').
48 - Requiring pervious surface for viewing platforms and decks (2 comments received)	5	We should not allow impervious surfaces near shoreline.
	63	Wood or composite decks are pervious if designed properly as stated earlier in the SMP. The use of the word pervious in the section may be confusing.
59 - Permit standards for shoreline stabilization - Aquatic SED (1 comment received)	63	There is no need for a Hearing Examiner when shoreline stabilization is under consideration an ADMIN CUP is adequate oversight. Hearing Examiners add time and cost to the process without benefit.
67 - Use of non-native vegetation in replanting requirements (3 comments received)	24	Non-native vegetation does not necessarily perform the same ecological functions as native vegetation. The Draft SMP should be revised to disallow substitutions for native vegetation in plantings for mitigation.
	55	Vegetation requirements should be for mitigation purposes should be native vegetation; the non-native vegetation allowance in the Planning Commission recommendations should be removed.
	95	Vegetation requirements should be for mitigation purposes should be native vegetation; the non-native vegetation allowance in the Planning Commission recommendations should be removed.

Additional Items From Review of Public Comments

The Board requested review of one additional substantive item in an earlier briefing. This pertains to how the draft SMP includes frequently flooded areas in shoreline jurisdiction. Currently, the draft SMP extends shoreline jurisdiction to all critical areas wholly or partially located within base shoreline jurisdiction. This includes frequently flooded areas, and specifically, the flood of record—the extent of the highest known flood elevation. The intent in bringing critical areas—including the flood of

record—into shoreline jurisdiction is to promote predictability and efficiency in local permit review by having these areas subject to only one permit system (the SMP).

One commenter expressed concern about the amount of additional area that would be brought into shoreline jurisdiction, and that many areas in the flood of record are far away from the regulated water body. They are also concerned about the additional regulations that come along with the SMP. Public comments on this item are attached to this briefing as Attachment C.

The public comments raise a decision point for the Board: whether to retain frequently flooded areas within SMP jurisdiction.

Board Review of Public Comments

At the October 30 briefing, the Board should direct staff on any additional public comments they would like to specifically address. Public comments were initially provided to the Board at the conclusion of the SMP public comment period in May 2023. The full text of public comments submitted during this comment period may be viewed by visiting www.ThurstonSMP.org and clicking on ‘Public Participation...’ from the main list of links on that page.

Documents Attached:

- Attachment A: Updated BOCC SMP Decision Matrix
- Attachment B: Public Comments Directly Addressing Remaining BOCC Decision Matrix Items
- Attachment C: Public Comments Regarding Frequently Flooded Areas & Shoreline Jurisdiction

Summary & Financial Impact:

The Board has received public comments on several topic areas of the SMP update. The Board will provide guidance to staff for preparation of the final SMP draft.

Affected Parties:

County residents and businesses, CPED, Public Works

Decision Points:

1. Whether to retain changes reflected in Board’s SMP public hearing draft which received public comment:

Considerations:

- The Board directed staff to incorporate changes identified in the February 2023 SMP decision matrix to allow public comment.
- Proposed changes increase consistency of the draft SMP with state law, and improve internal consistency, clarity, implementation. Some specific changes increase flexibility for landowners or enhance protection of shoreline resources.
- Decision matrix items addressed in this briefing each received at least one specific public comment.
- Many residents expressed support for the Planning Commission recommendation as a whole.

2. Whether to include the flood of record within shoreline jurisdiction.

Considerations:

- The draft SMP includes in shoreline jurisdiction all critical areas which are wholly/partially located in shoreline jurisdiction, including the flood of record. This increases the area subject to the SMP.
- Critical Areas protections and other County flood regulations apply in these areas regardless of their inclusion in shoreline jurisdiction.
- Ecology has raised question about applying the SMP (which regulates shorelines and water-dependent uses) to areas that are located far from the actual shoreline.
- Increasing shoreline jurisdiction expands the area in which Ecology will have decision making authority over County permit applicants.
- Increasing shoreline jurisdiction expands the area in which the County will need to demonstrate no net loss of ecological function.

3. Whether to make any additional changes based on the Board's review of public comments.

Considerations:

- The Board should provide guidance to staff on specific changes that may be warranted based on the Board's review of public comments.

Board Direction:

Prepare information and brief the Board on several topics in the SMP update.

Next Steps/Timeframe:

There are several Board briefings scheduled for the remainder of the year. Here is summary of key dates in the SMP update effort:

- November 20, 2023 briefing: Complete Review of Substantive Comments
- December 4, 2023 briefing: Remaining Wrap-up Topics
- December 11, 2023 briefing: [Optional for Any Remaining Topics]
- December 12, 2023 Board meeting: Board Opportunity to Consider Local Adoption of SMP

Attachment A

Thurston County SMP Update - BOCC Decision Matrix (10/30/23 Briefing) - Greyed Out Items Represent BOCC-Completed Items						
	Topic	Reference location	PC approved recommendation	Ecology relayed position	BoCC Decision (Maintain, Delete, Modify)	Board Thumbs Up
1	Shoreline buffer widths	19.400.120 (in general)	Lake and Marine 50 ft Shoreline Residential 100 ft Urban Conservancy 125 ft Rural Conservancy 200 ft Natural Streams 250 ft (all designations)	This buffer scheme is within the realm of justifiable with revisions to ensure the “minimum necessary” approach and generally requiring a variance for buffer reduction, depending on what you see as you develop the Cumulative Impacts Analysis. WDFW advocated for retaining larger buffers from previous drafts of the SMP.	1. Retain buffers in PC recommendation. 2. Restore larger buffers from earlier drafts: Lake and Marine 75/85 ft Shoreline Residential 125/250 ft Urban Conservancy 150/250 ft Rural Conservancy 250 ft Natural Streams 250 ft (all designations) 3. Propose alternative buffer widths.	2 to 1
2	Shoreline modification allowances in Natural Shoreline Environment Designations - Docks, floats, buoys, beach stairs	19.400.120(D), 19.600.105, 19.600.160	<u>Allow following in Natural SED with CUP:</u> Beach stairs Single Use Docks (marine) <u>Allow in Natural SED with SDP/AdSDP:</u> Floats Buoys Single Use Docks (lakes)	Allowing new docks is inconsistent with the purpose and management policies of the Natural environment (WAC 173-26-211(5)(a)). Recommend prohibiting them (allow joint use docks with CUP). Ecology recommends prohibiting beach stairs in Natural SED (Allow with CUP if demonstrated to be necessary to provide access to a permitted moorage facility.) WDFW suggests that dock restrictions remain on Natural shoreline designation to protect sensitive marine embayments, pocket estuaries, salt marsh, and lake fringe wetland habitats.	1. Retain permit requirements proposed in draft SMP. 2. Change permit requirements for shoreline modifications in the Natural SED: --Prohibit single use docks in Natural SED (allow joint-use docks with CUP). --Prohibit beach stairs in Natural SED (allow for access to permitted moorage facility with a CUP). --Prohibit floats and buoys in Natural SED of lakes.	2 to 1
3	Dimensional standards for mooring structures	19.600.160(C)(3)	Remove specific development standards for mooring structures (such as docks, piers, buoys) and reference WDFW Hydraulic Project Approval standards.	Ecology has indicated this is a workable approach.	1. Retain reference to HPA standards. 2. Restore specific development standards.	3 to 0

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4	Referring to nonconforming uses	19.400.100, 19.150.247 & .592	Use the word "conforming" to refer to legally existing development that no longer conforms to modern permit and development standards (e.g. a home built close to shoreline before buffers were adopted).	The proposed approach is inconsistent with the requirement that the SMP's regulations be of "sufficient scope and detail" to ensure implementation of the SMA (WAC 173-26-191(2)(a)(ii)(A)) and is not approvable as drafted.	1. Proceed with use of phrase "conforming" throughout document. 2. Use "legally nonconforming" throughout document. Clarify that SFRs may be considered "conforming" based on 2011 carve-out law (Note: Alterations of such structures must still meet SMP standards). 3. Use an alternate reference for said development, such as "nonconforming" or "legally existing nonconforming".	3 to 0
5	Permit standards for bulkheads	19.600.175(A), 19.600.105	Hard Stabilization: Allow with SDP in all upland designations Hybrid Stabilization: Allow with SDP in all upland designations	Ecology recommendation: Hard stabilization: Prohibit in Natural SED in most cases (can make allowances for existing SFRs). Recommend administrative CUP for Conservancy SEDs. Hybrid stabilization: Allow with CUP.	and hybrid stabilization. 1. Retain PC recommendation for stabilization permits. 2. Incorporate permit requirements recommended by Ecology. 3. Revert to previous draft: require CUP for all new hard stabilization; administrative CUP for hybrid or soft stabilization.	2 to 1
6	References to critical areas within the SMP	Throughout		References to critical area standards incorporated into SMP should be clear. The CAO itself is not being adopted into the SMP, rather specific provisions from the CAO are being incorporated, and included in Appendix E of the SMP for reference.	1. Amend references to critical areas in SMP for clarity and accuracy. 2. Retain references to critical areas proposed in draft SMP as-is.	
7	Allowing bulkheads for eutrophic lakes	19.150.210, 19.600.175(B)(2), 19.600.175(D)(2)(c)(v))	PC included an additional allowance for bulkheads on eutrophic lakes in addition to what is permitted by WAC, to prevent erosion and introduction of sediment.	This is inconsistent with the WAC and should be removed.	1. Remove specific allowances for bulkheads in eutrophic lakes to ensure consistency with WAC. 2. Retain allowance for bulkheads in eutrophic lakes proposed in draft SMP.	
8	Definition of floodway	19.150.379.5	PC recommendation includes a definition of floodway that is used in other county codes.	There are two statutory definitions. The County's definition must be consistent with one of them.	1. Use WAC definition but also referring to floodway definition used in other codes to ensure consistency. 2. Retain definition proposed in draft SMP.	3 to 0
9	Definition of mitigation sequencing	19.150.560		Refer to WAC for appropriate language to describe mitigation sequencing.	1. Amend definition for consistency with WAC. 2. Retain definition proposed in draft SMP.	3 to 0
10	Dollar thresholds in substantial development permit exemption definition	19.150.770	PC included updated cost thresholds in other sections of SMP	Recommend using updated dollar thresholds in document.	1. Update cost thresholds for SDP exemptions to the most current dollar amounts. 2. Retain cost thresholds proposed in draft SMP.	3 to 0

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11	Reference to wetlands in shoreline jurisdiction definition	19.200.109(A)(6)	PC recommendation implies that wetlands are separate from shorelands.	Reference to shorelands is incorrect (RCW 90.58.030(2)(d)). Associated wetlands are included in the definition of “shorelands”; they are not included in SMP jurisdiction <u>in addition to</u> shorelands.	1. Amend reference to wetlands within shorelands for consistency with WAC. 2. Do not amend reference to wetlands within shorelands.	3 to 0
12	Referencing WAC substantial development permit exemption criteria in Existing Structures regulations	19.400.100(B)(1)(g)	PC intended to allow alterations of structures within existing footprint without an SDP.	Exemption criteria in the WAC control how exemptions may be authorized in SMP.	1. Insert reference to WAC SDP exemptions standards (retains PC intent; clarifies that WAC controls such exemptions) 2. Do not amend statement text proposed in SMP.	
13	Referencing WAC regarding allowances for floating homes to be considered conforming	19.400.100(B)(4)		Revisions required for consistency with statute. This section is combining and conflating a few different topics covered in RCW 90.58.270.	1. Insert language from WAC to clarify how certain existing floating homes/floating on-water residences may be considered conforming. 2. Do not insert WAC language.	3 to 0
14	Locating structures on constrained lots to prevent need for shoreline stabilization	19.400.105(A)(3)	New development on lots constrained by depth, topography or critical areas shall be located to <u>minimize</u> , to the extent feasible, the need for shoreline stabilization.	This provision is inconsistent with WAC 173-26-231(3)(a)(iii). Such development would require a shoreline variance.	1. Replace "minimize" with "avoid" to be more consistent with statute. 2. Do not make change in draft SMP.	
15	Monitoring requirements for advanced mitigation projects	19.400.110(C)(2)	As written, PC recommendation allows mitigation project monitoring to end after 2 monitoring periods.	As written, is not adequate to document success of mitigation projects.	1. Clarify that monitoring will occur for a minimum of 5 years, and until mitigation success is demonstrated by meeting all performance standards. (This was original intent of this provision--the original draft was not clear.) 2. Retain proposed language in draft SMP.	
16	Addressing critical areas in SMP jurisdiction	19.400.115 (multiple places within)	PC recommendation discusses relationship between critical areas and shorelines. Revisions could increase clarity of document while preserving intent of PC recommendation.	Ecology staff have indicated that the relationship between critical areas and shoreline regulations is not entirely clear in the draft SMP. County staff and Ecology staff have worked together to propose text changes to increase clarity for staff and the public, and to guide implementation.	1. Amend draft SMP to increase clarity on relationship between critical areas and shorelines. 2. Do not make change in draft SMP.	
17	Shoreline buffer reductions - general proposed changes	19.400.120(B)(2), (3), & (4)		As written, this section is not implementable. County staff have worked with Ecology to reduce implementation gaps and clarify how buffer reductions work.	1. Implement various amendments to shoreline buffer reductions. 2. Do not make change in draft SMP.	
18	Clarifying buffer reductions for streams	19.400.120(B)(3)	PC recommendation does not draw distinction between how stream and marine/lake buffer reductions would be managed. Stream buffers are larger to start out with and may require different buffer reduction standards.	Reducing a 250' buffer down to 50'-150' is not appropriate or supported by science. In general, a 25% buffer reduction is supported.	1. Amend text to allow 25% reduction of stream buffer, and relocate this text for increased clarity. 2. Retain language in proposed SMP (allows larger reductions).	3 to 0

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19	Clarifying buffer reduction requirements in Urban Conservancy SED	19.400.120(B)(3)(b)	Reduced buffer width is 75-90 feet in this SED. As written, the language implies buffer may be even smaller.	Recommend clarifying intent of language.	1. Clarify that buffer reductions in a range of 75-90 feet are authorized by this section. 2. Do not make change in draft SMP.	3 to 0
20	Characterization of shoreline setback	19.400.120(B)(5)	Included statement that setback is intended to protect buffer during construction and is not needed after construction.	Delete incorrect language that states setback is no longer needed after construction. The setback allows room for maintenance access outside of the buffer for the life of the structure.	1. Remove incorrect language and also clarify that a lack of a shoreline setback shall not preclude maintenance of legally existing structures. 2. Do not make change in draft SMP.	
21	Relocating text relating to water-depending development from constrained lot section	19.400.120(C)(1)	PC recommendation implies that buffers apply to water dependent development.	It does not make sense to provide alternative buffer options for water-dependent development. Water-dependent development is already allowed in the buffer; it just has to mitigate to ensure no net loss.	1. Remove reference to water-dependent development, and relocate accompanying text on water-dependent development to more appropriate section of SMP. Expand to clarify how different types of water-oriented development is managed, and that this development may be sited in buffers if no net loss criteria is met. 2. Do not change or relocate text.	3 to 0
22	Providing mitigation sequencing context to allowances for decks/platforms in buffers	19.400.120(D)(1)(b)	PC recommendation increases allowances for decks and platforms in buffers.	Revisions needed to bring this allowance into consistency with mitigation sequencing.	1. Introduce amendments to text to highlight that decks/platforms in buffer must be minimum size necessary to support permitted use, and shall encroach on buffer the minimum amount necessary. 2. Do not include these provisions in the draft SMP.	
23	Correcting reference to floating residences in dimensional standards table	Table 19.400.140(A)	PC recommendation draft uses the phrase "boat houses" in correlation with WAC that speaks to floating homes/floating on-water residences, which is technically incorrect.	Recommend revising text for consistency with RCW.	1. Change reference to floating homes/floating on-water residences for consistency with RCW. 2. Do not make change in draft SMP.	3 to 0
24	Waiver of public access requirements	19.400.145(A)(5)(d)	PC recommendation allows waiver of public access requirements if cost of providing them is disproportionate to total project cost.	Recommend revision to align with the purpose of requiring public access, consistent w/the policy directives of the Act - allow waiver if cost of providing access is disproportionate to the project's impact on public access.	1. Revise public access waiver. 2. Do not make change in draft SMP.	
25	Use of "E" for projects that are exempt from SDP requirement	19.600.105 Table (general)	PC recommendation denotes projects that are exempt from an SDP with an "E" for Exempt, vs. "P" for SDP.	Calling only certain uses/mods out is misleading and can lead to incorrect assumptions and implementation. In general, Ecy staff do not recommend identifying uses and modifications as exempt in the table. Any one of the uses/mods in the table may qualify for an SSDP exemption if the proposal meets the criteria in WAC 173-27-040.	1. Recharacterize any uses/modifications currently shown as "Exempt" to "P" (for SDP). Use legend to explain that projects meeting exemption criteria will be exempt from SDP. 2. Do not make change in draft SMP - continue to use "E" for Exempt.	

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26	Permit standards for dredge disposal	19.600.105 Table - Dredge Disposal, 19.600.135	PC recommendation proposes the following permit standards: Natural SED: CUP Rural/Urban Conservancy SED: Administrative SDP	Dredge disposal in the Natural environment, except for ecological restoration, is inconsistent with the purpose of the designation (WAC 173-26-211(5)(a)). Rural Conservancy and Urban Conservancy designations also prioritize protection of ecological function. Disposal of dredge materials in these environments warrants additional scrutiny and analysis of cumulative impacts. Recommend: Natural: Prohibited Rural/Urban Conservancy: CUP or Administrative CUP	1. Change permit requirements for dredge disposal. 2. Do not change permit requirements for dredge disposal.	
27	Permit standards for flood hazard reduction measures	19.600.105 Table - Flood Hazard Reduction Measures, 19.400.150(A)	Natural SED: SDP Rural Conservancy SED: SDP	Given the extent of floodplain and floodway included in the County's shoreline jurisdiction (i.e. all of it), there needs to be more scrutiny applied to proposals to install new flood control structures. These can have a significant impact on shoreline ecological functions and processes. Recommend: Natural SED: Prohibited Rural Conservancy: CUP	1. Change permit requirements for flood hazard reduction measures. 2. Do not change permit requirements for flood hazard reduction measures.	3 to 0
28	Permit standards for boat houses	19.600.105 Table - Mooring Structures	PC recommendation mentions permit standards in text of SMP, but not in the land use table.	[Note: This item was observed by County staff, but general guidance from Ecology has included ensuring consistency between the land use table and text sections of the SMP.]	1. Include permit standards for boat houses in the land use table, for internal consistency. 2. Do not make change in draft SMP.	3 to 0
29	Reducing required mitigation when providing public access	Appendix B - Section B.1.J	PC recommendation allows project mitigation to be reduced by half when public access is provided.	As written, this is inconsistent with no net loss requirements.	1. Make changes to this section for consistency with statute. 2. Do not make change in draft SMP.	3 to 0
30	Implementation of mitigation for shoreline stabilization/barrier structures	Appendix B - Section B.3		In general this section needs more language/explanation to be implementable.	1. Include additional context and reorganization of this section of the draft SMP. 2. Do not make change in draft SMP.	3 to 0
31	Minor sentence rewording for clarity	Throughout		Suggest minor wording/phrasing revisions for clarity.	1. Implement minor wording/phrasing revisions. 2. Do not implement minor wording/phrasing revisions.	3 to 0
32	Minor technical corrections	Throughout		Examples: SMP amendment not required to remove annexed land from County's SMP jurisdiction. (19.100.120(D)) Recommend deleting reference to dock setbacks; it does not belong here (19.400.120(D)(1)(e)(iv))	1. Implement minor technical corrections. 2. Do not implement minor technical corrections.	3 to 0

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33	Minor revisions or relocations to aid comprehension, implementation, or reduce redundancy/duplication	Throughout. Examples at right		<p>Examples:</p> <p>--Recommend simplifying references to shorelines that are regulated by the SMP. (19.100.130)(F)</p> <p>--Insert "buffer and" to clarify that this language applies to expansions outside both the shoreline buffer and setback. (19.400.100)(B)(1)(c))</p> <p>--Clarify how expansions of existing structures within the buffer are addressed. (19.400.120(B)(1))</p> <p>--Add "parallel to OHWM" to clarify where this provision applies. (19.400.100(B)(1)(e))</p> <p>--Recommend adding note that vegetation conservation buffers may also be referred to as shoreline buffers. (19.400.100(B)(1)(f))</p> <p>--Recommend removing 'Alternatives for Existing Development' section - this language is covered elsewhere. (19.400.120(C)(2))</p> <p>--Relocating standards for beach stairs in the land use table (Table 19.600.105)</p>	<p>1. Include minor revisions to increase clarity and comprehension, reduce redundancy and duplication, and aid implementation of the draft SMP.</p> <p>2. Do not make changes to the draft SMP.</p>	3 to 0
34	Recommended additions/modifications to definitions	Various	Some terms used in the PC recommendation are not defined in the document.	<p><u>Recommend adding definitions for:</u></p> <p>Beach stairs (19.150.167)</p> <p>Shoreline Jurisdiction (19.150.714)</p> <p>Stair Tower (19.150.747)</p> <p><u>Recommend modifying select definitions:</u></p> <p>Guidelines (19.150.395): Clarify that Chapter 173-27 WAC is not SMP guidelines.</p> <p>Pervious Surface (19.150.615): Clarify that decks may be considered pervious (already stated elsewhere in document)</p> <p>Prohibited (19.150.645): Remove extraneous language.</p>	<p>1. Implement proposed changes to SMP definitions.</p> <p>2. Do not make changes to draft SMP.</p>	3 to 0
35	Update formatting, numbering, internal code references, spelling	Throughout			<p>1. Implement minor changes in draft SMP.</p> <p>2. Do not make changes to draft SMP.</p>	3 to 0
36	Parallel shoreline environment designation scenarios	19.200.145(A)(6)	PC recommendation excludes some possible scenarios of how parallel shoreline designations may be interpreted.	[Note: This issue was observed by County staff.]	<p>1. Include additional language to aid interpretation of shoreline designations.</p> <p>2. Do not make changes to draft SMP.</p>	3 to 0
37	Determining when parcels disconnected from shoreline are subject to SMP	19.200.145(A)(9)	PC recommendation does not stipulate how these determinations are made.	Recommend adding language that the Director shall make determinations on which standards apply to properties with a distinct break in connectivity to the shoreline.	<p>1. Include language clarifying that the Director shall make determinations of when SMP standards apply.</p> <p>2. Do not make change in draft SMP.</p>	3 to 0
38	Inserting a preamble for nonconforming uses	19.400	This language was removed from the PC recommendation draft when the term 'conforming' was employed to refer to legally nonconforming uses/structures/lots.	This language could be added back in to provide additional context for what nonconforming uses/structures/lots are and how they are addressed in SMP.	<p>1. Re-establish preamble for nonconforming uses to provide context for how these uses are managed in SMP.</p> <p>2. Do not make change in draft SMP.</p>	

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	Topic	Reference location	PC approved recommendation	Ecology relayed position	BoCC Decision (Maintain, Delete, Modify)	Board Thumbs Up
39	Internal consistency - variances for buffer reductions	19.400.105(A)(6)	PC recommendation stipulates when variances are required for buffer reductions, but that is not referenced here.	Proposed language to alert reader that a variance may be required to locate a structure within the buffer, per other sections of SMP.	1. Include proposed language in draft SMP. 2. Do not include proposed language in draft SMP.	3 to 0
40	Internal consistency - water dependent uses in buffers, mitigation sequencing required	19.400.105(B)(1)	This section of PC recommendation is not entirely clear as written.	Revisions recommended to clarify that water-dependent uses are allowed in buffers, subject to mitigation sequencing.	1. Include clarification in draft SMP. 2. Do not make change in draft SMP.	3 to 0
41	Clarifying effective date and requirements for advanced mitigation projects	19.400.110(B)(5)	PC recommendation does not stipulate a start date for when advanced mitigation projects may be considered for use.	[Note: Effective date issue was observed by County staff.] Recommend language that indicates all requirements of this section must be met in order to qualify for advanced mitigation.	1. Make proposed changes to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
42	Advising applicants of other agency approvals for advanced mitigation projects	19.400.110(B)(5)(a)	PC recommendation does not include this language as written.	Ecology suggests adding a requirement that all other applicable permits be obtained, at least to put it on the applicant's radar.	1. Add reminder to applicants that other agency approvals may be required for advanced mitigation projects. 2. Do not make change in draft SMP.	3 to 0
43	Clarifying reporting requirements for advanced mitigation projects	19.400.110(C)(2)	PC recommendation does not specify that monitoring reports must be submitted to County, or that maintenance criteria and a monitoring schedules is part of an applicant's mitigation plan.	[Note: These issues were observed by County staff.]	1. Make proposed changes to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
44	Should/shall for avoiding extensive vegetation removal	19.400.120(A)(3)	PC recommendation states that extensive vegetation removal to create views/expansive lawns <u>should</u> not be allowed within shoreline jurisdiction.	If this is a requirement, the word "shall" should be used. "Should" is for policy language.	1. Change language to "shall" to prohibit extensive vegetation removal for lawns/views within shoreline jurisdiction. 2. Do not make change in draft SMP.	3 to 0
45	Adding a reference to critical area buffers in shoreline buffers section	19.400.120(B)(6)	PC recommendation does not include this language as written.	Recommend adding language to remind reader that critical area buffers also apply within shoreline jurisdiction.	1. Include reminder that critical area buffers also apply in shoreline jurisdiction. 2. Do not make change in draft SMP.	3 to 0
46	Reorganizing constrained lot provisions for single family homes	19.400.120(C)(1)		Revisions proposed to this section to retain its intent while resolving the inconsistencies and duplicities with the variance criteria. Also propose removing reference to Inventory & Characterization document; mitigation plans should rely on existing conditions. [Staff note: Proposed changes make use of statutory carve-out to waive or reduce variance requirements for single family homes/garages with a combined footprint of less than 1,200 square feet].	1. Make proposed changes to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
47	Clarifying trail requirements	19.400.120(D)(1)(a)		This section needs to be rewritten/reorganized.	1. Reorganize trail standards for clarity. 2. Do not make changes in draft SMP.	3 to 0

Thurston County SMP Update - BOCC Decision Matrix (10/30/23 Briefing) - Greyed Out Items Represent BOCC-Completed Items						
	Topic	Reference location	PC approved recommendation	Ecology relayed position	BoCC Decision (Maintain, Delete, Modify)	Board Thumbs Up
48	Requiring pervious surface for viewing platforms and decks	19.400.120(D)(1)(b)	PC recommendation does not currently require this.	Recommend requiring viewing platforms and decks to be constructed of pervious surface.	1. Require viewing platforms and decks to be constructed of pervious surface (this can include wooden decks with gaps between boards if ground is not compacted). 2. Do not make change in draft SMP.	
49	Prohibiting beach stairs below Ordinary High Water Mark	19.400.120(D)(1)(c)	PC recommendation prohibits these in the land use table, but allows them in the text.	Ecology has indicated it is appropriate to prohibit beach stairs below the ordinary high water mark. (Note: If they are allowed, permit requirements must be identified.)	1. Prohibit beach stairs below ordinary high water mark. 2. Do not prohibit beach stairs below the ordinary high water mark.	3 to 0
50	Expanding use of water-oriented storage structures	19.400.120(D)(1)(e)	PC recommendation is written more narrowly than suggested language.	Recommend broadening use of water-oriented storage structure--allow as accessory to water-dependent uses or to support residential access.	1. Expand the scenarios where water-oriented storage structures may be utilized. 2. Do not make change in draft SMP.	3 to 0
51	Use of water-oriented storage structure roofs for recreation	19.400.120(D)(1)(e)(v & vi)	PC recommendation does not allow roofs of storage structures to be used as recreational platforms.	[Note: This is a County staff suggestion to enable recreational use of the shoreline. Ecology has indicated support for this allowance.]	1. Include language to clarify that storage structure roofs may be used as viewing platforms. 2. Do not make change in draft SMP.	3 to 0
52	Additional detail for mitigation of hazard tree removal	19.400.120(D)(4)(b)	PC recommendation does not include this specificity as written.	Recommend additional criteria to guide replacement plantings when hazard trees are removed.	1. Include additional language to guide replacement plantings after hazard tree removal. 2. Do not make change in draft SMP.	3 to 0
53	Development standards for fences in shoreline jurisdiction	19.400.120(D)(5)	PC recommendation does not include this specificity as written.	Recommend adding provisions here to specify height, materials, alignment (e.g. perpendicular to the shoreline), avoidance of vegetation, mitigation to ensure>NNL	1. Include development standards for fences in shoreline jurisdiction. May reference standards that already exist in other county codes. 2. Do not make change in draft SMP.	3 to 0
54	Development standards for nonstructural flood hazard mitigation measures	19.400.150(B)(4-6)	PC recommendation did not apply this section to nonstructural flood hazard mitigation measures.	Ecology commented that the draft had no nonstructural flood hazard reduction measure standards. Applying the standards in this section to all flood hazard reduction measures would address this issue.	1. Apply one set of standards to all types of flood hazard mitigation measures. 2. Do not make change in draft SMP.	3 to 0
55	Abbreviation for administrative conditional use permits in land use table	19.600.105 Table (general)	PC recommendation uses "C" for Conditional Use Permits.	Unless this is a convention used elsewhere in County code, I recommend "AdC" for administrative CUP to be consistent w/"AdP" and make it clear the conditional use is required.	1. Change abbreviation used for administrative conditional use permits, for internal consistency. 2. Do not make change in draft SMP.	3 to 0
56	Non-water-oriented industrial uses in Shoreline Residential SED	19.600.105 Table - Industrial Uses	PC recommendation currently allows non-water-dependent industrial uses in Shoreline Residential SED in limited circumstances.	Recommend prohibiting non-water-dependent industrial uses in Shoreline Residential SED, as water-dependent industrial uses are already prohibited.	1. Prohibit non-water-oriented industrial uses in Shoreline Residential SED (water-oriented industrial uses already prohibited). 2. Do not make change in draft SMP.	3 to 0
57	Recreational development - permit footnote	19.600.105 Table - Footnote 13		Footnote that discusses permit standards is unclear.	1. Clarify permit standards for recreational development. 2. Do not make change in draft SMP.	3 to 0

Thurston County SMP Update - BOCC Decision Matrix (10/30/23 Briefing) - Greyed Out Items Represent BOCC-Completed Items						
	Topic	Reference location	PC approved recommendation	Ecology relayed position	BoCC Decision (Maintain, Delete, Modify)	Board Thumbs Up
58	Recreational development - buffer footnote	19.600.105 Table - Footnote 14	PC recommendation has specific reference to buffer standards for non-water oriented recreational development.	Recommend deleting; all non-water oriented uses are subject to buffer standards. This footnote doesn't make sense.	1. Delete footnote. 2. Retain footnote.	3 to 0
59	Permit standards for shoreline stabilization - Aquatic SED	19.600.105 Table - Shoreline Stabilization, 19.600.175	These cells are blank in the PC recommendation. Footnotes state hard stabilization may be permitted with a CUP, and soft stabilization with an SDP.	Recommend including permit standards for shoreline stabilization in Aquatic SED (CUP for hard/hybrid stabilization, SDP for soft stabilization).	1. Include permit standards for shoreline stabilization in the land use table, for internal consistency. 2. Do not make change in draft SMP.	
60	Shoreline stabilization - substantial development permit footnote	19.600.105 Table - Footnote 17	PC recommendation provides specific call-out for SDP exemption for qualifying soft stabilization.	Any development that meets SDP exemption criteria would be exempt from that permit - this doesn't need to be called out here.	1. Strike footnote. 2. Retain footnote.	3 to 0
61	Separation of primary and accessory utilities in land use table & footnotes	19.600.105 Table - Utilities	PC recommendation combines permit standards for primary and accessory utilities.	Recommend separating into “primary” and “accessory”, simplify footnotes.	1. Separate permit standards for primary and accessory utilities. 2. Do not make change in draft SMP.	3 to 0
62	Inserting footnote to clarify when beach stairs are authorized	19.600.105 Table - Footnotes	Other sections of PC recommendation state that water-oriented use is required before allowing beach stairs. The land use table does not include this language.	In general, Ecology has indicated it is appropriate to include reminders in the land use table or text for clarity and internal consistency.	1. Make proposed change to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
63	Including an applicability section for marinas	19.600.125(C)(2)	PC recommendation does not include this language as written.	Recommend adding an “applicability” section that refers to the County’s definition/threshold for marinas (i.e. moorage facility for ten or more vessels). (Staff note: In general, Ecology has advocated for providing appropriate context in each section of the SMP.)	1. Make proposed change to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
64	Additional standards for advanced mitigation plans	19.700.112(C)(2), (7), and (13)	PC recommendation does not include this language as written.	Recommend adding additional requirements for advanced mitigation plans. (Note: County staff recommend cross-referencing other Ecology recommendations in this section for internal consistency.)	1. Make proposed change to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
65	Including an applicability section for general mitigation standards	Appendix B - Section B.1	PC recommendation does not include this language as written.	Suggest opening with an applicability statement.	1. Make proposed change to draft SMP. 2. Do not make changes in draft SMP.	3 to 0
66	Clarification on mitigation requirements - replacement vegetation	Appendix B - Section B.2.A	PC recommendation does not include this language as written.	This section is currently lacking standards for replacement vegetation, i.e. composition of native and/or non-native vegetation used as mitigation.	1. Include additional standards to clarify that replacement vegetation must be "like for like". 2. Do not make change in draft SMP.	3 to 0

Thurston County SMP Update - BOCC Decision Matrix (10/30/23 Briefing) - Greyed Out Items Represent BOCC-Completed Items						
	Topic	Reference location	PC approved recommendation	Ecology relayed position	BoCC Decision (Maintain, Delete, Modify)	Board Thumbs Up
67	Use of non-native vegetation in replanting requirements	Appendix B - Section B.2.A	PC recommendation included the concept of using non-native vegetation in mitigation planting. PC requested Ecology weigh in on an approach to implement this.	Concept is consistent with statute. Ecology proposed restrictions to the types of situations in which non-native vegetation may be used for compensatory mitigation.	1. Make proposed changes to draft SMP. 2. Do not make changes in draft SMP.	
68	Reference to county in-lieu fee program	Appendix B - Section B.5.B	PC recommendation includes reference to wetland (critical area) mitigation.	Since this appendix is limited to shoreline buffer and in-water impacts, suggest deleting.	1. Delete reference to critical areas mitigation (this chapter is specifically intended for shorelines). 2. Do not make change in draft SMP.	3 to 0

From: [Maya Teeple](#)
To: [Andrew Deffobis](#)
Subject: FW: Thurston shoreline comments; Oct 28
Date: Thursday, October 28, 2021 3:47:46 PM

Maya Teeple | Senior Planner
 Thurston County Community Planning & Economic Development
 Community Planning Division
 2000 Lakeridge Dr SW, Bldg 1, Olympia, Washington 98502
Cell (Primary): (360) 545-2593
Maya.Teeple@co.thurston.wa.us | www.thurstonplanning.org

From: northbeachcomm@cs.com <northbeachcomm@cs.com>
Sent: Thursday, October 28, 2021 3:47 PM
To: Maya Teeple <maya.teeple@co.thurston.wa.us>
Subject: Thurston shoreline comments; Oct 28

Oct 27

Thurston County Planning Commission;

We must protect our shorelines in Thurston County, for future generations.

The construction of bulkheads should not be allowed.

We know that bulkhead effect the habitat.

We know that bulkheads effect the plants in the water, the flora.

Bulkheads decrease habitat. They should not be allowed.

We should not allow residents to continue to improve their "Grandfather-in Bulkheads".

We should not allow impervious surfaces near shorelines.

For example, in Budd Inlet, the shorebird population has been reduced drastically. Now you see almost no birds. The fish stock, the Chinook, coho and steelhead populations in Puget Sound have declined.

There are several possible reasons for this, but shoreline habitat issues are involved.

Our wastewater facility, the billion dollar LOTT plant, is finding chemicals in our rivers, in our water. They find cancer-causing

chemicals and medications in ground and surface waters.
Highly treated reclaimed water, from LOTT is pumped into Puget Sound, this also effect the health of our Budd Inlet. This also effects the habitat in Puget Sound. All of these issues degrade the habitat.

The plastic from oyster beds and goeduck farms destroy the habitat. These farms should not be allowed in Puget Sound. They should not be allowed on our shorelines.

There should be a 100 foot buffer from real estate development, and our water bodies. This shoreline is an important buffer for the water quality, for the shoreline habitat.
Please help us preserve our beautiful Puget Sound.
Please help us preserve our shorelines.

Thanks;
Lee Riner
2103 Harrison
Oly. WA
98502

From: [Thomasina Cooper](#)
To: [Andrew Deffobis](#)
Cc: [Christina Chaput](#)
Subject: FW: Comment from Black Hills Audubon concerning the Shoreline Master Program Update
Date: Thursday, October 6, 2022 8:40:47 AM
Attachments: [Black Hills Audubon Comment on Minority Report on Shoreline Master Program Update.pdf](#)

Hi Andy and Chris-

The commissioners received the email below and letter attached re: the SMP. I wanted to ensure you see this. Please forgive any duplication, if you've already gotten it.

Thanks! Have a good day!
Thomasina

-----Original Message-----

From: Samuel Merrill <sammerrill3@comcast.net>
 Sent: Wednesday, October 5, 2022 7:49 PM
 To: Gary Edwards <gary.edwards@co.thurston.wa.us>; Carolina Mejia-Barahona <carolina.mejia@co.thurston.wa.us>; Tye Menser <tye.menser@co.thurston.wa.us>
 Cc: Anne Van Sweringen <avansw2@gmail.com>
 Subject: Comment from Black Hills Audubon concerning the Shoreline Master Program Update

Dear Commissioners Edwards, Mejia, and Menser,

Attached is a Comment from Black Hills Audubon concerning the Minority Report re the Shoreline Master Program Update. Could you confirm that this has been received in good order?

Thanks for your continued efforts for the County.

Best wishes,

Anne Van Sweringen, Member, Conservation Committee Sam Merrill, Chair Conservation Committee

Black Hills Audubon Society



A Washington State Chapter of the National Audubon Society
P.O. Box 2524, Olympia, WA 98507
(360) 352-7299 www.blackhills-audubon.org

Black Hills Audubon Society is a volunteer, non-profit organization of more than 1,300 members in Thurston, Mason, and Lewis Counties whose goals are to promote environmental education and protect our ecosystems for future generations.

Honorable Gary Edwards
Honorable Carolina Mejia
Honorable Tye Menser

October 5, 2022

Dear Commissioners,

Black Hills Audubon Society (BHAS) is a chapter of roughly 1300 members of the National Audubon Society, including Thurston, Mason, and Lewis Counties. We ask you to support the Minority Report submitted to the Board of County Commissioners along with the Thurston County Shoreline Master Program Update.

The Thurston County Planning Commission voted 5-3 to recommend approval of the draft Shoreline Master Program Update (SMP) last August. Many of the draft revisions improve the capacity of the SMP to promote and enhance the environment as well as the public interest. However, four Planning Commission members respectfully recommend and request that the BoCC consider further revision of the draft SMP before SMP Update approval (see August 8, 2022 letter to the BoCC from Helen Wheatley (author), Derek Day, Joel Hansen, Kevin Pestinger). These commissioners focused on areas where improvements to the draft SMP will enhance its protectiveness against Net Loss, especially in the face of climate change.

This Minority Report brings to light essential elements of the draft SMP that became less protective. Here is a summary (please read the full Minority Report for more information):

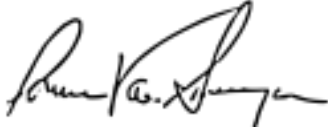
- Regarding Critical Areas, these four commissioners are concerned that insufficient consideration is given to critical saltwater areas. Permitting of critical areas is treated differently in the draft SMP from the Critical Areas Ordinances: The Reasonable Use principle, which is highly protective of ecological function, is replaced by shoreline variances. The principle of critical area protectiveness – i.e., that the purpose of a critical area is to provide environmental function, not balanced use – should apply to the draft SMP.
- Loss of vegetation is a major component of the Shoreline Management Act. For instance, the removal of pollutants such as nitrogen relies on the vegetative community. Non-native vegetation does not necessarily perform the same ecological functions as native vegetation. The Draft SMP should be revised to disallow substitutions for native vegetation in plantings for mitigation. Consider revising the draft vegetation policies to keep the SMP compliant.

- Shoreline buffers in the draft SMP are significantly decreased in contrast to state guidelines, the principles of Best Available Science, and policies of many other jurisdictions. To account for climate change, reduced buffer widths in the draft SMP's Shoreline Environmental Designations (SEDs) should be rejected. Planning commissioners supported a buffer reduction policy instead of decreasing some and increasing others. For instance, the planning commission is proposing Thurston County buffers for Rural Conservancy SEDs that are reduced by 50% or an extraordinary 125 feet. Critical saltwater habitats also require a higher level of protection due to the important ecological functions they provide. To protect and restore ecological functions, shoreline designations should be integrated effectively with the protection and restoration of Aquatic critical saltwater habitats. Other jurisdictions are expanding and revising buffers to be wider.
- Regarding Aquaculture: Climate change looms very large for both the aquaculture industry and the shoreline ecosystem in which it takes place. Given the many unknowns regarding the long-term environmental impacts of commercial-scale aquaculture, especially commercial geoduck aquaculture, the SMP should take a more precautionary stance and adjust its policies accordingly. The SMP should consider the regulation of aquaculture and the value of frequent monitoring to avoid net loss of ecological functions.
- Shoreline structures and uses should not result in a net loss to ecosystem functions or public access. The interests of the state are primarily in preserving ecological function; federal and state regulations are largely concerned with reducing the impacts of mooring structures. The draft SMP should include policies and regulations regarding piers, docks, and other overwater and in-water structures.
- While providing positive effects for humans, mooring, overwater, and in-water structures including pilings can have direct negative impacts on shoreline ecological functions. State and federal regulations attempt to reduce these impacts, for instance, with permits for piers and docks. The shoreline inventory and characterization should inform where overwater structures such as piers and docks may be allowed. Portions of the shoreline may not be appropriate for these overwater structures due to impacts to shoreline ecological functions, navigation, and aesthetics. The SMP should include policies and regulations for these structures and uses.
- Restoration is key to achieving No Net Loss of ecological functions in habitats. Setbacks should support the ecological functions of buffers. Vegetation buffers of appropriate width should be recognized as sites with restoration potential. Where buffers are less than 80% effective, other policies such as restoration with native vegetation or soft shoreline stabilization can be used to mitigate the inadequacy of the buffer. Such policies are necessary because of the need for balance in ecosystems and habitats. In terms of costs and benefits, however, preserving ecosystem function and the ecosystem services that buffers provide is often the most effective option.
- In urban areas, a key element to maintaining management zones for riparian habitats is connectivity (the movement of animals across riparian, aquatic, and upland habitats), both in and along streams. The Washington Department of Fish and Wildlife urges governments to use: 1) both volumes of its Priority Habitats and Species (PHS) publications (which provide guidance on Best Available Science), 2) its riparian wetlands guidance for fish and aquatic

species, and 3) its adoption of Site-Potential Tree Height (SPTH) to maintain full function of riparian ecosystems.

- Revisions to the SMP concerning climate change must reflect county efforts as required in the comprehensive plan under the Growth Management Act and the Thurston Climate Adaptation Plan. An adaptive management approach is key for the SMP and must be supported.

Sincerely,



Anne Van Sweringen
Member, Conservation Committee, Black Hills Audubon Society



Sam Merrill
Chair, Conservation Committee, Black Hills Audubon Society

From: [Pres LLCC](#)
To: [Tye Menser](#); [Gary Edwards](#); [Carolina Mejia-Barahona](#)
Subject: Fwd: Shoreline Master Program Work Session 3/7/23
Date: Sunday, March 5, 2023 10:12:17 PM

All concerned,

I received word of SMP changes that affect my community and wanted to contribute. Thank you for your consideration.

In response to the minority report:

I disagree with the false urgency pushed by the minority report. The planning commission review may have been lengthy but this is the purpose of the government, to do the will of the people. I do not see where this urgency exists. This false urgency portends making a hasty decision which would lead to negative outcomes long term.

I agree with the shorter buffer areas in opposition to the minority report and in accordance with the planning commission. The minority report focuses on "climate change" which is not in accordance with WAC 173-26-010 stating:

"Shoreline Management Act is intended to be a cooperative program between local government and the state. It is the intent of this chapter to provide minimum procedural requirements as necessary to comply with the statutory requirements while providing latitude for local government to establish procedural systems based on local needs and circumstances"

Climate change is not local. Climate change does not fall under the purpose of the SMA WAC. This push is an appeal to fear and is logically inconsistent. Setbacks in Thurston County have limited effect on climate change.

As president of the Lake Lawrence Community Club, I can only speak to our lake but we have not experienced ecological loss discussed by the minority report, nor the climate change yet again stated as the reasoning for this. Obviously the minority report believes the climate takes precedence over the will of the governed, upon which we disagree. In my community most of our residents want to do what they feel is in the best interest of their property. Not the interest of someone who has never seen their lake or land.

In regards to decision points for the BOCC:

Topic 1: I support the PC approved recommendation prior to the 2/22/23 meeting.

Topic 2: I support the PC approved recommendation prior to the 2/22/23 meeting.

Topic 3: I support the PC approved recommendation prior to the 2/22/23 meeting.

Topic 4: I strongly support the use of conforming. Using anything otherwise allows any current structures to later be affected by the next SMP update. This adds confusion to the local owners and layers of complexity to any changes they would make to their property which when built was conforming and legal but now arbitrarily is not.

Topic 5: I support the PC approved recommendation prior to the 2/22/23 meeting.

In response to ecology required items:

Topic 7: I agree with designation of eutrophic lakes being different.

Topic 12: I agree with PC approved recommendation.

Topic 24: I agree with PC. How is spending more money for public access ever ecologically prosperous? This seems an overstep via Ecology as this would entail construction inside buffers.

Topic 26: Agree with PC.

Thank you for your time and consideration. We appreciate the planning commission's time and dedication and care of those they represent.

Derick Mordus

Current President LLCC

From: [Thomasina Cooper](#)
To: [Andrew Deffobis](#)
Subject: FW: Shoreline Master Program
Date: Tuesday, March 7, 2023 1:14:11 PM

Hi Andy-

Please add the comment below to the record.

Thanks!

Thomasina

From: Daniel Moffett <dmoffett@hotmail.com>
Sent: Tuesday, March 7, 2023 11:37 AM
To: Tye Menser <tye.menser@co.thurston.wa.us>
Subject: Shoreline Master Program

Commissioners Menser, Mejia and Edwards

I am a resident of Thurston County and owner of lakeside waterfront property in Thurston County.

I support the Planning Commission's recommendations for the DRAFT Shoreline Master Plan without the added Minority Report. I do not support the Minority Report.

I am specifically concerned with short notice minority report that includes changes having to do with:

- A push for larger (wider) buffers
- Designating existing structure within the buffer as "nonconforming" or "legally existing nonconforming" instead of "conforming"
- Reimposing rigid dimensional standards for docks and piers
- Removal of acknowledgement that non-salmon bearing eutrophic lakes are different
- Impose special restrictions on any alterations to a structure within the buffer
- Minimize the size of decks and viewing platforms

Dan Moffett

Dan Moffett

From: phyllisfarrell681@hotmail.com
To: [SMP](#)
Subject: Incoming SMP Comment
Date: Thursday, May 4, 2023 6:47:34 PM

Your Name (Optional):

Phyllis A Farrell

Your email address:

phyllisfarrell681@hotmail.com

Comment:

Greetings, thank you for the opportunity to comment on the draft SMP.

I commend the staff and Planning Commission for the extensive research and work in developing the draft. I have followed the process for several years and it has been arduous! Overall, I think the draft has many good provisions and improvements, but there are some areas that need to be addressed.

Vegetation Buffers:

The Minority Report states the proposed provisions are not protective enough to meet Shoreline Management Act (SMA) policy goals and prevent net loss.

The Planning Commission recommended Option A to decrease Shoreline Environmental Designation buffers. They also recommended buffers for Rural Conservancy designations to be reduced by 50% or 125 feet. The Minority Report states these recommendations do not “reflect the policy goals of the act” (WAC 173.26.186)

Thurston County SMP buffers need to reflect best available science. Option B had more protective buffers, especially in marine shorelines (85’ Marine Shoreline Residential and 250’ in Urban Conservancy, Rural Conservancy and Natural). Buffers are important for maintaining ecological function!

Projected sea level rise might shorten buffers.

Reducing buffers will make mitigation and restoration efforts more expensive and complicated.

Gwen Lentes, WDFW, shared in an e mail 10.19.20, WDFW recommends designating riparian buffers as critical areas and using the larger buffer option to more closely align with recent best available science.

The riparian wetlands guidance for fish and aquatic species recommends prioritization of the “pollution removal function when appropriate,” and adoption of Site-Potential Tree Height (SPTH), based on potential tree height at 200 years, as “a scientifically supported approach if the goal is to protect and maintain full function of the riparian ecosystem.”

The Department of Ecology recommends a Riparian Habitat Area width of 250 feet for Type “S” (Shorelines of the State) and all fish (Type “F”) streams regardless of whether they are currently or just potentially used, and whether they flow all year or not. The Draft SMP matches the Ecology guideline of 250 feet only for Type S streams and other streams greater

than 20 feet wide. The range of protection for other fish streams is 150 to 200 feet. The more protective buffer width of 250' for both Type S and F streams is needed to ensure NNL and account for climate changes in stream temperatures.

Vegetation requirements should be for mitigation purposes should be native vegetation; the non native vegetation allowance in the Planning Commission recommendations should be removed.

No Net Loss can only be achieved with restoration of vegetation in buffers.

Critical Areas:

Critical areas are an essential tool of the GMA for preventing loss of environmental function.

The Minority Report states: The SMP should assure that critical areas within the shoreline are protected in a manner consistent with the Critical Areas Ordinance (CAO) of the Growth Management Act (GMA). We are concerned that there is insufficient consideration given to critical saltwater areas. We note that permitting of critical areas is treated differently in the Draft SMP from the CAO in an important respect: the application of the principle of Reasonable Use (which is highly protective of ecological function) is replaced by shoreline variances. Without some revision, the Draft SMP will likely result in net loss of shoreline critical areas and their functions.

Per the Minority Report, it is recommended to add a Policy (SH-15) "Critical saltwater habitats should be protected and restored according to the principles of WAC 173-26-221"

Armoring:

Armoring (bulkheads and logs/stones to stabilize shorelines) results in loss of shoreline sediment important for habitat for marine organisms. It is estimated that more than 27% of Puget Sound shorelines have armoring adversely affecting forage fish habitat and salmon recovery. The Department of Ecology states that more than 700 miles of Puget Sound's shoreline is armored – with approximately four miles added every two years.

The Puget Sound Partnership recommends reduction of shoreline armoring by 25%, more protective permitting requirements and substituting "soft" or natural armoring for impervious bulkheads.

The Puget Sound Partnership's Regional Estuary Program Shoreline Armoring Implementation Strategy offers an approach that identifies effective implementation, compliance monitoring and enforcement improvements within and across regulatory agencies in Puget Sound. These efforts will reduce new (and especially illegal) armoring and reduce the impacts of repairs. The SMP should align with the PSP Regional Estuary Program Shoreline Armoring Implementation Strategy recommendations.

The Minority Report indicates the draft SMP is not as protective against No Net Loss as it should be.

The Minority Report recommendations should be inserted in the SMP...incorporating the Ecology SMP Handbook Guidelines, most notably that shoreline designations must be supplemented with consideration of specific shoreline environmental conditions and cumulative impacts.

With potential sea level rise encroaching on homeowners' vegetation buffers, there will be

requests for armoring. Require "soft" armoring for repairs and limit armoring expansions; allowing only if the modifications do not result in a net loss of ecological function.

1. Docks should be prohibited in Natural designations
2. Maintain the requirement that docks must be grated to allow light
3. Limit new docks and require multi-family or community docks

Aquaculture:

Monitoring, Inspections and Enforcement Current and historical practices have demonstrated a lack of adequate inspection, monitoring and enforcement of aquaculture permits. New procedures and practices are required to minimize environmental impacts. Every site should be inspected at the time of planting, when structural changes occur, such as with removal of nets, and when harvesting occurs. There must be a mechanism for reporting permit violations by county personnel and citizens and a response by the county.

Adaptive Management: The principle of Adaptive Management should be applied to aquaculture. This should include a formal means of observing and reporting information about industry practices and impacts on the environment, as well a formal process to revise regulations as new information emerges.

No use of plastics: Polyvinyl Chloride (PVC) and High Density Polyethylene (HDPE) plastics are used extensively in aquaculture. They are toxic during their manufacture and use in the marine environment. The toxic elements include mercury, asbestos and/or polyfluoroalkyl substances (PFAS). There is no safe level of PFAS chemicals for humans. The use of these plastics for aquaculture must be eliminated and sustainable practices required.

Non-disruptive harvesting: Current geoduck harvesting techniques involve the liquification of the tidelands to a depth of three feet by the use of high pressure hoses. This damages the benthic environment and reduces biodiversity. Because sites are continuously replanted after each harvest, there is no time for recovery. Hydraulic harvesting should be prohibited in favor of sustainable techniques.

Additionally, intensive oyster bag cultivation with plastic bags and netting covers large sections of tideland disrupting naturally occurring flora and fauna. Spacing and buffers based on available science with adaptable management practices should be put in place to protect the tideland environment.

Individual permits (not consolidated): Because aquaculture sites can vary greatly even when in close proximity, each site must be evaluated for environmental impacts. The consolidation of multiple adjacent parcels into one permit application prevents proper environmental evaluation and should be prohibited.

Thank you,

Phyllis Farrell
Sunwood Lakes

Time: May 5, 2023 at 1:47 am

From: [Doug Karman](#)
To: [Andrew Deffobis](#)
Subject: FW: Comments - SMP Public Hearing 5-16-2023
Date: Sunday, May 14, 2023 7:37:24 PM

Andy,

This email came back saying your smp@co.thurston.wa.us had a server error.

From: Doug Karman <doug.karman@comcast.net>
Sent: Sunday, May 14, 2023 4:19 PM
To: 'Gary Edwards' <gary.edwards@co.thurston.wa.us>; 'Carolina Mejia-Barahona' <carolina.mejia@co.thurston.wa.us>; 'Tye Menser' <tye.menser@co.thurston.wa.us>
Cc: 'smp@co.thurston.wa.us.' <smp@co.thurston.wa.us.>
Subject: Comments - SMP Public Hearing 5-16-2023

To: Thurston County Board of County Commissioners

From: Doug Karman
 4108 Kyro Rd SE
 Lacey Washington

Date: May 14, 2023

Re: SMP Public Hearing 5-16-2023
 Comments for your consideration

Commissioners:

When at all possible, the Planning Commission recommendation should be the one used to move forward. Their recommendation was developed after years of testimony from the public as well as County and State presentations. The Minority report should be given no more credence than any single individual from the public. The 4 Commissioners supporting this minority report were not present for 99% of the work sessions, public testimony and agency presentations on the SMP. Therefore, they were not part of the public process. The majority report/PC recommendation was made by 5 Commissioners who were part of the full public process from the beginning to the end either as a commissioner or as public participant.

The decision matrix you have been provided by staff is extensive and should have been presented to the Planning Commission prior to moving the SMP forward to the BoCC. In addition, the public should have been given an opportunity to comment on the document before the Planning Commission finalized its recommendation. Following are my comments on the Matrix:

1. **Buffers:** Use the Majority Report recommendations which is supported by Ecology. 97% of the shoreline residential classification has already been developed with these buffers. To make them wider makes no sense and would unduly burden the Shoreline Residential property owners without benefit.
2. **Docks/Floats/Buoys in the Natural environment:** If these are not allowed the property owner

will do one of two things – a) build a dock anyway or b) keep removing shoreline vegetation to be able to park their rowboats, kayaks, and other water toys. A dock or float has the least impact on the shoreline ecological function.

3. **Dimensional standards for mooring structures:** Go with the Majority recommendation as approved by Ecology. There was lengthy discussion and testimony that the Minority report sponsors were not a part of.
4. **Referring to nonconforming uses vs conforming uses:** The legislature recognized in 2011 that there would be great concern by the public if their legally established shoreline structure was now classified as nonconforming and required that this be clarified. Ecology briefed the Planning Commission and stated that they did not have a problem with classifying legally established shoreline structures as conforming. I am not sure where the Ecology reference in the matrix came from but there was a county staff member who disagreed with this. Even the county attorney said that it didn't matter if it was called non-conforming, conforming, legally conforming and such. The majority disagrees with the Ecology statement in the matrix especially for the Shoreline Residential classification. 97% of the SR properties are already developed. Not making some concessions here will result in a significant uproar from those residents who own SR properties.
5. **Permit requirement for all bulkheads:** A hearing examiner should not be needed for bulkheads. An Admin CUP should be adequate. Hearing Examiner in this case only adds cost with no benefit.
6. **References to critical areas within the SMP:** Prefer having specifics in the SMP as directed by the CAO.
7. **Allowing bulkheads for eutrophic lakes:** Allowing lakes to die is not what the WAC's say. There are heavy pressures on our shorelines from large waves caused by the new wake boats and by climate change. Not trying to slow down the eutrophication of our lakes is like saying you shouldn't get bypass surgery for your heart or have Chemo therapy for cancer. Aging and illness is a natural process. Does Ecology think we should also let our lakes die as well as our ill citizens? Both are inconsistent with law.
8. **To 11 No comment**
12. **Referencing WAC SDP exemption criteria in existing structures:** Use Staff recommendation 1.
13. **No comment**
14. **Locating structure on constrained lots:** Use Staff recommendation 1.
15. **Mitigation monitoring requirements:** use Staff recommendation 1.
16. **Addressing critical areas:** Use Staff recommendation 1.
17. **Shoreline buffer reductions:** The buffers recommended by the Planning Commission after lengthy discussion and consideration should be utilized.
18. **No comment**
19. **No comment**
20. **Characterization of shoreline setback:** If you remove the statement that the setback is no longer needed after construction except for maintenance essentially says the buffer is 15 ft wider than stated in the document. So, regarding Shoreline Residential the buffer would increase from 50 ft to 65 ft. Keep the Planning Commissions wording.
21. **No comment**
22. **Providing mitigation sequencing context to allowances for decks/platforms in buffers:** Use the Planning Commission recommendation. Properly designed decks and platforms function much like grass in the buffer.
23. **Floating residences:** No comment
24. **Waiver of public access requirements:** Use PC recommendation.
25. **Use of "E", exempt for projects that are exempt from the SDP:** You should at least make an attempt to make it easy for the public to understand. Maintain the PC recommendation.
26. **Permit standards for dredge disposal:** Go with Ecology's recommendation.
27. **To 37. No comment**

38. **Inserting a preamble for nonconforming uses: Use PC recommendation.**
39. **To 47 No comment**
48. **Requiring pervious surface for viewing platforms and decks:** Wood or composite decks are pervious if designed properly as stated earlier in the SMP. The use of the word pervious in the section may be confusing.
49. **To 58 No comment**
59. **Shoreline stabilization – SDP footnote:** There is no need for a Hearing Examiner when shoreline stabilization is under consideration an ADMIN CUP is adequate oversight. Hearing Examiners add time and cost to the process without benefit.
60. **To 68 No comment**

Respectfully submitted,

A handwritten signature in blue ink that reads "Douglas J. Karman". The signature is written in a cursive, flowing style.

Douglas J. Karman

From: [Tim Trohimovich](#)
To: [SMP](#); [Jamie Caldwell](#)
Subject: Comments on SMP Update for BOCC Public Hearing
Date: Tuesday, May 16, 2023 9:23:43 AM
Attachments: [image003.png](#)
[Futurewise Coms to Thurston Co on SMP Update May 16 2023.pdf](#)

Dear Commissioners and Staff:

Enclosed please find Futurewise's comments on the Shoreline Master Program BOCC Public Hearing Draft for the May 16, 2023, Board of County Commissioners Public Hearing. Thank you for considering our comments.

Please let me know if you require anything else.

Tim Trohimovich, AICP (he/him)
Director of Planning & Law



816 Second Avenue, Suite 200
Seattle, WA 98104-1530
206 343-0681 Ex 102
tim@futurewise.org
connect: [Twitter](#) [Facebook](#)
futurewise.org

May 16, 2023

The Honorable Carolina Mejia, Chair
The Honorable Gary Edwards
The Honorable Tye Menser
Board of Commissioners for Thurston County
3000 Pacific Avenue SE
Olympia, WA 98501

Dear Chair Mejia and Commissioners Edwards and Menser:

Subject: Comments on the Shoreline Master Program (SMP) BOCC Public Hearing Draft for the May 16, 2023, Board of County Commissioners Public Hearing.

Sent via email to: smp@co.thurston.wa.us;
jamie.caldwell@co.thurston.wa.us

Thank you for the opportunity to comment on the Shoreline Master Program (SMP) BOCC Public Hearing Draft for the May 16, 2023, Board of County Commissioners Public Hearing. Futurewise strongly supports the update and appreciates the many improvements in this draft.

The southern resident orcas, or killer whales, are threatened by (1) an inadequate availability of prey, the Chinook salmon, “(2) legacy and new toxic contaminants, and (3) disturbance from noise and vessel traffic.”¹ “Recent scientific studies indicate that reduced Chinook salmon runs undermine the potential for the southern resident population to successfully reproduce and recover.”² A 2018 analysis by the National Oceanic and Atmospheric Administration and the State of Washington Department of Fish and Wildlife ranked the Southern Puget Sound fall Chinook stocks that originate in the Nisqually and Deschutes River systems

¹ State of Washington Office of the Governor, Executive Order 18-02 Southern Resident Killer Whale Recovery and Task Force p. 1 (March 14, 2018) last accessed on May 4, 2023, at: https://www.governor.wa.gov/sites/default/files/exe_order/eo_18-02_1.pdf and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

² *Id.*

highest in importance as food sources for the southern resident killer whales.³ The Shoreline Master Program update is an opportunity to take steps to help recover the southern resident orcas, the Chinook salmon, and the species and habitats on which they depend. We support improving protections for these key species such as improved regulations to manage hard shoreline armoring and improved protections for shoreline vegetation.

Therefore, we strongly support the shoreline master program update. We do have suggestions to improve the update discussed below.

Futurewise works throughout Washington State to support land-use policies that encourage healthy, equitable and opportunity-rich communities, and that protect our most valuable farmlands, forests, and water resources. Futurewise has members and supporters throughout Washington State including Thurston County.

Provisions Futurewise Particularly Supports

The SMP update has many good provisions. We want to highlight some of the best provisions:

- The vegetation conservation goal and policies in proposed 19.300.110. Retaining native vegetation in shorelines jurisdiction is important to maintaining no net loss of shoreline ecological functions.⁴
- Calling for carrying out the Alliance for a Healthy South Sound's (AHSS) South Sound Strategy through the shoreline master program and its implementation. This will better protect water quality and water quantity.
- The vegetation conservation requirements in proposed 19.400.120 especially the improved standards in A.3. Retaining native vegetation in shorelines jurisdiction is important to maintaining no net loss of shoreline ecological functions and to comply with the Shoreline Master Program Guidelines.⁵

³ National Oceanic and Atmospheric Administration and the State of Washington Department of Fish and Wildlife, *Southern Resident Killer Whale Priority Chinook Stocks* p. 6 (June 22, 2018) last accessed on May 4, 2023, at: <https://www.documentcloud.org/documents/4615304-SRKW-Priority-Chinook-Stocks.html> and enclosed with the electronic version of Futurewise's March 6, 2019, letter to Thurston County with the filename: "SRKW-Priority-Chinook-Stocks.pdf."

⁴ EnviroVision, Herrera Environmental, and Aquatic Habitat Guidelines Program, *Protecting Nearshore Habitat and Functions in Puget Sound* p. II-39 – II-40 (October 2007, Revised June 2010) last accessed on May 4, 2023, at: <https://wdfw.wa.gov/publications/00047/> and enclosed with the paper original of Futurewise's March 6, 2019, letter to Thurston County.

⁵ *Id.*

- Proposed 19.400.130B.'s requirement that sites with known or potential archaeological resources require a site inspection by a professional archaeologist. This will significantly improve protections for archaeological resources and save permit applicants time and money because the risk of having their project stopped for archaeological work will be reduced.⁶
- Proposed 19.500.105K.'s monitoring provisions. These provisions are needed to determine if the Shoreline Master Program is achieving no net loss. These provisions are required by the Shoreline Master Program Guidelines.⁷

Summary of Key Recommendations

- Please correct the descriptions of critical areas and their status under the Shoreline Management Act in proposed 19.100.110. Please see page 4 of this letter for the detailed recommendation.
- Modify Policy SH-18 to maintain water quality as the SMP Guidelines require. Please see page 5 of this letter for the detailed recommendation.
- While we appreciate the improvements to the proposed aquatic buffers, we continue to recommend that the County adopt aquatic buffers in proposed 19.400.120B consistent with Management Recommendations for Washington's Priority Habitats. These buffer widths are necessary to achieve no net loss of shoreline resources. Please see page 6 of this letter for the detailed recommendation.
- Require wider setbacks between development and critical areas and critical areas buffers in areas subject to wildfire danger. Please see page 9 of this letter for the detailed recommendation.
- Please adopt a ten percent impervious surface limit for the Rural Conservancy shoreline environment consistent with the SMP Guidelines to protect shoreline ecological functions. Please see page 10 of this letter for the detailed recommendation.
- Protect people, property, and habitat from sea level rise and increased coastal erosion. Please see page 11 of this letter for the detailed recommendation.

⁶ See for example Jeff Chew, *Jefferson PUD sticks with Beckett Point Connections* pp. 8 – 9 (Washington Public Utility Districts Association [WPUDA]: Winter 2008) last accessed on May 4, 2023 at: <https://www.yumpu.com/en/document/view/46547248/connections-washington-public-utility-district-association/11>

⁷ *Friends of the San Juans v. San Juan County and State of Washington*, Department of Ecology, WWRGMHB Case No. 17-2-0009, Final Decision and Order (June 13, 2018), at 34 of 38.

- Prohibit marine net pen aquaculture for nonnative species in the Aquatic environment. Please see page 19 of this letter for the detailed recommendation.
- In the Rural Conservancy environment only allow new structural shoreline stabilization and flood control works where there is a documented need to protect an existing structure as SMP Guidelines require. Please see page 20 of this letter for the detailed recommendation.
- Please modify proposed 19.600.170B.7. to require public access consistent with the SMP Guidelines. Please see page 21 of this letter for the detailed recommendation.
- Require mitigation for all losses of shoreline ecological functions including the adverse impacts of development outside of buffers as required by the SMP guidelines. Please see page 22 of this letter for the detailed recommendation.
- Include all required elements in the Shoreline Restoration Plan. Please see page 23 of this letter for the detailed recommendation.

Detailed Recommendations

Please correct the descriptions of critical areas and their status under the Shoreline Management Act in proposed 19.100.110 Purpose and Intent on 5 of 572.

The Shoreline Management Act (SMA), in RCW 90.58.610, provides that “RCW 36.70A.480 governs the relationship between shoreline master programs and development regulations to protect critical areas that are adopted under chapter 36.70A RCW.” RCW 36.70A.480(5) provides that the “[s]horelines of the state shall not be considered critical areas under this chapter except to the extent that specific areas located within shorelines of the state qualify for critical area designation based on the definition of critical areas provided by RCW 36.70A.030(5) and have been designated as such by a local government pursuant to RCW 36.70A.060(2).” Proposed 19.100.110 in the third paragraph is unclear as to whether the Growth Management Act (GMA) definitions identify critical areas as RCW 90.58.610 and RCW 36.70A.480(5) require. So, we suggest that the last sentence in the third paragraph of Proposed 19.100.110 be revised to read as follows with our additions double underlined and deletions double struck through.

Although Washington’s shorelines may contain critical areas, the shorelines themselves are not critical areas ~~by default as~~ unless they meet the definitions in the ~~defined by~~ GMA.

Please clarify shoreline master program jurisdiction in proposed 19.100.120D on page 6 of 427.

The shoreline master program applies to all shorelines and shorelands in unincorporated Thurston County.⁸ The GMA divides unincorporated Thurston County within the county's jurisdiction into three broad categories: urban, rural, and natural resource lands. We are concerned that proposed 19.100.120D may inadvertently be interpreted as exempting natural resource lands from the jurisdiction of the shoreline master program (SMP). In addition, the SMA allows cities to predesignate lands within their urban growth areas. Once annexed, these predesignations apply to the annexed land. In this case, no amendment is required to apply the city SMP to those areas. But, not all areas in the urban area may be subject to predesignations. So, we suggest that proposed 19.100.120D be revised with our additions double underlined and deletions double struck through.

- D. This Master Program shall apply to all unincorporated ~~rural and urban~~ lands within Thurston County until such time as a city incorporates land into their city boundaries through annexation and, if necessary, an SMP amendment.

Modify Policy SH-18 to maintain water quality as the SMP Guidelines require. See proposed 19.300.115A. on page 43 of 572

The SMP Guidelines, in WAC 173-26-186(8)(b), provides that “[l]ocal master programs shall include policies and regulations designed to achieve no net loss of those ecological functions.” Shoreline ecological functions include the “maintenance of water quality.”⁹ Unfortunately, rather than maintaining water quality, proposed Policy SH-18 provides that shoreline uses should minimize impacts that contaminate surface or ground water. Minimizing contamination will not maintain water quality. We recommend that Policy SH-18 be revised to read as follows with our additions double underlined and our deletions double struck through.

- A. Policy SH-18 Shoreline use and development shall not ~~should minimize impacts that~~ contaminate surface or ground water, cause adverse effects on shoreline ecological functions, or impact aesthetic qualities and recreational opportunities, including, but not limited to, healthy shellfish harvest, swimming, and boating.

⁸ RCW 90.58.030(2).

⁹ WAC 173-26-201(2)(c) underlining added.

Please adopt aquatic buffers in proposed 19.400.120B consistent with *Management Recommendations for Washington's Priority Habitats* and the available science for marine buffers. Please see pages 62 – 64 of 572

To protect species such as the Chinook salmon and the orcas, the policy of the Shoreline Management Act, in RCW 90.58.020, “contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life ...” Also recognizing the need to protect these species, the SMP Guidelines, in WAC 173-26-221(5)(b), require that “[m]aster programs shall include: Planning provisions that address vegetation conservation and restoration, and regulatory provisions that address conservation of vegetation; as necessary to assure no net loss of shoreline ecological functions and ecosystem-wide processes, to avoid adverse impacts to soil hydrology, and to reduce the hazard of slope failures or accelerated erosion.” Shoreline ecological functions include shoreline vegetation and habitat for native aquatic and shoreline-dependent mammals and anadromous and resident native fish, which include Chinook salmon and orcas.¹⁰

Shoreline “[v]egetation conservation includes activities to protect and restore vegetation along or near marine and freshwater shorelines that contribute to the ecological functions of shoreline areas.”¹¹ Shoreline master programs “shall” “[e]stablish vegetation conservation standards that implement the principles in WAC 173-26-221(5)(b). Methods to do this may include setback or buffer requirements, clearing and grading standards, regulatory incentives, environment designation standards, or other master program provisions.”¹²

The SMP Guidelines, in WAC 173-26-221(5)(b), also provide in part that “[i]n establishing vegetation conservation regulations, local governments must use available scientific and technical information, as described in WAC 173-26-201(2)(a). At a minimum, local governments should consult shoreline management assistance materials provided by the department and *Management Recommendations for Washington's Priority Habitats*, prepared by the Washington state department of fish and wildlife where applicable.”

The State of Washington Department of Fish and Wildlife has recently updated the priority habitat and species recommendations for riparian areas. The updated management recommendations document that fish and wildlife depend on

¹⁰ WAC 173-26-201(3)(d)(i)(C).

¹¹ WAC 173-26-221(5)(b).

¹² WAC 173-26-221(5)(c).

protecting riparian vegetation and the functions this vegetation performs such as maintaining a complex food web that supports salmon and maintaining temperature regimes to name just a few of the functions.¹³

To maintain riparian functions, the updated *Riparian Ecosystems, Volume 1: Science synthesis and management implications* scientific report recommends protecting the riparian ecosystem which has a width estimated to be “one 200-year site-potential tree height (SPTH) measured from the edge of the active channel or active floodplain. Protecting functions within at least one 200-year SPTH is a scientifically supported approach if the goal is to protect and maintain full function of the riparian ecosystem.”¹⁴ The report defines site-potential tree height (SPTH) as the “average maximum height of the tallest dominant trees (200 years or more) for a given site class.”¹⁵ The Washington State Department of Fish and Wildlife has created an easy to use web-based tool to identify the site-potential tree height of specific properties.¹⁶

We recommend that shoreline jurisdiction be expanded to include the 100-year flood plain¹⁷ and that the buffers for river and stream shorelines be increased to use the newly recommended 200-year SPTH and that this width should be measured from the edge of the channel, channel migration zone, or active floodplain whichever is wider.¹⁸ This will help maintain shoreline functions and Chinook habitat.

¹³ T. Quinn, G.F. Wilhere and K. Krueger, (technical editors), *Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications* pp. 3 – 6 (Habitat Program, Washington Department of Fish and Wildlife, Olympia: 2020. A Priority Habitats and Species Document of the Washington Department of Fish and Wildlife) last accessed on May 4, 2023, at: <https://wdfw.wa.gov/publications/01987> and enclosed at this Dropbox Link: https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMIUWSFRa?dl=o with the filename: wdfw01987.pdf.

¹⁴ *Id.* at p. 271.

¹⁵ *Id.* at p. 273.

¹⁶ R. Rentz, A. Windrope, K. Folkerts, and J. Azerrad, *Riparian Ecosystems, Volume 2: Management Recommendations* pp. 70 – 77 (Habitat Program, Washington Department of Fish and Wildlife, Olympia: 2020. A Priority Habitats and Species Document of the Washington Department of Fish and Wildlife) last accessed on May 4, 2023, at: <https://wdfw.wa.gov/publications/01988> and enclosed at this Dropbox Link: https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMIUWSFRa?dl=o with the filename: wdfw01988.pdf.

¹⁷ Authorized by RCW 90.58.030(2)(d)(i).

¹⁸ T. Quinn, G.F. Wilhere and K. Krueger, (technical editors), *Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications* pp. 271 – 73 (Habitat Program, Washington Department of Fish and Wildlife, Olympia: 2020. A Priority Habitats and Species Document of the Washington Department of Fish and Wildlife).

Protecting Nearshore Habitat and Functions in Puget Sound documents marine riparian vegetation is important to maintaining the health of Puget Sound.¹⁹ Removing or disturbing this native vegetation results in reduced ecological functions as does decreasing the width of the vegetated riparian area, reducing plant density, and reducing plant diversity.²⁰ The widths of marine riparian vegetation necessary to provide the functions listed above vary with the function. To maintain a 100 percent of the delivery of large organic debris is estimated to require approximately 200 feet of marine riparian vegetation.²¹ Most of the leaf litter and other organic matter that reaches Puget Sound is from vegetation 100 to 200 feet from the sound.²² Shading forage fish spawning habitat can require 56 – 125 feet of marine riparian vegetation to maintain 80 percent of the shaded area.²³ *Protecting Nearshore Habitat and Functions in Puget Sound* documents that protecting wildlife habitats requires buffers 240 to 902 feet wide.²⁴ Removing 99 percent of the sediment for runoff requires 984 feet of riparian vegetation.²⁵ To effectively perform these functions, the riparian vegetation needs to be undisturbed and undeveloped native vegetation.²⁶

“[R]esearch shows that there is no particular impervious area threshold where degradation in stream integrity begins to occur; rather, the relationship is a continuum.”²⁷ “[D]egradation can occur at even low levels of total impervious area

¹⁹ EnviroVision, Herrera Environmental, and Aquatic Habitat Guidelines Program, *Protecting Nearshore Habitat and Functions in Puget Sound* pp. II-39 – II-40 (October 2007, Revised June 2010) last accessed on May 4, 2023, at: <https://wdfw.wa.gov/publications/00047/> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

²⁰ *Id.* at p. II-43.

²¹ Jim Brennan, Hilary Culverwell, Rachel Gregg, Pete Granger, *Protection of Marine Riparian Functions in Puget Sound*, Washington p. 21 (Washington Sea Grant Seattle, WA: June 15, 2009. Prepared for: Washington Department of Fish and Wildlife) last accessed on May 4, 2023, at: <http://wdfw.wa.gov/publications/00693/> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

²² *Id.* at p. 22.

²³ *Id.* at p. 15.

²⁴ EnviroVision, Herrera Environmental, and Aquatic Habitat Guidelines Program, *Protecting Nearshore Habitat and Functions in Puget Sound* p. III-39 (October 2007, Revised June 2010).

²⁵ Jim Brennan, Hilary Culverwell, Rachel Gregg, Pete Granger, *Protection of Marine Riparian Functions in Puget Sound*, Washington p. 9 (Washington Sea Grant Seattle, WA: June 15, 2009. Prepared for: Washington Department of Fish and Wildlife).

²⁶ *Id.* at pp. 39 – 40.

²⁷ Thurston Regional Planning Council & Thurston County, *Deschutes Watershed Land Use Analysis: Current Conditions Report* p. 106 (Dec. 29, 2015) last accessed on May 4, 2023, at: <https://www.co.thurston.wa.us/planning/watershed/docs/deschutes-project-materials/deschutes->

...”²⁸ The Thurston Regional Planning Council and Thurston County studied the “impacts of planned growth under current plans” in the basins that make up the Deschutes Watershed.²⁹ Every basin in the watershed will experience moderate or high increases in total impervious area (TIA) at buildout.³⁰ “The [i]mpacts of [p]lanned [g]rowth” put every basin “[p]ossibly at risk of further impacts” or “[a]t risk of further impacts.”³¹

Our recommended buffers will reduce the potential for future adverse impacts to both fresh water and marine shorelines. We urge you to adopt our recommended buffers for non-water dependent uses.

Require wider setbacks between development and critical areas and critical areas buffers in areas subject to wildfire danger. See proposed 19.400.120B.4. on page 59 of 427

Setbacks from critical areas buffers provide an area in which buildings can be built, repaired, and maintained without having to intrude in the buffer. So, setbacks cannot be ended after construction. We appreciate and support that the statement “[t]he building setback is to protect the buffer during construction and is no longer required after construction is completed” in proposed 19.400.120B.4. on page 63 of 572 is proposed to be deleted.

Setbacks also allow for the creation of a Home Ignition Zone that can protect buildings from wildfires and allow firefighters to attempt to save the buildings during wildfires. Thurston County averages 63 wildfires per year.³² The county “can expect at least one fire exceeding 100 acres over the next 25 years.”³³ Since a 30-foot-wide Home Ignition Zone is important to protect buildings,³⁴ we

[current-conditions-report.pdf](#) and enclosed at this Dropbox Link: https://www.dropbox.com/sh/4l459v8kavtropic2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=o with the filename: “deschutes-current-conditions-report.pdf.”

²⁸ *Id.*

²⁹ *Id.* at p. 107.

³⁰ *Id.*

³¹ *Id.*

³² Thurston Regional Council, *3rd Edition Hazards Mitigation Plan for the Thurston Region* p. 4.5-6 (The Emergency Management Council of Thurston County: April 2017) last accessed on May 4, 2023, at: <https://www.trpc.org/1100/Plan-Documents>.

³³ *Id.*

³⁴ Nation Fire Protection Association “preparing homes for wildfire” webpage last accessed on May 4, 2023, at: <https://www.nfpa.org/Public-Education/By-topic/Wildfire/Preparing-homes-for->

recommend that Shoreline Management Program require a setback at least 30 feet wide adjacent to critical areas and shoreline and critical area buffers in areas at high risk of wildfires. High risk areas are identified on Table 4.5.1 and on Map 4.5.4 of the *3rd Edition Hazards Mitigation Plan for the Thurston Region*. Combustible structures, such as decks, should not be allowed within this setback to protect the building from wildfires.

Please adopt a ten percent impervious surface limit for the Rural Conservancy shoreline environment consistent with the SMP Guidelines to protect shoreline ecological functions. See proposed 19.400.140 on page 71 – 72 of 572

Table 19.400.140(A) in Note 3 indicates that Hard Surface thresholds for Shoreline Environmental Designations are in Section 19.400.125. But Section 19.400.125 does not include any hard surface limits. The Thurston County Drainage Design and Erosion Control Manual referenced in Section 19.400.125 calls on project applicants to limit impervious surface to the minimum necessary, but it does not include impervious surface limits.³⁵

Impervious surfaces are increasing in some areas of Thurston County outside urban growth areas including within shoreline jurisdiction.³⁶ “Impervious surfaces increase runoff of contaminants like fertilizers and pesticides to rivers, lakes and the ocean, reducing the amount and quality of water that is available for people, aquatic life and wildlife.”³⁷ The Thurston Regional Planning Council and Thurston County studied the “impacts of planned growth under current plans” in the basins that make up the Deschutes Watershed.³⁸ Every basin in the watershed will experience moderate or high increases in total impervious area (TIA) at buildout.³⁹ “The [i]mpacts of [p]lanned [g]rowth” put every basin “[p]ossibly at risk of further impacts” or “[a]t risk of further impacts.”⁴⁰ Many Thurston County basins

[wildfire](#) and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

³⁵ Thurston County Drainage Design and Erosion Control Manual p. vi (Dec. 2016 Edition).

³⁶ *2020 State of Our Watersheds: A Report by the Treaty Tribes in Western Washington* p. 154, p. 158, p. 288, p. 292 last accessed on May 4, 2023, at: <https://nwifc.org/publications/state-of-our-watersheds/> and enclosed at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=0 with the filename: “state-of-our-watersheds-sow-2020-final-web.pdf.”

³⁷ *Id.* at p. 288.

³⁸ *Id.* at p. 107.

³⁹ *Id.*

⁴⁰ *Id.*

already have impervious surfaces greater than ten percent.⁴¹ These include the West Bay, Chambers, Mission Creek, Indian Creek, Percival Creek, Schneider, Capitol Lake, Moxile Creek, Green Cove Creek, Squaxin Passage, Woodard, and Woodland basins.⁴² Many basins are likely to be covered by more than five or ten percent impervious surfaces in the coming years.⁴³

To prevent adverse impacts on and degradation of shoreline ecological functions, WAC 173-26-211(5)(b)(ii)(D) requires rural conservancy shoreline environments to limit impervious surfaces to ten percent of the lot. The proposed SMP does not include any impervious surface limits for the Rural Conservancy environment. This is inconsistent WAC 173-26-211(5)(b)(ii)(D) and will result in continuing adverse impacts shoreline ecological functions. A ten percent maximum imperious surface limit is required for the Rural Conservancy environment.

Protect people, property, and habitat from sea level rise and increased coastal erosion. See proposed 19.400.150B on pages 75 – 76 of 572

The Shoreline Management Act and Shoreline Master Program Guidelines require shoreline master programs to address the flooding that will be caused by sea level rise. RCW 90.58.100(2)(h) requires that shoreline master programs “shall include” “[a]n element that gives consideration to the statewide interest in the prevention and minimization of flood damages ...” WAC 173-26-221(3)(b) provides in part that “[o]ver the long term, the most effective means of flood hazard reduction is to prevent or remove development in flood-prone areas ...” Counties and cities should consider the following when designating and classifying frequently flooded areas ... [t]he potential effects of tsunamis, high tides with strong winds, sea level rise, and extreme weather events, including those potentially resulting from global climate change”⁴⁴ The areas subject to sea level rise are flood prone areas just the same as areas along bays, rivers, or streams that are within the 100-year flood plain. As the State of Washington Department of Ecology’s (Ecology) *Shoreline Master Program Handbook Appendix A: Addressing Sea Level Rise in Shoreline Master Programs* states “SMPs must

⁴¹ *South Puget Sound Forum: Environmental Quality – Economic Vitality Indicators Report* p. 4 last accessed on May 4, 2023, at: <https://www.trpc.org/ArchiveCenter/ViewFile/Item/68> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

⁴² *Id.*

⁴³ *Id.* at p. 5.

⁴⁴ WAC 365-190-110(2) underlining added. This regulation is part of the State of Washington Department of Commerce Minimum Guidelines to Classify Agriculture, Forest, Mineral Lands and Critical Areas.

address flood hazards and seek to reduce the damage caused by floods. Goals and policies addressing flood hazards are another opportunity to address sea level rise and the increased threat from flooding that will accompany it.”⁴⁵

RCW 90.58.100(1) and WAC 173-26-201(2)(a) also require “that the ‘most current, accurate, and complete scientific and technical information’ and ‘management recommendations’ [shall to the extent feasible] form the basis of SMP provisions.”⁴⁶ This includes the current science on sea level rise.

Sea level rise is a real problem that is happening now. Sea level is rising and floods and erosion are increasing. In 2012 the National Research Council concluded that global sea level had risen by about seven inches in the 20th Century.⁴⁷ A recent analysis of sea-level measurements for tide-gage stations, including the Seattle, Washington tide-gauge, shows that sea level rise is accelerating.⁴⁸ Virginia Institute of Marine Science (VIMS) “emeritus professor John Boon, says ‘The year-to-year trends are becoming very informative. The 2020 report cards continue a clear trend toward acceleration in rates of sea-level rise at 27 of our 28 tide-gauge stations along the continental U.S. coastline.’”⁴⁹

⁴⁵ State of Washington Department of Ecology, *Shoreline Master Program Handbook Appendix A: Addressing Sea Level Rise in Shoreline Master Programs* p. 8 (Publication Number 11-06-010: rev. 12/17) last accessed on May 4, 2023, at: <https://apps.ecology.wa.gov/publications/SummaryPages/1106010.html> and enclosed with this letter. The appendix is also at this enclosed at this Dropbox Link: https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=0 with the filename: “1106010part19.pdf.”

⁴⁶ *Taylor Shellfish Company, Inc., et al., v. Pierce County and Ecology (Aquaculture II)*, Final Decision and Order Central Puget Sound Region Growth Management Hearings Board Case No. 18-3-0013c (June 17, 2019), at 10 of 81 footnote omitted.

⁴⁷ National Research Council, *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* p. 23, p. 156, p. 96, p. 102 (2012) accessed on May 4, 2023, at: <https://www.nap.edu/download/13389>.

⁴⁸ William and Mary Virginia Institute of Marine Science, *U.S. West Coast Sea-Level Trends & Processes Trend Values for 2020* last accessed on June 18, 2021, at: https://www.vims.edu/research/products/slrc/compare/west_coast/index.php and enclosed at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=0 with the filename: “U.S. West Coast _ Virginia Institute of Marine Science Trend Values 2020.pdf.”

⁴⁹ David Malmquist, *U.S. sea-level report cards: 2020 again trends toward acceleration* Virginia Institute of Marine Science website (Jan. 24, 2021) last accessed on June 18, 2021, at: https://www.vims.edu/newsandevents/topstories/2021/slrc_2020.php and enclosed at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=0 with the filename: “U.S. sea-level report cards_ 2020 again trends toward acceleration _ Virginia Institute of Marine Science.pdf.”

“Acceleration can be a game changer in terms of impacts and planning, so we really need to pay heed to these patterns,’ says Boon.”⁵⁰ The Seattle tide gage was one of the 27 that had an accelerating rate of sea level rise.⁵¹

The report *Projected Sea Level Rise for Washington State – A 2018 Assessment* projects that for a low greenhouse gas emission scenario there is a 50 percent probability that sea level rise will reach or exceed 1.9 feet by 2100 for Budd Inlet including Boston Harbor.⁵² *Projected Sea Level Rise for Washington State – A 2018 Assessment* projects that for a higher emission scenario there is a 50 percent probability that sea level rise will reach or exceed 2.3 feet by 2100 for Budd Inlet including Boston Harbor.⁵³ Projections are available for all marine shorelines in Washington State. The general extent of the projected sea level rise currently projected for coastal waters can be seen on the NOAA Office for Coastal Management Digitalcoast Sea Level Rise Viewer available at: <https://coast.noaa.gov/digitalcoast/tools/slr.html>

Projected sea level rise will substantially increase flooding. As Ecology writes, “[s]ea level rise and storm surge[s] will increase the frequency and severity of flooding, erosion, and seawater intrusion—thus increasing risks to vulnerable communities, infrastructure, and coastal ecosystems.”⁵⁴ Not only our marine shorelines will be impacted, as Ecology writes “[m]ore frequent extreme storms

⁵⁰ *Id.*

⁵¹ William and Mary Virginia Institute of Marine Science, *U.S. West Coast Sea-Level Trends & Processes Trend Values for 2020*.

⁵² *Relative Sea Level Projections for RCP 4.5 for the Coastal Area Near: 47.1N, 122.9W* data now available at: <https://cig.uw.edu/resources/special-reports/sea-level-rise-in-washington-state-a-2018-assessment/> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County. The methodology used for these projections is available in Miller, I.M., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., Welch, M., Grossman, E., *Projected Sea Level Rise for Washington State – A 2018 Assessment* p. 8 of 24 (A collaboration of Washington Sea Grant, University of Washington Climate Impacts Group, Oregon State University, University of Washington, and US Geological Survey. Prepared for the Washington Coastal Resilience Project: updated 07/2019).

⁵³ *Relative Sea Level Projections for RCP 8.5 for the Coastal Area Near: 47.1N, 122.9W* data now available at: <https://cig.uw.edu/resources/special-reports/sea-level-rise-in-washington-state-a-2018-assessment/> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

⁵⁴ State of Washington Department of Ecology, *Preparing for a Changing Climate Washington State’s Integrated Climate Response Strategy* p. 90 (Publication No. 12-01-004: April 2012) last accessed on May 4, 2023, at: <https://fortress.wa.gov/ecy/publications/summarypages/1201004.html> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

are likely to cause river and coastal flooding, leading to increased injuries and loss of life.”⁵⁵

A peer-reviewed scientific study ranked Washington State 14th in terms of the number of people living on land less than one meter above local Mean High Water compared to the 23 contiguous coastal states and the District of Columbia.⁵⁶ This amounted to an estimated minimum of 18,269 people in 2010.⁵⁷ Zillow recently estimated that 31,235 homes in Washington State may be underwater by 2100, 1.32 percent of the state’s total housing stock. The value of the submerged homes is an estimated \$13.7 billion.⁵⁸ Zillow wrote:

It’s important to note that 2100 is a long way off, and it’s certainly possible that communities [may] take steps to mitigate these risks. Then again, given the enduring popularity of living near the sea despite its many dangers and drawbacks, it may be that even more homes will be located closer to the water in a century’s time, and these estimates could turn out to be very conservative. Either way, left unchecked, it is clear the threats posed by climate change and rising sea levels have the potential to destroy housing values on an enormous scale.⁵⁹

Sea level rise will have an impact beyond rising seas, floods, and storm surges. The National Research Council wrote that:

Rising sea levels and increasing wave heights will exacerbate coastal erosion and shoreline retreat in all geomorphic environments along the west coast. Projections of future cliff and bluff retreat are limited by sparse data in Oregon and Washington and by a high degree of

⁵⁵ *Id.* at p. 17.

⁵⁶ Benjamin H. Strauss, Remik Ziemlinski, Jeremy L. Weiss, and Jonathan T. Overpeck, *Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States* 7 ENVIRON. RES. LETT. 014033, 4 (2012) last accessed on May 4, 2023, at: <http://iopscience.iop.org/1748-9326/7/1/014033/article> This journal is peer reviewed. Environmental Research Letters “About Environmental Research Letters” webpage accessed on May 4, 2023, at: <https://publishingsupport.iopscience.iop.org/journals/environmental-research-letters/about-environmental-research-letters/#peer-review>.

⁵⁷ *Id.*

⁵⁸ Krishna Rao, *Climate Change and Housing: Will a Rising Tide Sink all Homes?* ZILLOW webpage (8/2/2016) last accessed on May 4, 2023, at: <http://www.zillow.com/research/climate-change-underwater-homes-12890/>.

⁵⁹ *Id.*

geomorphic variability along the coast. Projections using only historic rates of cliff erosion predict 10–30 meters [33 to 98 feet] or more of retreat along the west coast by 2100. An increase in the rate of sea-level rise combined with larger waves could significantly increase these rates. Future retreat of beaches will depend on the rate of sea-level rise and, to a lesser extent, the amount of sediment input and loss.⁶⁰

A recent paper estimated that “[a]nalysis with a simple bluff erosion model suggests that predicted rates of sea-level rise have the potential to increase bluff erosion rates by up to 0.1 m/yr [meter a year] by the year 2050.”⁶¹ This translates to four additional inches of bluff erosion a year.

A recent peer-reviewed article estimated that up to 8,017 people in Thurston County will be at risk of adverse impacts from sea level rise in 2100.⁶² The time to adopt protective measures is now.

Homes built today are likely to be in use 2100. And new lots created today will be in use in 2100. This is why the Washington State Department of Ecology recommends “[l]imiting new development in highly vulnerable areas.”⁶³

Unless wetlands and shoreline vegetation can migrate landward, their area and ecological functions will decline.⁶⁴ If development regulations are not updated to

⁶⁰ National Research Council, *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* p. 135 (2012).

⁶¹ George M. Kaminsky, Heather M. Baron, Amanda Hacking, Diana McCandless, David S. Parks, *Mapping and Monitoring Bluff Erosion with Boat-based LIDAR and the Development of a Sediment Budget and Erosion Model for the Elwha and Dungeness Littoral Cells, Clallam County, Washington* p. 3 last accessed on May 4, 2023, at: <http://www.coastalwatershedinstitute.org/Final%20Report%20Clallam%20County%20Bluffs%202014%20Final%20revised.pdf>.

⁶² Mathew E. Hauer, Jason M. Evans, and Deepak R. Mishra, *Millions projected to be at risk from sea-level rise in the continental United States* NATURE CLIMATE CHANGE Letters Advance Online Publication p. 3 (Published Online: 14 March 2016 | DOI: 10.1038/NCLIMATE2961). Nature Climate Change is a peer-reviewed science journal. See the Author Instructions accessed on May 4, 2023, at: http://mts-nclim.nature.com/cgi-bin/main.plex?form_type=display_auth_instructions.

⁶³ State of Washington Department of Ecology, *Preparing for a Changing Climate Washington State's Integrated Climate Response Strategy* p. 90 (Publication No. 12-01-004: April 2012).

⁶⁴ Christopher Craft, Jonathan Clough, Jeff Ehman, Samantha Joye, Richard Park, Steve Pennings, Hongyu Guo, and Megan Machmuller, *Forecasting the effects of accelerated sea-level rise on tidal marsh ecosystem services* FRONT ECOL ENVIRON 2009; 7, doi:10.1890/070219 p. *6 last accessed on

address the need for vegetation to migrate landward in feasible locations, wetlands and shoreline vegetation will decline. According to Ecology “[d]evelopment of coastal areas and shoreline armoring (e.g., bulkheads, seawalls) prevent habitat areas from reestablishing inland” in response to sea level rise.⁶⁵ Ecology provides more detailed documentation of these adverse impacts:

The prospect of more flooding, erosion, and storm damage may lead communities and property owners to seek to build seawalls, dikes, and tidal barriers. The construction and placement of these structures will have a direct and immediate impact on natural shoreline environments. These structures will also lead to the progressive loss of beach and marsh habitat as those areas are squeezed between the rising sea and a more intensively engineered shoreline. Predicted decreases in size or transitions in tidal marshes, salt marshes, and tidal flats will affect the species these habitats support. It is predicted that while some species may be able to locate alternate habitats or food sources, others will not (Glick, 2007).

Shellfish, forage fish, shorebirds, and salmon are among those identified as examples of species at risk (Glick, 2007). Sea level rise will also lead to other changes in coastal ecosystems, such as shifting of stream mouths and tidal inlets, reconfigured estuaries and wetlands, and more frequently disturbed riparian zones.⁶⁶

“Loss of salt marsh and related habitats may be significant in systems constrained by surrounding development.”⁶⁷ This loss of shoreline vegetation will harm the environment. It will also deprive marine shorelines of the vegetation that protects property from erosion and storm damage by modifying soils and accreting

Feb. 26, 2021 at: <http://nsmn1.uh.edu/steve/CV/Publications/Craft%20et%20al%202009.pdf>. Frontiers in Ecology and the Environment is a peer-reviewed scientific journal. Frontiers in Ecology and the Environment Journal Overview webpage last accessed on Feb. 26, 2021, at: <https://esajournals.onlinelibrary.wiley.com/journal/15409309>. Both enclosed at this Dropbox Link: https://www.dropbox.com/sh/4l459v8kavt2/AADAt7NOEwWlcDm_vMlUWSFRa?dl=o with the filename: “Craft et al 2009.pdf” and “Frontiers in Ecology and the Environment - Journal Overview” respectively.

⁶⁵ Washington State Department of Ecology, *Preparing for a Changing Climate: Washington State’s Integrated Climate Response Strategy* p. 68 (Publication No. 12-01-004: April 2012).

⁶⁶ State of Washington Department of Ecology, *Shoreline Master Program Handbook Appendix A: Addressing Sea Level Rise in Shoreline Master Programs* pp. 3 – 4 (Publication Number 11-06-010: rev. 12/17).

⁶⁷ *Id.* p. 4.

sediment.⁶⁸ This will increase damage to upland properties. The general extent of wetland migration can be seen on the NOAA Office for Coastal Management Digitalcoast Sea Level Rise Viewer available at:

<https://coast.noaa.gov/digitalcoast/tools/slr.html>

Flood plain regulations are not enough to address sea level rise for three reasons. *Projected Sea Level Rise for Washington State – A 2018 Assessment* explains two of them:

Finally, it is worth emphasizing that sea level rise projections are different from Federal Emergency Management Agency (FEMA) flood insurance studies, because (1) FEMA studies only consider past events, and (2) flood insurance studies only consider the 100-year event, whereas sea level rise affects coastal water elevations at all times.⁶⁹

The third reason is that flood plain regulations allow fills and piling to elevate structures and also allow commercial buildings to be flood proofed in certain areas. While this affords some protection to the structure, it does not protect the marshes and wetlands that need to migrate.

Because of these significant impacts on people, property, and the environment, “[n]early six in ten Americans supported prohibiting development in flood-prone

⁶⁸ R. A. Feagin, S. M. Lozada-Bernard, T. M. Ravens, I. Möller, K. M. Yeagei, A. H. Baird and David H. Thomas, *Does Vegetation Prevent Wave Erosion of Salt Marsh Edges?* 106 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA pp. 10110-10111 (Jun. 23, 2009) last accessed on May 4, 2023, at: <http://www.pnas.org/content/106/25/10109.full> and enclosed at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=o with the filename: “10109.full.pdf.” This journal is peer-reviewed. *Id.* p. 10113.

⁶⁹ Miller, I.M., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., Welch, M., Grossman, E., *Projected Sea Level Rise for Washington State – A 2018 Assessment* p. 8 of 24 (A collaboration of Washington Sea Grant, University of Washington Climate Impacts Group, Oregon State University, University of Washington, and US Geological Survey. Prepared for the Washington Coastal Resilience Project: updated 07/2019) last accessed on May 4, 2024, at:

<https://cig.uw.edu/resources/special-reports/sea-level-rise-in-washington-state-a-2018-assessment/> and enclosed at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMlUWSFRa?dl=o with the filename: “SLR-Report-Miller-et-al-2018-updated-07_2019.pdf.”

areas (57%).”⁷⁰ It is time for Washington state and local governments to follow the lead of the American people and adopt policies and regulations to protect people, property, and the environment from sea level rise. Therefore, we recommend that the SMP update require that new lots and new buildings be located outside the area of likely sea level rise and if that is not possible, buildings should be elevated above the likely sea level rise. We recommend the following new regulations be added to the SMP update in proposed 19.400.150B on page 76 of 572.

8. New lots shall be designed and located so that the buildable area is outside the area likely to be inundated by sea level rise in 2100 and outside of the area in which wetlands and aquatic vegetation will likely migrate during that time.
9. Where lots are large enough, new structures and buildings shall be located so that they are outside the area likely to be inundated by sea level rise in 2100 and outside of the area in which wetlands and aquatic vegetation will likely migrate during that time.
10. New and substantially improved structures shall be elevated above the likely sea level rise elevation in 2100 or for the life of the building, whichever is less.

Also, to avoid flooding, erosion, and other adverse impacts on shoreline resources, we strongly recommend that the County take a comprehensive approach to adapting to sea level rise and its adverse impacts modeled on the process California’s coastal counties and cities use. The process includes six steps.⁷¹

1. Determine the range of sea level rise projections relevant to Thurston County’s shorelines subject to tidal influence. The California Coastal Commission recommends analyzing intermediate and long-term projections because “development constructed today is likely to remain in place over the next 75-100 years, or longer.”⁷²

⁷⁰ Bo MacInnis and Jon A. Krosnick, *Climate Insights 2020: Surveying American Public Opinion on Climate Change and the Environment Report: Natural Disasters* p. 8 (Washington, DC: Resources for the Future, 2020) accessed on May 4, 2023, at: <https://www.rff.org/publications/reports/climateinsights2020-natural-disasters/> and enclosed at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMIUWSFRa?dl=0 with the filename: “Climate_Insights_2020_Natural_Disasters.pdf.”

⁷¹ *California Coastal Commission Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits* pp. 69 – 95 (Nov. 7, 2018) last accessed on May 4, 2023, at:

<https://www.coastal.ca.gov/climate/slrguidance.html> and at this Dropbox Link:

https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMIUWSFRa?dl=0 with the filename: “o_Full_2018AdoptedSLRGuidanceUpdate.pdf.”

⁷² *Id.* p. 74.

2. Identify potential physical sea level rise impacts in Thurston County's shorelines subject to tidal influence.
3. Assess potential risks from sea level rise to the resources and development on the shorelines subject to tidal influence.
4. Identify adaptation strategies to minimize risks. The *California Coastal Commission Sea Level Rise Policy Guidance* includes recommended adaptation strategies to consider.⁷³
5. Adopt an updated shoreline master program incorporating the selected adaption strategies.
6. Implement the updated shoreline master program and monitor and revise as needed. Because the scientific data on sea level rise is evolving, the California Coastal Commission recommends modifying "the current and future hazard areas on a five-to-ten-year basis or as necessary to allow for the incorporation of new sea level rise science, monitoring results, and information on coastal conditions."⁷⁴

Based on this proven model, we recommend that the following proposed policy be adopted as part of the shoreline master program periodic update.

Policy X. Thurston County shall monitor the impacts of climate change on Thurston County's shorelands, the shoreline master program's ability to adapt to sea level rise and other aspects of climate change at least every periodic update and revise the shoreline master program as needed. Thurston County shall periodically assess the best available sea level rise projections and other science related to climate change within shoreline jurisdiction and incorporate them into future shoreline master program updates as needed.

Prohibit marine net pen aquaculture for nonnative species in the Aquatic environment. Please see proposed Table 19.600.105 Shoreline Use and Modifications Matrix on page 100 – 103 of 572 and proposed 19.600.115 on 105 – 109 of 572

RCW 77.125.050(1) provides that the State of Washington Department of Natural Resources "may authorize or permit activities associated with the use of marine net pens for nonnative marine finfish aquaculture only if these activities are performed under a lease of state-owned aquatic lands in effect on June 7, 2018.

⁷³ *Id.* pp. 121 – 162.

⁷⁴ *Id.* p. 94.

The department may not authorize or permit any of these activities or operations after the expiration date of the relevant lease of state-owned aquatic lands in effect on June 7, 2018.” Consistent with RCW 77.125.050(1), proposed Table 19.600.105 should prohibit marine net pens for nonnative marine finfish aquaculture in the Aquatic environment.

In the Rural Conservancy environment only allow new structural shoreline stabilization and flood control works where there is a documented need to protect an existing structure. Please see proposed Table 19.600.105 Shoreline Use and Modifications Matrix on page 102 of 572, proposed 19.400.150 on pages 75 – 76 of 572, proposed 19.600 and proposed 19.600.175D on pages 132 – 135 of 572

WAC 173-26-211(5)(b)(ii)(C), which applies to the Rural Conservancy environment, provides that:

(C) Construction of new structural shoreline stabilization and flood control works should only be allowed where there is a documented need to protect an existing structure or ecological functions and mitigation is applied, consistent with WAC 173-26-231. New development should be designed and located to preclude the need for such work.

Based on this requirement, we recommend new structural shoreline stabilization only be allowed in the Rural Conservancy environment to protect an existing structure or ecological functions. Recent studies in Puget Sound have documented that structural shoreline stabilization has significant adverse impacts on the local beach on which it is installed and on large areas of Puget Sound.⁷⁵ So this change is necessary to maintain shoreline ecological functions.

⁷⁵ Megan N. Dethier, Wendel W. Raymond, Aundrea N. McBride, Jason D. Toft, Jeffery R. Cordell, Andrea S. Ogston, Sarah M. Heerhartz, Helen D. Berry, *Multiscale impacts of armoring on Salish Sea shorelines: Evidence for cumulative and threshold effects* 175 ESTUARINE, COASTAL AND SHELF SCIENCE 106 p. 106 (2016) enclosed with the paper original of this letter. Estuarine, Coastal and Shelf Science is a peer-reviewed scientific journal. Estuarine, Coastal and Shelf Science Author Information Pack pp. 9 – 11 (20 Feb 2019) accessed on Feb. 22, 2019 at: <https://www.journals.elsevier.com/estuarine-coastal-and-shelf-science> and enclosed with the paper original of Futurewise’s March 6, 2019, letter to Thurston County.

Please modify proposed 19.600.170B.7. on page 129 of 572 to require public access consistent with the SMP Guidelines.

One of the policies of Washington's Shoreline Management Act is to increase public access to publicly owned shorelines.⁷⁶ Unfortunately, proposed 19.600.170B.7. does not fully comply with the SMA or the SMP Guidelines.

The SMP Guidelines implement the Shoreline Management Act (SMA) policies by including more specific requirements for public access. These provisions include WAC 173-26-221(4)(d) which requires in part that:

(iii) Provide standards for the dedication and improvement of public access in developments for water-enjoyment, water-related, and nonwater-dependent uses and for the subdivision of land into more than four parcels. In these cases, public access should be required except:

(A) Where the local government provides more effective public access through a public access planning process described in WAC 173-26-221(4)(c).

(B) Where it is demonstrated to be infeasible due to reasons of incompatible uses, safety, security, or impact to the shoreline environment or due to constitutional or other legal limitations that may be applicable.

In determining the infeasibility, undesirability, or incompatibility of public access in a given situation, local governments shall consider alternate methods of providing public access, such as off-site improvements, viewing platforms, separation of uses through site planning and design, and restricting hours of public access.

(C) For individual single-family residences not part of a development planned for more than four parcels.

Shoreline master programs, including the Thurston County SMP Update, must include public access requirements that are consistent with the SMA and the SMP

⁷⁶ RCW 90.58.020.

Guidelines. Thurston County's proposed SMP update does not fully comply with these requirements because proposed 19.600.170B.7. allows joint or community access in place of public access. So, we recommend that proposed 19.600.170B.7. be modified to read as follows with our deletions double struck through:

7. New multi-residential development, including the subdivision of land for five or more parcels, shall provide for ~~joint or community and/or~~ public access, except where demonstrated to be infeasible due to any of the following:

....

~~Public access may be limited to the landowners within the new development. The developer may choose to allow broader access at their discretion. Broader public access may also be required if shoreline access has historically been permitted or otherwise provided at the site.~~

Require mitigation for all losses of shoreline ecological functions including the adverse impacts of development outside of buffers as required by the SMP guidelines. See Appendix B page 154 of 572

As the State of Washington Court of Appeals wrote “reasonable and appropriate uses should be allowed on the shorelines only if they will result in no net loss of shoreline ecological functions and systems. See RCW 90.58.020; WAC 173-27-241(3)(j).”⁷⁷

Proposed Appendix B B.1.D violates this requirement because it does not require mitigation for development in shorelines jurisdiction but outside buffers. For example, impervious surfaces are increasing in Thurston County including within shoreline jurisdiction.⁷⁸ This adversely impacts salmon habitat. Allowing the removal of shoreline vegetation and increased impervious surfaces outside buffers will adversely impact shoreline ecological resources violating the no net loss requirement of the SMP Guidelines. To comply with the SMP Guidelines, the SMP Update must require mitigation vegetation loss and other adverse impacts of developments on shoreline ecological functions both inside and outside buffers.

⁷⁷ *Olympic Stewardship Found. v. State Env't & Land Use Hearings Off. through W. Washington Growth Mgmt. Hearings Bd.*, 199 Wn. App. 668, 690, 399 P.3d 562, 572 (2017) review denied *Olympic Stewardship Foundation v. State Department of Ecology*, 189 Wn.2d 1040, 409 P.3d 1066 (2018) certiorari denied *Olympic Stewardship Foundation v. State of Washington Environmental and Land Use Hearings Office*, 139 S.Ct. 81, 202 L.Ed.2d 25 (2018).

⁷⁸ 2020 *State of Our Watersheds: A Report by the Treaty Tribes in Western Washington* p. 154, p. 158, p. 288, p. 292.

One way of making mitigation easier to implement and more effective is to develop a vegetation management manual with minimum requirements for planting plans and mitigation. Bainbridge Island has developed a mitigation manual the county could use as an example.

Comments on Appendix C. Shoreline Restoration Plan pages 158 – 81 of 427

WAC 173-26-201(2)(f) provides that:

Consistent with principle WAC 173-26-186 (8)(c), master programs shall include goals, policies and actions for restoration of impaired shoreline ecological functions. These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program. The approach to restoration planning may vary significantly among local jurisdictions, depending on:

- The size of the jurisdiction;
- The extent and condition of shorelines in the jurisdiction;
- The availability of grants, volunteer programs or other tools for restoration; and
- The nature of the ecological functions to be addressed by restoration planning.

Master program restoration plans shall consider and address the following subjects:

- (i) Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;
- (ii) Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;
- (iii) Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;
- (iv) Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;
- (v) Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals;

(vi) Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

If Appendix C is intended to be the Shoreline Restoration Plan, we are concerned that the requirements of WAC 173-26-201(2)(f)(i), (iii), (iv), and (vi) have not been addressed. We recommend that they be addressed.

Thank you for considering our comments. If you require additional information, please contact me at telephone 206-343-0681 Ext. 102 and email: tim@futurewise.org.

Very Truly Yours,



Tim Trohimovich, AICP
Director of Planning & Law

Enclosures for this letter are this Dropbox Link:
https://www.dropbox.com/sh/4l459v8kavtrop2/AADAt7NOEwWlCdm_vMIUWSFRa?dl=0

From: [Phyllis Farrell](#)
To: [County Commissioners](#)
Subject: SMP comments
Date: Thursday, May 4, 2023 6:54:30 PM

Greetings Commissioners, I look forward to meeting with you next week. I have submitted written comments/suggestions via the SMP website, but am including below the comments to you directly... hoping you will see them before our meetings.

I commend the staff and Planning Commission for the extensive research and work in developing the draft. I have followed the process for several years and it has been arduous! Overall, I think the draft has many good provisions and improvements, but there are some areas that need to be addressed.

Vegetation Buffers:

The Minority Report states the proposed provisions are not protective enough to meet Shoreline Management Act (SMA) policy goals and prevent net loss.

The Planning Commission recommended Option A to decrease Shoreline Environmental Designation buffers. They also recommended buffers for Rural Conservancy designations to be reduced by 50% or 125 feet. The Minority Report states these recommendations do not "reflect the policy goals of the act" (WAC 173.26.186)

Thurston County SMP buffers need to reflect best available science. **Option B had more protective buffers, especially in marine shorelines (85' Marine Shoreline Residential and 250' in Urban Conservancy, Rural Conservancy and Natural). Buffers are important for maintaining ecological function!**

Projected sea level rise might shorten buffers.

Reducing buffers will make mitigation and restoration efforts more expensive and complicated.

Gwen Lentes, WDFW, shared in an e mail 10.19.20, WDFW recommends designating riparian buffers as critical areas and using the larger buffer option to more closely align with recent best available science.

The riparian wetlands guidance for fish and aquatic species recommends prioritization of the "pollution removal function when appropriate;" and **adoption of Site-Potential Tree Height (SPTH), based on potential tree height at 200 years, as "a scientifically supported approach if the goal is to protect and maintain full function of the riparian ecosystem."**

The Department of Ecology recommends a Riparian Habitat Area width of 250 feet for Type "S" (Shorelines of the State) and all fish (Type "F") streams regardless of whether they are currently or just potentially used, and whether they flow all year or not. The Draft SMP matches the Ecology guideline of 250 feet only for Type S streams and other streams greater than 20 feet wide. The range

of protection for other fish streams is 150 to 200 feet. **The more protective buffer width of 250' for both Type S and F streams is needed to ensure NNL and account for climate changes in stream temperatures.**

Vegetation requirements should be for mitigation purposes should be native vegetation; **the non native vegetation allowance in the Planning Commission recommendations should be removed.**

No Net Loss can only be achieved with restoration of vegetation in buffers.

Critical Areas:

Critical areas are an essential tool of the GMA for preventing loss of environmental function.

The Minority Report states: The SMP should assure that critical areas within the shoreline are protected in a manner consistent with the Critical Areas Ordinance (CAO) of the Growth Management Act (GMA). We are concerned that there is insufficient consideration given to critical saltwater areas. We note that permitting of critical areas is treated differently in the Draft SMP from the CAO in an important respect: the application of the principle of Reasonable Use (which is highly protective of ecological function) is replaced by shoreline variances. Without some revision, the Draft SMP will likely result in net loss of shoreline critical areas and their functions.

Per the Minority Report, it is recommended **to add a Policy (SH-15) "Critical saltwater habitats should be protected and restored according to the principles of WAC 173-26-221"**

Armoring:

Armoring (bulkheads and logs/stones to stabilize shorelines) results in loss of shoreline sediment important for habitat for marine organisms. It is estimated that more than 27% of Puget Sound shorelines have armoring adversely affecting forage fish habitat and salmon recovery. The Department of Ecology states that more than 700 miles of Puget Sound's shoreline is armored – with approximately four miles added every two years. **The Puget Sound Partnership recommends reduction of shoreline armoring by 25%, more protective permitting requirements and substituting "soft" or natural armoring for impervious bulkheads.**

The Puget Sound Partnership's Regional Estuary Program Shoreline Armoring Implementation Strategy offers an approach that identifies effective implementation, compliance monitoring and enforcement improvements within and across regulatory agencies in Puget Sound. These efforts will reduce new (and especially illegal) armoring and reduce the impacts of repairs. **The SMP should align with the PSP Regional Estuary Program Shoreline Armoring Implementation Strategy recommendations.**

The Minority Report indicates the draft SMP is not as protective against No Net Loss as it should be.

The Minority Report recommendations should be inserted in the SMP...incorporating the Ecology SMP Handbook Guidelines, most notably that shoreline designations must be supplemented with consideration of specific shoreline environmental conditions and cumulative impacts.

With potential sea level rise encroaching on homeowners' vegetation buffers, there will be requests for armoring. **Require "soft" armoring for repairs and limit armoring expansions;** allowing only if the modifications do not result in a net loss of ecological function.

1. Docks should be prohibited in Natural designations

2. Maintain the requirement that docks must be grated to allow light

3. Limit new docks and require multi-family or community docks

Aquaculture:

Monitoring, Inspections and Enforcement Current and historical practices have demonstrated a lack of adequate inspection, monitoring and enforcement of aquaculture permits. New procedures and practices are required to minimize environmental impacts. Every site should be inspected at the time of planting, when structural changes occur, such as with removal of nets, and when harvesting occurs. **There must be a mechanism for reporting permit violations by county personnel and citizens and a response by the county.**

Adaptive Management **The principle of Adaptive Management should be applied to aquaculture.** This should include a formal means of observing and reporting information about industry practices and impacts on the environment, as well a formal process to revise regulations as new information emerges.

No use of plastics Polyvinyl Chloride (PVC) and High Density Polyethylene (HDPE) plastics are used extensively in aquaculture. They are toxic during their manufacture and use in the marine environment. The toxic elements include mercury, asbestos and/or polyfluoroalkyl substances (PFAS). There is no safe level of PFAS chemicals for humans. **The use of these plastics for aquaculture must be eliminated and sustainable practices required.**

Non-disruptive harvesting Current geoduck harvesting techniques involve the liquification of the tidelands to a depth of three feet by the use of high pressure hoses. This damages the benthic environment and reduces biodiversity. Because sites are continuously replanted after each harvest, there is no time for recovery. **Hydraulic harvesting should be prohibited in favor of sustainable techniques.**

Additionally, intensive oyster bag cultivation with plastic bags and netting covers large sections of tideland disrupting naturally occurring flora and fauna. Spacing and buffers based on available science with adaptable management practices should be put in place to protect the tideland environment.

Individual permits (not consolidated) Because aquaculture sites can vary greatly even when in close proximity, each site must be evaluated for environmental impacts. The consolidation of multiple adjacent parcels into one permit application prevents proper environmental evaluation and should be prohibited.

Thank you,

Phyllis Farrell

Sunwood Lakes

Sent from [Mail](#) for Windows

From: [Cynthia Wilson](#)
To: [Andrew Deffobis](#); [Carolina Mejia-Barahona](#); [Gary Edwards](#); [Tye Menser](#)
Subject: Shoreline Master Program Draft Comments
Date: Wednesday, May 31, 2023 11:26:48 PM
Attachments: [cped-cp-docs-factsheet-habitat-1.pdf](#)
[comment on the draft SMP2023.pdf](#)
[CAO Bibliography 7-24-12\[55475\].pdf](#)

Attached are my comments on the Draft Shoreline Master Program.
Thank you for the opportunity to comment.
Sincerely
Cynthia Wilson
360 561-0524

May 31, 2023

Dear Commissioners,

Thank you for the opportunity to comment on the draft Shoreline Master Program (SMP) update. My name is Cynthia Wilson. I am a Fisheries Biologist and have over 36 years working for the State of Washington and Thurston County on environmental issues. My previous position was as the Community Planning and Economic Development (CPED) Planning Manager before I retired. During my time at the County, I spent a significant amount of time implementing the Critical Areas Ordinance (CAO) and SMP, as well as working on the 2012 CAO update for Thurston County.

Generally, I think there are many good elements of the draft SMP document but I do have concerns especially about Marine and Freshwater Riparian area buffers. I have several overall comments as well as some specific ones based on issues or comment letters.

I have reviewed the Planning Commission (PC) recommendation as well as the minority report. While there are a number of issues, I agree with the minority report regarding buffers and the importance of buffers in the Shoreline environment. The minority report is more consistent with current Best Available Science (BAS) and is more consistent with Federal, State and Local salmon and orca recovery efforts. It has referenced good science for protection of our fragile and important Shoreline areas. It also reflects consistency with the current CAO and the BAS used for that update.

As I have followed the PC review it appears that occasionally there has been more focus on lake development regulations and buffers. Unfortunately, these desires have carried over to a blanket buffer recommendation that includes lakes with the marine shorelines, and there has sometimes been a dismissal of some of the science that is so important to these types of discussions.

Buffers

Much of the current BAS builds upon that used in the 2012 CAO update. As an alternative to the PC proposed buffers, I would suggest that Lakes should be separated from Marine shorelines in the application of buffers in the different designations. My recommendations would be as follows for the following reasons.

Lakes

50-75 ft Shoreline Residential

125 ft Urban Conservancy (Portions of Black Lk, Long Lk, Pattison Lk, Bigelow Lk, etc)

150 ft Rural Conservancy

250 ft Natural

(Some of these areas would likely be regulated as wetlands but they are also designated under the SMP)

Marine

85ft Shoreline Residential
250 Urban Conservancy
250 Rural Conservancy
250 ft Natural
Streams 250ft (all Designations)

Lakes

Many Lakes, especially in Rural Residential/Shoreline Residential designation are already highly impacted and have minimal shoreline vegetation, as well as water quality issues due to septic, fertilizers and stormwater run-off. There are also very few undeveloped lots within many lake areas. It would be beneficial to the lake water quality to add additional buffer protections and vegetation. This could occur by focusing attention on potential redevelopment and moving structures back a bit while promoting education of the values of native vegetation, avoiding fertilizers and controlling run-off, on existing lots.

Lake quality can impact other water bodies by discharging water with an increased temperature and by transporting pollutants and sediments downstream to streams and wetlands, and eventually to marine waters. Lakefront property owners may not be aware of the environmental importance of their lakes. Their focus frequently is on recreational uses such as boating and swimming. These activities will be impacted by poor water quality, so methods to improve these qualities will benefit lake front property owners.

- Although I believe that the science supports the slightly larger buffers on Lakes, the smaller buffers proposed by the PC majority could be applied to Lakes only. Lake Shoreline Residential buffers could be 50-75'.
- Most of the lots within the Shoreline Residential are built-out so there would be no effect on existing structures or property condition, especially with the new allowance to reconstruction within the existing footprint.
- Future impacts would be from redevelopment where structures could be moved back, even a small amount, with Urban Conservancy, Rural Conservancy and Natural buffers incrementally increasing to protect the Lake shorelines. Again, these would not impact existing structures but would make future development implemented in a more environmentally protective way. Outreach on property management, possibly through Lake Management Districts, could focus on improving existing development elements, vegetation, septic and stormwater management on existing lots.

Marine Riparian Areas

I support the buffers as proposed in the earlier drafts and the 2012 updated CAO (Freshwater and Marine Riparian Habitat areas. (TCC 24.25) as indicated above. These are consistent with the current Best Available Science and the Stream and Marine Urban Conservancy; Rural Conservancy; and Natural designation buffers have been in place for over 10 years.

The science and BAS documents focus on the important habitat functions and values provided by freshwater and marine riparian areas, and include, among other things, new guidance about viewing 'riparian management zones' as not simply buffers for streams and rivers, but as habitats in and of themselves. These Riparian Management areas are identified as Critical Areas themselves, and are not just needed to protect Critical Areas or Shorelines. Marine Riparian areas are so important to wildlife, salmon and orca recovery and the near shore is equally critical to juvenile and adult salmon migration. Using the buffers as above and identified in the CAO, would provide consistency.

- Existing Development would not be impacted. Future remodeling/reconstruction is much easier, especially with the new allowance to reconstruct within the existing footprint.
- The majority of Marine Shoreline Residential properties are already developed. Buffers will be increased by 35 feet which is likely to only impact redevelopment of properties and increase the environmental qualities of the property.
- If the concern is for properties that may be highly restricted in meeting these setbacks, criteria can be set that allows for development/redevelopment of small lots with minimized footprints and mitigation that will lessen the development's impact. Addressing these smaller lots individually should be the focus rather than wholesale abandonment of appropriate scientifically supported buffers.
- Additionally, the Marine buffers supported by the minority report and proposed in previous versions are not new. Most of them were adopted into the 2012 CAO under Freshwater and Marine Riparian Areas. Therefore, the impression that the buffers will to be "significantly" increased is not accurate and contributes to bigger concerns than are necessary.
- Current BAS supports maintaining the 250-foot setback currently set in the 2012 CAO for Fish and Wildlife Habitat Conservation Areas-Freshwater and Marine Riparian Areas (TCC 24.25). This is consistent with current science regarding the importance of riparian areas for Puget Sound salmon protection and recovery, especially considering the proposed potential buffer reductions and activities that may be allowed to occur within the buffers. The CAO Marine Riparian buffers have been in place for the last 11 years and to reduce it in the SMP update would negate the protection these buffers have provided to fish and wildlife species along the shoreline.
- Reducing the Marine buffers to a proposed 150-foot, would impact the shoreline area dramatically. This would be contrary to meeting no net loss requirements and the Best Available Science that shows how important these areas are to our threatened and

endangered species, salmon and Orca recovery efforts. Nor would a change to a smaller buffer be consistent with the current political climate that is spending millions of Federal, State and Local dollars to recover Salmon and Orca in Puget Sound.

- Current science indicates that even larger buffers, not smaller buffers, may be required to preserve fish and wildlife habitat as well as water quality. You need only to look at the Governor's "State of the Sound" to see that we are not doing enough to protect our valuable natural resources including salmon and Orca. stateofthesound.wa.gov. Increased reductions, loss of vegetation and structures within a Riparian buffer are not supported by WDFW [Management Recommendations for Washington's Priority Habitats: Riparian | Washington Department of Fish & Wildlife](#), [Land Use Planning for Salmon, Steelhead and Trout: A land use planner's guide to salmonid habitat protection and recovery | Washington Department of Fish & Wildlife](#)

Brief History on 2012 CAO and the SMP

In 2012 the updated Critical Areas Ordinance (CAO) was adopted by Thurston County after extensive scientific research and review and extensive public comment and review. The CAO adopted buffers and standards to protect Freshwater Riparian Areas and Marine Riparian areas. The only portion of the Shoreline that was left under the regulations of the SMP were Rural Shorelines (now called Shoreline Residential) and Lakes. See the attached information sheet on the CAO update process. Marine Urban/Rural Conservancy and Natural designation buffers have been in place since 2012. The lake buffers under discussion are based on the 1990 SMP.

Rural Shorelines/Shoreline Residential were primarily excluded from the CAO update because most of those areas were already developed at the current 50' buffer or closer. Those areas were intended to be analyzed in the SMP update by focusing on potential restoration and incrementally moving new structures (when the property is redeveloped) back from the shoreline. There was recognition that many of these lots did not have room to meet extensive setbacks but that improvements could be made in enhancement and planting of native vegetation, improving the water quality discharges from stormwater and septic systems, potentially removing bulkheads and nearshore obstructions if possible.

Lakes were not addressed in the 2012 CAO update due to recognizing that Thurston County lakes are very different from each other and a more refined approach was necessary. Lakes were anticipated to be addressed in the SMP update you are now reviewing. Citizens who live on lakes have many different desires. Sometimes those desires are not necessarily consistent with science and the protection of the beautiful water bodies they live on. There is overwhelming environmental science that supports setting back structures from the edge of the water, protecting and increasing native trees and vegetation to protect and improve water quality and provide fish and wildlife habitat, and to avoid or remove bulkheads or shoreline structures. All of these measures will improve the environmental quality of a shoreline.

Requiring setbacks and buffers is one of the most important things the County can do to protect our fragile and sensitive shorelines. Many things can, and do, happen after a home is built, vegetation is removed, bulkheads and docks are built without permits, and other alterations occur. The only way to rectify these violations is through a compliance action. Something that takes a large amount of staff time and effort and that is inconsistent because violations are complaint driven. Keeping an adequate setback/buffer reduces the vegetation disturbance and avoids the need for other structures such as bulkheads, which are damaging to fish and wildlife habitat.

Variances and Mitigation

I encourage you not to allow for modification of buffers unless a property does not have a buildable area and avoidance cannot be met. Variances to buffer widths for development should be only allowed when the standard buffer cannot be accommodated on a property. The current SMP draft version implies that a variance could be requested for any reason. The criteria should be clear with specific requirements and not left to interpretation of the applicant or the nebulous terminology such as “to the extent possible” or “minimum disturbance”. While these are good overall goals, some specificity should be included such as square feet limit on footprint or disturbance and mitigation plantings with associated financial bonds to ensure the work is done. Please don’t put the burden of interpretation on the planner who potentially will be pressured by the applicant as well as others. Without good criteria, you can assume that every variance request will be approved, thus negating the environmental benefits of a full functioning buffer.

It appears that the current Planning Commission draft SMP is relying on the implementation of mitigation revegetation to reduce impacts. Mitigation sequencing is required when impacting an environmentally sensitive area and the number one priority is avoidance. Relying on mitigation plantings is false confidence since very few private property mitigation projects are successful. This is due not usually to purposefully removing plants or maintaining buffers, but due to lack of attention, changing property owners, and the County’s inability to monitor and force a property owner to complete and maintain the mitigation area.

It is a problem and results in permanent loss of ecological functions. It also puts the County in the untenable position of regulating by enforcement and trying to do it consistently and for every project. Avoidance of impacts should be the priority, then clear criteria for those properties that cannot be used without some alteration of buffer functions. Mitigation plantings can then be required and applied for those limited projects. I encourage you not to reduce the current buffers and not to allow non-essential buffer reductions with unachievable mitigation requirements. Reducing current buffers and relying on mitigation planting will not lead to the no net loss requirement. The focus of accommodation should be on those few lots that are too small to meet regulatory buffers. You cannot reach restoration or no net loss goals

by setting low buffers and then allowing reduction of those buffers and allowing more impacts to the habitat.

Docks and Piers

Docks and piers should be prohibited on Marine Conservancy and Natural shorelines. They are unusable due to tidal influence; they interfere with nearshore drift and they cannot be built without damaging the nearshore which is critical habitat for salmonids and other marine species that are so threatened now. I would also recommend that they be prohibited or restricted in Marine Shoreline Residential designations for the same reasons, although some of these areas have already been significantly impacted due to the small buffers.

I'm unclear why grating/transparent areas on docks is under discussion. I would recommend that WDFW criteria be used to avoid confusion for staff and applicants. I believe that WDFW has required it for resident and non-resident fish through their HPA process for a number of years. It would be a burden to imply to a property owner that they do not need grating when in fact, they would need the grating through the HPA from WDFW. To limit it as phrased, ignores the fact that there are land locked salmon which require no less protection than anadromous salmonids. For instance, Steelhead are the anadromous form of the rainbow trout (*Oncorhynchus mykiss*). Should we protect water bodies with Steelhead but not native Rainbow trout? They are both salmon. WDFW could provide their guidance on dock construction and impacts to fish and the lakes that need it. The County could incorporate those criteria. Outreach to contractors and manufacturers that construct docks would be beneficial so that the type of dock with grating is available for purchase that meets WDFW's criteria. Although there were comment letters concerned with the grating requirement, I suspect that is because it requires special construction and dock elements that are not currently available to the public rather than not liking the appearance.

Legal Non-conforming

The term non-conforming or legally non-conforming is a well understood term in the planning field for most jurisdictions. I think "legal non-conforming" as reference to a legally permitted structure, which may now not meet current codes, would be appropriate. Regardless of terminology, the criteria and restrictions (or not) will be the same.

It is clear that the Planning Commission is seeking to allow reconstruction of legal non-conforming structures within the same footprint which is a big benefit to shoreline property owners and will make some permitting easier. A definition of "footprint" for the various codes would be very helpful to staff and those reviewing proposals. I recommend that the SMP incorporate language to anticipate footprints that include unpermitted structures or impervious areas and for structures that are so dilapidated that they are unlivable but could claim to "remodel within the existing footprint". Making sure staff has clear language to use will be important to include in the SMP. Frequently this can be helped by stating "remodeled within the existing legally permitted footprint" or similar.

Bulkheads

New bulkheads should not be allowed in any shoreline designation due to the plethora of well documented impacts to fish and wildlife. This is especially true for any Marine Shoreline. Replacement of bulkheads may be allowed consistent with the SMP criteria and the hierarchy of methods to reduce impact. The preference being natural stabilization methods over hard armoring. Having appropriate buffers and setbacks, as I noted above, will avoid the need for bulkheads.

Again, thank you for the opportunity to comment.

Sincerely,

Cynthia Wilson

360 561-0524

Staff note: This comment includes several attachments which are available to view by:

- 1. Visiting <https://s3.us-west-2.amazonaws.com/thurstoncountywa.gov.if-us-west-2/s3fs-public/2023-06/cped-cp-docs-SMP-BOCC-Public-Hearing-Combined-Comments-101-119-A-1.pdf>**
- 2. Scrolling to Comment 118 (begins on page 203 using the page counter at the top of the PDF.**

From: [Alex Nielsen](#)
To: [Andrew Deffobis](#)
Cc: [SMP](#)
Subject: Master Shoreline Plan Comments - Nielsen Pacific Ltd.
Date: Tuesday, May 16, 2023 11:34:41 AM
Attachments: [2798_001.pdf](#)

Dear Andrew,

Please see the attached letter regarding our comments ahead of tonights Shoreline Master Plan hearing.

Alex,

—

Alex Nielsen
Vice President
Nielsen Pacific Ltd.
(253) 720-7030

NIELSEN PACIFIC LTD.

May 16, 2023

THURSTON COUNTY BOARD OF COUNTY COMMISSIONERS

3000 Pacific Avenue Southeast
Olympia, Washington 98501

Dear Thurston County Commissioners:

Nielsen Pacific LTD/Holroyd Company owns property at 828 Old Pacific Highway Southeast, Olympia, Washington 98513. There are six Thurston County Tax Parcels, sharing the same number (09640007000), under our ownership that have all or portions of them proposed to be designated as Rural Conservancy in the preliminary Shoreline Master Program Maps based upon the Thurston County Graphic Information Systems (GIS) February 1996 Flood of Record "mapped" inundation area. These six parcels ("Six Parcels") are addressed under this submittal collectively. The Six Parcels of the Nielsen Pacific Property abut the intersection of Old Pacific Highway Southeast and Durgin Road Southeast, with the northern most tip being at the intersection of Old Pacific Highway Southeast and Durgin Road Southeast. The basis for inclusion of the Nielsen Property is the "1996 Flood of Record" and a flood monument identified on the County's GIS Map. We have not been able to locate any additional County data substantiating this monument elevation. The only documentation online or available through the Washington State Department of Transportation and the Washington State DNR is an aerial photograph with a Resolution of 1:24,000.

I.

We have concerns regarding how the Flood of Record elevation was established and request that the field survey data and any photographs taken from the ground that support Elevation 30.23 NAVD 88 for Flood Reference Monument NS08 on the Face of highline power pole at the intersection of Old Pacific Highway Southeast and Durgin Road Southeast be made available in the public record for the property owners to evaluate. Stephen Nielsen, principal owner of Nielsen Pacific was present on the ground at the time of the 1996 flood event with first-hand knowledge of the flood level during the peak volume and therefore, we disagree with the flood stage elevation set forth by the County.

II.

We also are requesting that a process be developed in advance of adopting the 2023 Thurston County Shoreline Master Program Update for property owners, such as ourselves, to submit ground topographic survey data of our Six Parcels to demonstrate that portions of our land are inappropriately included in the inundation areas of the 1996 Flood of Record (even assuming the County's flood stage elevation is accurate). Therefore, any adopted Shoreline Master Program Mapping can correctly indicate those areas that lie outside the proposed Shoreline Designation.

The southwestern most portion of the County-mapped Flood of Record area on our Six Parcels is clearly included in the flooded area in error. Even assuming the County's Flood of Record Elevation at the intersection of Old Pacific Highway Southeast and Durgin Road Southeast at

NIELSEN PACIFIC LTD.

elevation 30.23 NAVD 88 is accurate, the hill on our property, a portion of which is included in the 1996 flood area, rises from not less than 30 to an elevation of 60 plus in the designated area which is clearly evident in the County's own GIS mapping online. The Flood of Record area on our Six Parcels has been preliminarily included in the Rural Conservancy Shoreline Designation in the 2023 Shoreline Master Program Update.

Therefore, ***we request that the Commissioners provide direction to County Staff, as part of the review process prior to adoption of the proposed Shoreline Master Program Update, to accept appropriate documentation, inclusive of survey mapping, from property owners, prior to the adoption of the 2023 Thurston County Shoreline Master Program Update,*** in order that property owners can establish that their land is incorrectly mapped in the proposed "frequently flooded areas" in Thurston County GIS. This will provide for the development of a more accurate mapping of Shoreline Designations in this update.

Thank you for your thoughtful consideration of our requests.

Sincerely,

NIELSEN PACIFIC, LTD.



Stephen Nielsen, President

From: [Alex Nielsen](#)
 To: [SMP](#)
 Cc: [Andrew Deffobis](#)
 Subject: SMP Additional Requests & Comments
 Date: Wednesday, May 31, 2023 4:25:51 PM
 Attachments: [sitts & hill engineers technical memorandum.pdf](#)
[1996 adopted thurston co \(tetra tech\) flood haz mitigation plan.pdf](#)
[fema firm panel.pdf](#)
[2020 tpu flood control reservoir efforts.pdf](#)

Dear Mr. Deffobis,

Thank you for the opportunity for further public comment. The decisions to be made on the proposed SMP Update should be made on sound and verifiable data. The SMP Update will alter the Zoning Classification on over 700 parcels and we believe a portion of the new Zoning Classification will be made in error. Based on the information that is currently publicly available (pending an additional records request submitted 5/23/23 through the County Website and records request made at SMP public hearing on 5/16/23), we have come to understand that a portion of the proposed SMP's mapping for "Frequently Flooded Areas" in the Nisqually Valley, specifically near 828 Old Pacific Highway Southeast, Olympia, Washington 98513 ***is beyond the minimum requirements set forth in WAC 173-22-040 and is not accurate based upon the Tetra Tech Report (2013) adopted by the County.***

We are requesting that either this mapping for "Frequently Flooded Areas" in the Nisqually Valley be amended to be consistent with Tetra Tech Report (2013) or the data the County is now relying upon with regard to Monument NS08 (Flood Elevation) must be made available in the public record for review by the public prior to any decision by the Commissioners.

The County Records Division is indicating that the requested information will not likely be made available (in accordance with a public records request) until June 23. We understand from Andrew Deffobis that if the Commissioners would ask for the data directly (i.e., field notes and other documentation), the County Planners would make it available promptly. We are confused why we (the public) must wait longer until June 23 to receive any such data in accordance with a public records request.

Attached is a Technical Memorandum prepared by our engineers (Sitts & Hill Engineers, Inc.) based upon available information in the public domain. As noted in the Memorandum, in 2013, the County engaged Tetra Tech, an experienced engineering firm, to prepare a Hazard Mitigation Plan. Their Report (also attached), which was formally adopted by the County, mapped the extents and limits of the 1996 Flood, which does not extend as far south as the County's designation of the "1996 Flood of Record". Tetra Tech's Report was prepared from County data as noted in the attached Memorandum. ***Tetra Tech's Report is in direct***

conflict with the County's "Monument NS08".

Tetra Tech's Report as to the extent (elevation of the 1996 Flood) (supported by County data) is consistent with the public testimony and is in conflict with proposed SMP mapping which must be resolved prior to any decision on an update to the SMP.

We appreciate you taking the time to review the attached Memorandum, Tetra Tech Report, and information. The County's decision should be made on sound and not conflicting data.

Thank you,

Alex Nielsen
Vice-President
Nielsen Pacific, Ltd.
253-720-7030
Alexn@holroyd.co



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Brent K. Leslie, PE, SE
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Michael A. McEvilly, PLS
Andrew J. Boileau, PE, SE
David C. Boileau, AIA

May 28, 2023

THURSTON COUNTY BOARD OF COUNTY COMMISSIONERS

3000 Pacific Avenue Southeast
Olympia, Washington 98501

TO: Chair Mejia, District 1 and Commissioners Edwards, District 2 and Menser, District 3

SUBJECT: 2023 Proposed Shoreline Master Program (SMP) Update

Dear Thurston County Board of County Commissioners:

The intent of this letter is to provide comment on the 2023 Thurston County Draft Shoreline Master Program update. We represent the Nielsen Companies, which includes Nielsen Pacific Ltd. and Holroyd Company, as owner and operator of a concrete plant located at 828 Old Pacific Highway Southeast, Olympia, Washington 98513, in unincorporated Thurston County at the intersection of Old Pacific Highway Southeast and Durgin Road Southeast. The site contains six parcels sharing the same Assessors Tax Parcel Number 09640007000. The Holroyd Company concrete plant is located on properties that have the potential to be impacted by the 2023 Shoreline Master Program update once adopted.

Our specific concerns are:

1. Inclusion of Lands Approximately 4,500 Feet from the Nisqually River in the Shoreline Designation

Thurston County is proposing to include "Flood of Record" inundation areas for the February 8, 1996 Nisqually River, as "Frequently Flooded Areas" and designate these areas as Shorelines, in the 2023 Shoreline Master Program (SMP) update. This is above and beyond the minimum Requirements of **WAC 173-22-040 Shoreland area designation criteria**.

From Thurston County GIS, as measured along Old Pacific Highway Southeast, the extent of the Flood of Record is approximately 4,500 feet and 3,000 feet southwest of the Nisqually River and its associated FEMA 100-year flood plain respectively.

2. The Absence of Data to Support the Limits and Extent of the Flood of Record as Proposed Under the 2023 Draft SMP Update

From RCW 90.58.100 (1), (e) and (f):

"RCW 90.58.100: Programs as constituting use regulations—Duties when preparing programs and amendments thereto—Program contents.

(1) The master programs provided for in this chapter, when adopted or approved by the department shall constitute *use regulations* for the various shorelines of the state. *In preparing the master programs, and any amendments thereto, the department and local governments shall to the extent feasible:*

(e) Utilize all available information regarding hydrology, geography, topography, ecology, economics, and other pertinent data;

(f) Employ, when feasible, all appropriate, modern scientific data processing and computer techniques to store, index, analyze, and manage the information gathered..."

The data and methodologies used to determine the inundation area and the flood elevation for the Flood of Record, that Thurston County has published in their online Graphic Information System (GIS) for Monument NS08, need to be made public. ***GIS information is in direct conflict with the 2013 Final Thurston County Flood Hazard Mitigation Plan, Figure 6-1 Mapped Flood Hazard Areas in Thurston County, prepared by Tetra Tech, and approved by the Thurston County Board of County Commissioners December 11, 2012.*** (See Attached)

Accurate information, to determine the extents of the Shoreline designation depicted on the official County maps, is critical due to the limitations and restrictions placed on properties as a result of a Rural Conservancy Shoreline Designation. My understanding is that even if there is a process to remove a property or a portion of a property from a Shoreline Designation, a Map Amendment will be required as the Shoreline has use restrictions implemented as a zoning classification. This differs from a Critical Area designation which is an overly.

Thurston County Staff have stated they have the scientific data and methodologies used to determine the limits and extent of the February 1996 Nisqually River, readily available for the Board of County Commissioners (BoCC) to review, if requested by them.

In a Request for Public Information on how the February 1996 flood elevation was determined for NS08, at the intersection of Old Pacific Highway Southeast and Durgin Road Southeast, we were told the information would be sent to us on or before June 23, 2023.

3. Procedures for Map Corrections

The 2023 Thurston County SMP update should include explicit direction to land owners, on methodologies to correct errors and have their property removed from the Shoreline designation based upon ground topographic survey information compared to published base flood elevations.

The overriding concern is that the Shoreline designation is not just an overly but creates zoning classification changes on affected property. These zoning classification changes control allowable uses on a property. If the mapping is incorrect, the property owner cannot change the allowable land uses which are tied to the Shoreline designation created in error.

We have reviewed the following documents and publications in support of the preparation of this letter:

- The Draft 2023 Shoreline Master Program document published on the County website
- The 1990 Thurston County Shoreline Designation Map
- The October 2022 Draft Thurston County Preliminary shoreline designation Map
- WAC 173-22-040 Shoreland area designation criteria, WAC 365-190-110 Frequently flooded areas and RCW 90.58.100 Programs as constituting use regulations—Duties when preparing programs and amendments thereto—Program contents.

- The January 2013 Final Thurston County Flood Hazard Mitigation Plan, prepared by Tetra Tech, approved by the Board of County Commissioners December 11, 2012
- Tacoma Public Utilities - February 14, 2020 Tacoma Power's Efforts During Thurston County Flooding
- Chapter 4.3 Flood Hazard Profile: March 2017 Thurston County Hazards Mitigation Plan
- Hydrology Report Nisqually River, WA, STARR II (Strategic Alliance for Risk Reduction), January 2019
- The information available from Thurston County Graphic Information System (GIS) for the February 1996 Flood of Record, available using the flood and groundwater hazard area layer in the "Show Me Everything Map"
- The current FEMA flood plain areas published in Thurston County (GIS)
- The FEMA FIRM Panel 215 of 625 Map Number 53067C0215E, Effective October 16, 2012, also indicated as FEMA flood plains 2012-2016 published in Thurston County (GIS)
- DNR aerial photography for Nisqually River Flooding dated February 9, 1996, also published by Thurston County

Item 1. Inclusion of Lands Approximately 4,500 Feet from the Nisqually River in the Shoreline Designation

Thurston County is proposing to include "Flood of Record" inundation areas for the February 8, 1996 Nisqually River, as "Frequently Flooded Areas" and designate these areas as Shorelines, in the 2023 Shoreline Master Program (SMP) update. This is above and beyond the minimum Requirements of WAC 173-22-040 Shoreland area designation criteria, but allowable; providing the requirements of RCW 90.58.100 are met. WAC 173-22-040 (b) does not require local governments to incorporate lands located further than 200 feet from the ordinary high water mark, lying outside the 100-year flood plain in their Shoreline Master Program Shoreline designation area.

Although the inundation area for the 1996 Nisqually Flood is included as Frequently Flood areas in the County's Critical Areas Ordinances, the Critical Areas designation **does not** affect the Zoning Classifications and restrict uses as is proposed under the 2023 SMP update, which will affect Zoning.

For the definition of "Frequently Flooded Areas" in the 2023 Draft SMP please see page 17 of 446 section **19.150.387 Frequently Flooded Areas:** "lands in the flood plain subject to at least a one percent or greater chance of flooding in any given year (*the FEMA 100-year flood plain – inserted in quote for clarity*) or areas within the highest know recorded flood elevation..."

Please see the 2013 Final Thurston County Flood Hazard Mitigation Plan at pages 6-11 and 6-12 Section **6.3.4 February 1996, Federal Disaster 1100: Flooding:**

"...One of the reasons that the Nisqually River was the worst hit during this event (February 8, 1996) is that Tacoma Power raised the level of the Alder Lake Dam to capacity during the first two days of the storm. ***The reservoir was over 17 feet below capacity at the start of the storm, as verified by historical records. Tacoma Power could have completely mitigated the effects of the event.*** (emphasis added) This was a repeat of what happened in November 1995."

The flooding on the Nisqually River is largely a result of available storage capacity in Alder Lake and the magnitude of discharges from Alder and La Grande Dams. The event of November 2006 demonstrates that Tacoma Power can and has attenuated flooding in the Nisqually Valley through management of storage volume in Alder Lake and discharges from Alder and La Grande Dams.

Please see the attached excerpt from the January 2019 Hydrology Report for the Nisqually River, WA, STARR II (Strategic Alliance for Risk Reduction) Table 2 – Peak discharges for selected floods at Nisqually River USGS gages. The February 1996 event is the largest at gages downstream of Alder Reservoir, but upstream, at the National gage, it was the second largest event. In 1996, the peak flow near National was 21,200 CFS and the peak flow at McKenna was 50,000 CFS. In November of 2006, the peak flow near National was 21,800 CFS and the peak flow at McKenna was 12,000 CFS. **Two events with similar hydrology did not produce similar flooding in the lower Nisqually Valley.**

Tacoma Public Utilities (TPU) Tacoma Power in their February 14, 2020 press release (attached), discusses how their efforts at the Nisqually River Project, were effective to reduce flooding downstream of the Nisqually Project, through the reduction of downstream flow by 25%.

The degree of flooding in the Nisqually valley is largely the result of management of storage and discharges at the TPU Nisqually River project. Since 1996, TPU has been effective in limiting flooding in the Nisqually Valley below February 8, 1996 Flood of Record levels.

A reasonable and defensible determination of the limits of Shoreline designations in the Nisqually Watershed would be to include the area limits 200 feet landward of the ordinary high water mark and the entire FEMA 100-year flood plain. ***Thurston County still has the opportunity to adequately and appropriately regulate activities in Frequently Flooded Areas located outside the 100-year flood plain through their Critical Areas Ordinance, as is the case at this time.***

2. The Absence of Data to Support the Limits and Extent of the Flood of Record as Proposed Under the 2023 Draft SMP Update

RCW 90.58.100 requires the use of (e) all available information regarding hydrology, geography, topography, ecology, economics, and other pertinent data; and (f) Employ, when feasible, all appropriate, modern scientific data processing and computer techniques to store, index, analyze, and manage the information gathered...” for municipalities updating their Shoreline Master Programs.

The data and methodologies, used to determine the inundation area and the flood elevation that Thurston County has published in their online Graphic Information System (GIS) for Monument NS08, need to be made public. ***GIS information is in direct conflict with the 2013 Final Thurston County Flood Hazard Mitigation Plan, Figure 6-1 Mapped Flood Hazard Areas in Thurston County, prepared by Tetra Tech, and approved by the Thurston County Board of County Commissioners December 11, 2012.*** (See attached)

We have sent Thurston County a Request for Public Information (RFPI) on how the 1996 Flood of Record high water elevation for Monument NS08 was determined at the intersection of Old Pacific Highway Southeast and Durgin Road Southeast including field notes, photographs, emails, aerial photography, studies, reports, computer modelling, including the GIS Shape Files and any written or electronic information used in support of determining the high water elevation. We have received correspondence from the Thurston County Prosecutor’s Office that initial information will be sent to us on or before June 23rd. Since the Public Comment Period on the SMP is due to close on May 31, 2023, we will not have the opportunity to evaluate the information from the RFPI and have our analysis regarding the Concrete Plant site entered into the record.

In an email, our client requested this same data, be available in the public record, on how the Flood of Record information was determined by Thurston County for Monument Number NS08 on May 19, 2023. Staff responded on May 23, 2023 and wrote, “Any comments made by the public prior to close of the public comment period will be in the record. I will include this comment in the record, as well.

The board will begin working through issues brought up in public comment during their work session tomorrow. If the Board asks staff to explore this issue further, I will be able to bring them more information on the issue, including but not limited to background information on our flood layers."

It is reasonable for staff to supply our requested public information prior to June 23, since it is available to be provided to the BoCC prior to or at the June 14 work session.

Conflicting information that we are aware of, at this time, includes Figure 6-1, Mapped Flood Hazard Areas in Thurston County, from the 2013 Tetra Tech Final Thurston County Flood Hazard Mitigation Plan, the current 1996 Flood of Record inundation area from Thurston County GIS and the February 9, 1996 aerial photography.

The 1996 Flood of Record information, including the February 9, 1996 aerial photo, for the Nisqually River was available at the time the 2013 Final Thurston County Flood Hazard Mitigation Plan was prepared, in which the mapping shows the Flood of Record and the FEMA 100-Year Floodplain located to the northeast of Kuhlman Road Southeast. The Flood of Record inundation area in Thurston County GIS includes area to the southwest of Kuhlman Road Southeast south into the southerly triangle created by the intersection of Old Pacific Highway Southeast and Durgin Road Southeast. As measured along Old Pacific Highway Southeast, these two locations for the "Flood of Record" are approximately 2,000 feet apart. The aerial photography from February 9, 1996 depicts Nisqually River flooding in the vicinity of Old Pacific Highway Southeast and Durgin Road Southeast. **None of these sources are in agreement with each other as to the location of the inundation area for the February 1996 Flood of Record event.**

Necessarily, Thurston County provided Tetra Tech information on the Nisqually River Flood of Record event to develop Figure 6-1 (2013 Final Flood Hazard Mitigation Plan) which shows both the "then current" FEMA 100-year floodplain and Thurston County Flood of Record Areas. Since that time, Thurston County has determined the Flood of Record Elevation at NS08, on the face of highline power pole at the intersection of Old Pacific Highway and Durgin Road, is at elevation 30.23 NAVD88. The highest flood date, from Thurston County GIS, is February 8, 1996 at 12:00 AM.

FEMA has updated the FIRM since the publishing of the 2013 Final Thurston County Flood Hazard Mitigation Plan.

It does not seem that the requirements of RCW 90.58.100 have been met by Thurston County, in the determination of Frequently Flooded Areas and the inundation area of the Flood of Record, for the Nisqually River for inclusion in the Shoreline designation areas. ***Certainly, Flood of Record information should be consistent throughout Thurston County published data.***

2. Procedures for Map Corrections

The 2023 Thurston County SMP update should include explicit direction to land owners, on methodologies to correct errors and have their property removed from the Shoreline designation based upon ground topographic survey information compared to published and accurate base flood elevations.

The Draft SMP in **24.20.040 River, marine, lake, and coastal flood hazard areas – Map amendments.**

"Map amendments for frequently flooded areas that are identified on the flood insurance rate maps prepared by the Federal Insurance Administration, as supplemented by "The Flood Insurance Study for

Thurston County," dated November 17, 1980 shall follow the amendment procedure in TCC 14.38.090, Map correction procedures."

TCC 14.38.090 indicates following the procedural requirements to obtain a Letter of Map Amendment (LoMA). An issue that we see is that the Flood of Record information, which Thurston County has defined as including Frequently Flooded Areas, is not completely depicted on the flood insurance rate maps.

CONCLUSION

Thurston County is on the verge of adopting the 2023 SMP Update based upon the lack of reliable information to support the extents of the "Flood of Record." GIS Flood of Record information is not consistent with the BoCC approved January 2013 Final Thurston County Flood Hazard Mitigation Plan, prepared by Tetra Tech, the aerial photography and eye witness testimony given at the Public Hearing, Tuesday May 16, 2023. This SMP Update will affect many property owners and errors in mapping may prove difficult and costly to correct.

When the degree of flooding in the Nisqually River Valley is largely dependent upon upstream storage in Alder Lake and discharges from Alder and La Grande Dams (refer to 2017 Thurston County Hazards Mitigation Plan, page 4.3-15 paragraph 4), it appears excessive to designate the February 1996 Nisqually River "Flood of Record" GIS inundation areas, extending approximately 4,500 feet from the Nisqually River, as Shorelands.

The proposed Shoreland designation areas which includes a Zoning Classification (Rural Conservancy) and not merely a Shoreline overlay designation should not be based upon information that conflicts with the County's own Flood Hazard Mitigation Plan. The Flood of Record can continue to be regulated by the County in the Critical Areas Ordinances.

Thank you for your thoughtful consideration of the issues presented in this letter.

Sincerely,

SITTS & HILL



Kathy A. Hargrave, PE
Civil Engineer

P:\14500\14544\Correspondence\Civil\Letters\2023-05-28 Thurston County re 2023 SMP Update.docx

County Staff Note: Attachment to this public comment has been provided to the Board electronically. It is available online at <https://s3.us-west-2.amazonaws.com/thurstoncountywa.gov.if-us-west-2/s3fs-public/2023-06/cped-cp-docs-SMP-BOCC-Public-Hearing-Combined-Comments-101-119-A-1.pdf>

Comment #114 begins on page 34, and the attachment begins on page 42.

Thurston County FLOOD HAZARD MITIGATION PLAN

FINAL

JANUARY 2013

Prepared for:

Thurston County Planning Department
2000 Lakeridge Drive SW
Olympia, WA 98502-6045

Prepared by:



TETRA TECH

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Project #135-12410-12002

Thurston County
Flood Hazard Mitigation Plan

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ACKNOWLEDGMENTS

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- Dan Portman, Technical Editor, Tetra Tech, Inc.

Special Acknowledgments

The development of this plan would not have been possible without the commitment of the Thurston County Flood Hazard Mitigation Plan Steering Committee. The dedication of the members of this volunteer committee allocating their time to this process is greatly appreciated. The citizens of Thurston County are also commended for their participation in the outreach strategy identified by the Steering Committee. This outreach success will set the course for the successful implementation of this plan during its next performance period.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

WHY PLAN FOR FLOODING?

Recent floods have shown that Thurston County needs to address floods on a countywide basis. The floods of 2007 – 2009, cost county residents in excess of \$10 million in uninsured property losses. Even though drainage basin plans and flood plans have been adopted for some watersheds, these plans do not cover all unincorporated areas. Additionally, as a participant in the federal Community Rating System (CRS), Thurston County can use this plan as key step toward significant reductions in flood insurance premiums. Thurston County can become one of the top-rated CRS counties in the nation with completion of this plan.

WHAT IS A FLOOD HAZARD MITIGATION PLAN?

Mitigation is defined as “sustained action taken to reduce or eliminate long-term risk to life and property” It involves strategies such as planning, policy changes, programs, projects, and other activities that can mitigate the impacts of hazards on a defined planning area. The responsibility for hazard mitigation lies with many, including private property owners, business, industry, and local, state and federal government. Recognizing that there is no one solution for mitigating flood hazards, planning provides a mechanism to identify the best alternatives within the capabilities of a jurisdiction. A flood hazard mitigation plan achieves the following in order to set the course for reducing the risk associated with flooding:

- Ensuring that all possible activities are reviewed and implemented so that local problems are addressed by the most appropriate and efficient solutions.
- Ensuring that activities are coordinated with each other and with other community goals and activities, preventing conflicts and reducing the cost of implementing each individual activity.
- Coordinating local activities with federal, state and regional programs.
- Educating residents on the hazards, loss reduction measures, and natural and beneficial functions of their floodplains.
- Building public and political support for mitigation projects.
- Fulfilling planning requirements for obtaining state or federal assistance.
- Facilitating the implementation of floodplain management and mitigation activities through an action plan that has specific tasks, staff assignments and deadlines.

The Thurston County Flood Hazard Mitigation Plan identifies 32 mitigation initiatives, chosen through a facilitated process that focused on meeting these objectives.

PLAN DEVELOPMENT METHODOLOGY

Development of the Thurston County Flood Hazard mitigation Plan included five phases:

- **Phase 1, Organize and review**—A 12-member steering committee was assembled to oversee the development of the plan, consisting of County staff, citizens and other stakeholders in the planning area. A planning team consisting of key County staff as well as a technical consultant was assembled to provide technical support to the Steering Committee. Full coordination with other county, state and federal agencies involved in flood hazard mitigation occurred from the onset of this plan’s development through its completion. A

multi-media public involvement strategy centered on a hazard preparedness questionnaire was implemented. A comprehensive review of existing plans and programs was performed that can support flood hazard mitigation. A key function of the Steering Committee was to identify guiding principles, goals and objectives for this plan. One of the principle objectives identified under this phase was to develop a plan that could easily integrate into the *Natural Hazards Mitigation Plan for the Thurston Region*.

- **Phase 2, Update the risk assessment**—Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury and property damage resulting from natural hazards. This process assesses the vulnerability of people, buildings and infrastructure to natural hazards. It focuses on the following parameters:
 - Hazard identification and profiling
 - The impact of hazards on physical, social and economic assets
 - Vulnerability identification
 - Estimates of the cost of damage or cost that can be avoided through mitigation.

The flood hazard risk assessment for this mitigation plan meets the requirements outlined in Chapter 44 of the Code of Federal Regulations as well as the CRS requirements for assessment of the flood hazard. Phase 2 occurred simultaneously with Phase 1, with the two efforts using information generated by one another to create the best possible risk assessment.

- **Phase 3, Engage the public**—Under this phase, the Steering Committee developed a public involvement strategy to maximize the capabilities of the County. This strategy was implemented by the planning team and included two public meetings early in the plan update process, a public meeting to review the draft plan, a hazard mitigation survey, a County-sponsored website dedicated to the plan, and multiple media releases. This strategy was deemed by the Steering Committee as a key element in the success of this planning effort.
- **Phase 4, Assemble the updated plan**—The Planning Team and Steering Committee assembled key information from Phases 1 and 2 into a document to meet the CRS requirements. Under the CRS, a floodplain management plan must include the following:
 - A description of the planning process
 - A risk assessment
 - A mitigation strategy including goals, a review of alternatives and a prioritized action plan
 - A plan maintenance section
 - Documentation of adoption.
- **Phase 5, Plan adoption**—Upon completion of Phase 4, a pre-adoption review draft of the plan will be sent to the Insurance Services Office (ISO), FEMA’s CRS contractor, for review and comment. Once pre-adoption approval has been granted by ISO, the final adoption phase will begin. This plan includes a plan implementation and maintenance section that details the formal process for ensuring that the plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the plan’s progress annually and producing a plan revision every 5 years. This phase includes strategies for continued public involvement and incorporation of the recommendations of this plan into other planning mechanisms of the County, such as the comprehensive plan, capital improvement plan, and the *Natural Hazards Mitigation Plan for the Thurston Region*.

MITIGATION GUIDING PRINCIPLE, GOALS AND OBJECTIVES

Through a facilitated process, the Steering Committee identified a set of guiding principles, goals and objectives. These planning components all directly support one another. Goals were selected that meet multiple guiding principles; objectives were identified that fulfill multiple goals, and mitigation initiatives were identified that achieve multiple objectives. The planning components are as follows:

- Guiding Principles
 1. Provide a methodical approach to flood hazard planning that can integrate with other planning mechanisms that enhance or support floodplain management.
 2. Enhance the public's awareness and understanding of the flood hazard.
 3. Create a decision-making tool for policy and decision makers.
 4. Promote compliance with state and federal program requirements.
 5. Ensure inter-jurisdictional coordination on all floodplain management activities.
- Goals
 1. Foster all sectors of the community working together to create a flood-hazard-resilient community.
 2. Ensure that local and state government entities have the capabilities to develop, implement and maintain effective floodplain management programs in the Thurston region.
 3. Ensure that the communities in the Thurston region collectively maintain the capacity to initiate and sustain emergency operations during and after a flood disaster.
 4. Ensure that local government operations are not significantly disrupted by flood hazard events.
 5. Reduce the vulnerability to flood hazards in order to protect the life, health, safety and welfare of the community's residents and visitors.
 6. Reduce the adverse impact on critical facilities and infrastructure from flood hazard events within the Thurston region.
 7. Increase public awareness of vulnerability to flood hazards and preparation for floods.
 8. Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of flood hazard events.
- Objectives
 1. Eliminate or minimize disruption of local government operations caused by flood hazard events.
 2. Maintain a regionally coordinated warning and emergency response program that can detect the flood threat and provide timely warning.
 3. Utilizing best available data and science, continually improve understanding of the location and potential impacts of flood hazards, the vulnerability of building types and community development patterns, and the measures needed to protect life safety.
 4. Continually provide state, county and local agencies with updated information about flood hazards, vulnerabilities and mitigation initiatives.

5. Establish partnerships among all levels of government and the business community to improve and implement regionally consistent floodplain management practices (such as prevention, property protection, public education and awareness, natural resource protection, emergency services, and capital improvements).
6. Develop or improve early warning emergency response systems and evacuation procedures for flood hazard events.
7. Work to lower emergency service response times, including through improvement to transportation facilities.
8. Consider the impacts of flood hazards in all planning processes that address current and future land uses within the planning area.
9. Evaluate the risks to public safety and existing development (e.g., critical facilities, infrastructure, and structures) in flood hazard areas.
10. Sponsor and support public outreach and education activities to improve awareness of flood hazards, and recommend roles that property owners can take to prepare, respond, recover and protect themselves from the impacts of these events.
11. Consider the impacts that future development will have on the environment's capacity to withstand the impacts of flood events and the opportunities this development may create for environmental restoration.

MITIGATION INITIATIVES

The flood hazard mitigation action plan is a key element of this plan. It is through the implementation of the action plan that Thurston County can strive to become flood disaster-resilient through sustainable hazard mitigation. The action plan includes an assessment of the capabilities of the County to implement hazard mitigation initiatives, a review of alternatives, a prioritization schedule, and a mitigation strategy matrix that identifies the following:

- | | |
|--|-------------------------------|
| • Description of the action | • Estimated costs |
| • Objectives addressed | • Timeline for implementation |
| • Lead implementation agency (or agencies) | • Funding sources |
| • Estimated benefits | • Prioritization |

For the purposes of this document, mitigation initiatives are defined as activities designed to reduce or eliminate losses resulting from the impacts of flooding.

Although one of the driving influences for preparing this plan was CRS, this plan does not focus solely on CRS credits. It was important to the County and the Steering Committee to examine initiatives that would work through all phases of emergency management. Some of the initiatives outlined in this plan fall outside CRS credit criteria, and CRS creditability was not the focus of their selection. Rather, the focus was on the initiatives' effectiveness in achieving the goals of the plan and whether they are within the County's capabilities. Table ES-1 presents a summary of the hazard mitigation initiatives identified by this plan update. Detailed descriptions for these initiatives can be found in Chapter 9.

**TABLE ES-1.
SUMMARY OF HAZARD MITIGATION INITIATIVES**

Initiative #	Description	Priority
FMI-1	Identify properties that are potential candidates for elevation, relocation or buyout based on an evaluation of flood risks, project feasibility, and planned flood risk reduction capital projects. A list of targeted high-priority acquisitions should be prepared and annually updated. An example of a high-priority project would be a property identified by FEMA as a repetitive loss property. Once the list is established, pursue funding opportunities to implement the projects.	Medium
FMI-2	Using the best available data on flood risk, conduct outreach to property owners to alert them to the risks and ways to deal with them, to inform them about potential opportunities to mitigate the risks, and to assess their interest in participation should funding be available. Property owners who are interested in participating in one of these programs should be informed that having flood insurance might help qualify them for funding assistance.	High
FMI-3	Continue a conservative approach to woody debris management and maintenance, using state- or County-established best management practices.	High
FMI-4	Continue to maintain compliance and good standing with the programmatic requirements of the National Flood Insurance Program.	High
FMI-5	Strive to maintain Thurston County's Community Rating System classification of no higher than Class 5, as a primary measure of successful flood risk reduction.	High
FMI-6	Expand multi-jurisdictional and multi-stakeholder coordination efforts and seek inter-local agreements or other contractual relationships in support of achieving long-term comprehensive flood risk reduction solutions, potentially in conjunction with salmon recovery efforts and regional flood risk reduction efforts.	High
FMI-7	Undertake a feasibility study on the formation of a countywide flood control zone district. This study should focus on the following: <ul style="list-style-type: none"> • What are the capital costs of flood risk reduction projects within the county? • What would be the costs to the constituents of Thurston County to implement a flood control zone district? • How would this affect other Thurston County programs? • What would be the benefit to the constituents of Thurston County? • Recommendations for structure and organization of the district. 	Medium
FMI-8	Analyze the findings of the flood control zone district feasibility report and determine if its recommendations should be adopted. Create a prioritized list of flood risk reduction projects and programs throughout the county that could be funded under this mechanism.	Medium
FMI-9	Invest in flood prediction and forecast modeling to support all facets of the Thurston County floodplain management program, including but not limited to flood hazard identification, flood threat recognition in support of flood notification programs, climate change adaptation, and risk assessment.	High
FMI-10	Complete an inventory of all publicly maintained stormwater facilities.	High
FMI-11	Create an inventory and establish a priority list for culvert replacement that takes into account fish passage, flood depth reduction and future losses avoided.	High
FMI-12	Utilizing the best available data, science and technology, enhance the existing flood notification program, striving to identify a notification protocol within systems that have real-time flood threat recognition capability.	High

**TABLE ES-1.
SUMMARY OF HAZARD MITIGATION INITIATIVES**

Initiative #	Description	Priority
FMI-13	Update the County emergency response plan to reflect any changes to flood notification protocol within the county.	High
FMI-14	Utilizing the best available data, science and technology, maintain and enhance as data becomes available the Level 2, user-defined HAZUS-MH model that was constructed to support this planning effort.	High
FMI-15	Develop a post-flood disaster action plan that establishes protocols for the County such as substantial damage determination, the recording of perishable data (such as high water marks), grant support, staffing, continuity of operations, and recovery.	Medium
FMI-16	Perform a comprehensive assessment of floodplain restoration, reconnection and enhancement of floodplain storage opportunities in the county.	Medium
FMI-17	Work with the County departments responsible for implementation and maintenance of the County's capital improvements programs to identify flood hazard mitigation projects that are eligible for hazard mitigation grants. Once projects are identified, pursue grant funding for those projects shown to be cost-effective.	High
FMI-18	Collaborate with Pierce County and Tacoma Power to identify appropriate operational procedures of Alder Lake Dam that will minimize the flood risk on the Nisqually River.	High
FMI-19	Continue to develop and implement an annual public outreach strategy that seeks to leverage public information resources and capabilities within the county.	High
FMI-20	Continue to pursue/ maintain Thurston County floodplain management program compliance with the National Marine Fisheries Service biological opinion regarding the National Flood Insurance Program.	High
FMI-21	Establish a link between the Thurston County Flood Hazard Mitigation Plan and the Natural Hazards Mitigation Plan for the Thurston Region. The Flood Hazard Mitigation Plan will become the flood hazard component of the Natural Hazards Mitigation Plan upon its next update. All future updates to the two plans will occur on the same planning cycle upon plan integration.	High
FMI-22	Obtain digital data and create GIS maps of the flood inundation from possible failures of the Skookumchuck Dam on the Skookumchuck River and the Alder and LaGrande Dams on the Nisqually River. Using this data, assess the risk associated with these facilities utilizing the best available data and science.	High
FMI-23	Develop evacuation plans for communities and residents downstream from the Nisqually and Skookumchuck River dams.	High
FMI-24	Draft a prioritized list of road segments and bridges that should be elevated above the 100-year floodplain and culverts that will fail under flood flow. Upgrade these structures if state or federal funds become available.	High
FMI-25	Develop a southeast flood detour plan for the Thurston County Comprehensive Emergency Management Plan.	High
FMI-26	Map the channel migration zones for all rivers in the region and the extent of high quality riparian habitat.	Medium

**TABLE ES-1.
SUMMARY OF HAZARD MITIGATION INITIATIVES**

Initiative #	Description	Priority
FMI-27	To support initiative # FMI-1, undertake a study of identified repetitive flood loss areas to determine the following: <ul style="list-style-type: none"> • Repetitive losses not captured by flood insurance data • Causes of the repetitive flooding • Assets impacted by the repetitive flooding (this would include assets such as livestock, out-buildings and rescue costs not already identified by FEMA) • Possible alternatives to remediate the repetitive flooding 	Medium
FMI-28	Revise shoreline regulations to encourage shoreline protective structures to be bioengineered.	High
FMI-29	Review the recommendations of adopted stormwater drainage basin plans to determine which ones are still relevant for implementation.	High
FMI-30	Prepare new drainage basin plans for the high groundwater areas.	High
FMI-31	To support implementation of the Thurston County Critical Areas Ordinance, encourage research that establishes best management practices for bioengineering and other techniques that provide streambank protection and improve fisheries through the use of large woody debris. Support local demonstration projects that could support such research.	Medium
FMI-32	Where feasible, consider the adoption of appropriate higher regulatory standards (including but not limited to freeboard, comp storage, lower substantial damage thresholds, setbacks and fill restrictions) as means to reduce future flood risk and support a no-adverse-impact philosophy of floodplain management.	Medium

IMPLEMENTATION

Full implementation of the recommendations of this plan will require time and resources. This plan reflects an adaptive management approach in that specific recommendations and plan review protocols are provided to evaluate changes in vulnerability and action plan prioritization after the plan is adopted. The true measure of the plan's success will be its ability to adapt to the ever-changing climate of hazard mitigation.

Funding resources are always evolving, as are programs based on state or federal mandates. Thurston County has a long-standing tradition of progressive, proactive response to issues that may impact its citizens. This tradition is reflected in the development of this plan. The Thurston County Board of Commissioners will assume responsibility for adopting the recommendations of this plan and committing County resources toward its implementation. The County's track record in floodplain management is commendable. Its well-established programs and policies have maintained the flood risk at a steady level without increase. The framework established by this plan will help maintain this tradition in that it identifies a strategy that maximizes the potential for implementation based on available and potential resources. It commits the County to pursue initiatives when the benefits of a project exceed its costs. Most important, the County developed this plan with extensive public input. These techniques will set the stage for successful implementation of the recommendations in this plan.

**PART 1 —
PLANNING PROCESS AND PROJECT
BACKGROUND**

CHAPTER 1. INTRODUCTION

1.1 WHY PREPARE THIS PLAN?

Flood hazard mitigation is a way to reduce or alleviate the loss of life, personal injury, and property damage that can result from flooding through long- and short-term strategies. It involves strategies such as planning, policy changes, programs, projects, and other activities that can mitigate the impacts of floods. The responsibility for flood hazard mitigation lies with many, including private property owners, business, industry, and local, state and federal government.

Numerous state and federal programs and regulations promote flood hazard mitigation planning. Notable among these are two programs of the Federal Emergency Management Agency (FEMA): the National Flood Insurance Program (NFIP) and the Community Rating System (CRS). These programs provide benefits in the form of reduced flood insurance costs for communities that meet minimum requirements for floodplain management. Thurston County participates in both the NFIP and the CRS.

A previous Thurston County flood hazard management plan was prepared in 1999 (TRPC, 1999). Given the many changes in local development and other conditions since then, as well as evolving local, state and federal regulations and programs, the County has developed this new flood hazard mitigation plan as an up-to-date tool for flood preparedness and flood hazard mitigation. Elements and strategies in this plan were selected because they meet various state or federal program requirements as well as the needs of Thurston County and its citizens.

This plan identifies resources, information, and strategies for reducing risk from flood hazards. It will help guide and coordinate mitigation activities. The plan was developed to meet the following objectives:

- Meet the needs of Thurston County as well as state and federal requirements.
- Meet planning requirements allowing Thurston County to enhance its CRS classification.
- Coordinate existing plans and programs so that high-priority initiatives and projects to mitigate possible disaster impacts are funded and implemented.
- Create a linkage between the flood hazard mitigation plan and established plans of Thurston County so that they can work together in achieving successful mitigation.

All citizens and businesses of Thurston County are the ultimate beneficiaries of this plan. Participation in development of the plan by key stakeholders helped ensure that outcomes will be mutually beneficial. The plan's goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

1.2 GUIDELINES FOR FLOOD PLANNING

The first priority for this plan is to benefit the citizens of Thurston County by providing the greatest possible protection against the hazard posed by potential flooding. In addition, the plan has been developed to follow as closely as feasible the guidelines for flood planning presented by FEMA for the CRS program and by Washington State for the Flood Control Assistance Account Program (FCAAP).

1.2.1 CRS Steps for Comprehensive Floodplain Management Plan

Developing a comprehensive floodplain management plan is among the activities that earn CRS credits toward reduced flood insurance rates. To earn CRS credit for a floodplain management plan, the community's process for developing the plan must include at least one item from each of 10 steps (see Appendix B for details):

- Planning process steps:
 - Step 1, Organize
 - Step 2, Involve the public
 - Step 3, Coordinate
- Risk assessment steps:
 - Step 4, Assess the hazard
 - Step 5, Assess the problem
- Mitigation strategy steps:
 - Step 6, Set goals
 - Step 7, Review possible activities
 - Step 8, Draft an action plan
- Plan maintenance steps:
 - Step 9, Adopt the plan
 - Step 10, Implement, evaluate and revise.

1.2.2 FCAAP Requirements for Comprehensive Flood Control Management Plan

Eligibility for Washington's FCAAP funding for flood projects requires that the requesting jurisdiction complete a comprehensive flood control management plan. The plan must include six components, as summarized below and described in detail in Appendix B:

- Determination of the need for flood control work
- Alternative flood control work
- Identification and consideration of potential impacts of in-stream flood control work on the in-stream uses and resources.
- Coverage, at a minimum, of the area of the 100-year floodplain within a reach of the watershed of sufficient length to ensure that a comprehensive evaluation can be made of the flood problems for a specific reach of the watershed, as well as flood hazard areas not subject to riverine flooding (e.g., coastal flooding, flash flooding, or flooding from inadequate drainage)
- Conclusion and proposed solutions
- Certification from the Department of Community, Trade and Economic Development that the local emergency management organization is administering an acceptable comprehensive emergency operations plan.

1.3 HOW TO USE THIS PLAN

This flood hazard mitigation plan is organized into the following primary parts, which follow the organization of the CRS steps for floodplain planning:

- Part 1—Planning Process and Project Background
- Part 2—Risk Assessment
- Part 3—Mitigation Strategy
- Part 4—Plan Maintenance

Each part includes elements identified in the CRS's 10 steps. These steps are often cited at the beginning of a subsection to illustrate compliance with the requirement.

The following appendices provided at the end of the plan include information or explanations to support the main content of the plan:

- Appendix A—A glossary of acronyms and definitions
- Appendix B—Description of CRS and FCAAP Planning Requirements
- Appendix C—Public outreach information, including the questionnaire and summary and documentation of public meetings.
- Appendix D—A template for progress reports to be completed as this plan is implemented

CHAPTER 2.

PLAN DEVELOPMENT METHODOLOGY

The process followed to develop the Thurston County Flood Hazard Mitigation Plan had the following primary objectives:

- Form a planning team
- Define the planning area
- Establish a steering committee
- Coordinate with other agencies
- Review existing programs
- Engage the public.

These objectives are discussed in the following sections.

2.1 FORMATION OF THE PLANNING TEAM

This planning project was initiated and overseen by the Natural Resources Program of the Thurston County Planning Department. The Planning Department's mission is to plan for sustainable land use and development within the unincorporated areas of Thurston County so that residential and business communities can thrive within a healthy environment. The Planning Department is responsible for land use and comprehensive planning for Thurston County. Thurston County hired Tetra Tech, Inc. to assist with development and implementation of the plan. The Tetra Tech project manager assumed the role of the lead planner, reporting directly to the Thurston County project manager. A planning team was formed to lead the planning effort, made up of the following members:

- Mark Swartout—Thurston County Project Manager
- Tim Rubert—Thurston County Floodplain Manager
- Andrew Kinney—Thurston County Emergency Management
- Rob Flaner, Tetra Tech—Lead Project Planner
- Ed Whitford—Tetra Tech Risk Assessment Lead
- Dan Portman—Tetra Tech Technical Editor

2.2 DEFINING THE PLANNING AREA

The planning area was defined as all of Thurston County. To support future integration with the Natural Hazards Mitigation Plan for the Thurston Region, this plan assesses the flood risk for all municipalities in the planning area. However, it identifies mitigation initiatives only for the unincorporated areas of the county, since this will be the CRS plan of record for Thurston County. This may change in the future as the Thurston County Flood Hazard Mitigation Plan becomes integrated with the Natural Hazards Mitigation Plan.

2.3 THE STEERING COMMITTEE

A steering committee was formed to oversee all phases of the planning effort. The members of this committee included key Thurston County staff, citizens, and other stakeholders from within the planning area. The planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. The team confirmed a committee of 12 members, listed in Table 2-1.

TABLE 2-1. STEERING COMMITTEE MEMBERS		
Name	Title	Jurisdiction/Agency
Allan Vanell (Chair)	Mayor (pro-tem)	Town of Bucoda (Chehalis River Council Representative)
Tris Carlson	Citizen	Thurston County Storm and Surface Water Advisory Board/ Floodplain resident
Mark Swartout	Thurston County CRS Coordinator	Thurston County, Planning Department
Tim Rubert	Thurston County Floodplain Manager	Thurston County, Building Department
Andrew Kinney		Thurston County Emergency Management
Paul Brewster	Senior Planner	Thurston Regional Planning Council
Glen Connelly	Floodplain Manager	Chehalis Tribe
Jeff Clem	Manager	Riverbend Campground—Business within the Nisqually River floodplain
Sue Thorn	Citizen	Black River Floodplain-Also a member of the Chehalis River Council
Nicole Hill	Stakeholder	Nisqually Land Trust
Howard Glastetter	Citizen	Nisqually River floodplain; also a member of the Storm and Surface Water Advisory Board
Paul Pickett	Academic/Citizen	Thurston Evergreen State College

Leadership roles and ground rules were established during the Steering Committee's initial meeting on April 16, 2012. The Steering Committee agreed to meet monthly as needed throughout the course of the plan's development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on an established work plan. The Steering Committee met four times from April through October. Meeting agendas, notes and attendance logs are available for review upon request. All Steering Committee meetings were open to the public and advertised as such on the flood plan website (see Section 2.6.1). The agendas and meeting notes were posted to the flood hazard mitigation plan website.

2.4 COORDINATION WITH OTHER AGENCIES

Opportunities for involvement in the planning process were provided to neighboring communities, local and regional agencies involved in flood hazard mitigation, agencies with authority to regulate development, businesses, academia, and other private and nonprofit interests (CRS Step 3). This task was accomplished by the planning team as follows:

- **Steering Committee Involvement**—Agency representatives were invited to participate on the Steering Committee.
- **Agency Notification**—The following agencies were invited to participate in the plan development from the beginning and were kept apprised of plan development milestones:
 - The Chehalis River Council
 - The Thurston Regional Planning Council
 - The Thurston County Surface Water Advisory Board (SWAB)
 - FEMA Region X
 - Washington Department of Ecology
 - The Chehalis Tribe
 - The Nisqually Tribe
 - The Nisqually Land Trust
 - Pierce County
 - Lewis County.

These agencies received meeting announcements, meeting agendas, and meeting minutes by e-mail throughout the plan development process. These agencies supported the effort by attending meetings or providing feedback on issues.

- **Pre-Adoption Review**—All the agencies listed above were provided an opportunity to review and comment on this plan, primarily through the plan website (see Section 2.6). Each agency was sent an e-mail message informing them that draft portions of the plan were available for review. In addition, the complete draft plan was sent to the Insurance Services Office, FEMA’s CRS contractor, for a pre-adoption review to ensure CRS program compliance.

2.5 REVIEW OF EXISTING PROGRAMS

The planning effort included review and incorporation, if appropriate, of existing plans, studies, reports and technical information. Chapter 4 of this plan provides a review of laws and ordinances in effect within the planning area that can affect mitigation initiatives, including an assessment of all Thurston County regulatory, technical and financial capabilities to implement flood hazard mitigation initiatives. In addition, the following programs can affect mitigation within the planning area:

- Natural Hazards Mitigation Plan for the Thurston Region
- 1999 Thurston County Flood Hazard Management Plan
- Thurston County Comprehensive Plan
- Thurston County Critical Areas Ordinance
- Shoreline Master Program for the Thurston Region
- Chehalis Watershed Cooperative
- Basin Plans
- Water Resource Inventory Area (WRIA) Planning.

2.6 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. CRS credits are available for providing opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval, as well as for optional public involvement activities (CRS Step 2).

2.6.1 Strategy

The strategy for involving the public in this plan emphasized the following elements:

- Include members of the public on the Steering Committee.
- Use a questionnaire to determine the public's perception of flood risk and support of mitigation initiatives.
- Attempt to reach as many planning area citizens as possible using multiple media.
- Identify and involve planning area stakeholders.

Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies and jurisdictions that have a vested interest in the recommendations of this plan. The effort to include stakeholders in this process included stakeholder participation on the Steering Committee. Stakeholders targeted for this process included:

- Owners/operators of businesses within the floodplain
- Academia
- Tribes
- Environmental advocacy groups
- Neighboring counties.

Questionnaire

A questionnaire (see Figure 2-1) was developed by the planning team with guidance from the Steering Committee. The questionnaire was used to gauge household preparedness for the flood hazard and the level of knowledge of tools and techniques that assist in reducing risk and loss from flooding. This questionnaire was designed to help identify areas vulnerable to floods. The answers to its 34 questions helped guide the Steering Committee in selecting goals, objectives and mitigation initiatives. All floodplain residents were notified about the survey by a postcard mailing advertising the public open houses. All attendees at the public open houses were asked to complete a survey. In addition, the survey and the plan information website was advertised in the "flood bulletin" that is sent annually to all floodplain residents in October (see Figure 2-2 and Figure 2-3). Hard copies of the questionnaires were made available at the public open houses. A web-based version of the questionnaire was made available on the plan website.

Over 50 questionnaires were completed during the course of this planning process. This number is not sufficient to establish trends, but the responses did provide the Steering Committee and planning team with feedback to use throughout the planning process. The Steering Committee used survey results to support the selection of guiding principles, goals and objectives discussed in Chapter 8. The survey results were also used in the review of alternatives and selection of mitigation initiatives as discussed in Chapter 9. The complete questionnaire and a summary of its findings can be found in Appendix C.

Thurston County Survey: Flood Preparedness

1. Survey Introduction

CITIZEN PREPAREDNESS QUESTIONNAIRE- A hazard mitigation planning team has been established to evaluate the flood risk within Thurston County and to identify and action plan that will seek to reduce this risk. To support this planning effort, we are seeking input from the citizens of Thurston County. This survey is designed to gage the level of knowledge local citizens have about flood issues and potential areas of flooding within Thurston county. The information you provide will help coordinate activities to help reduce the future flood risk within the County.

This survey contains 34 questions and will take approximately 10 - 15 minutes to complete. The Thurston County County Planning Team thanks you for taking the time to participate in this information-gathering process.

* 1. Where in Thurston County do you live?

- | | | |
|--|--------------------------------|--|
| <input type="radio"/> Bucoda | <input type="radio"/> Ranier | <input type="radio"/> Yelm |
| <input type="radio"/> Lacey | <input type="radio"/> Tenino | <input type="radio"/> Rochester |
| <input type="radio"/> Olympia | <input type="radio"/> Tumwater | <input type="radio"/> Unincorporated Thurston County |
| <input type="radio"/> Other (please specify) | | |

2. Do you work in Thurston County?

- ☐ Yes ☐ No

3. Do you live in a known floodplain or and area that has been subject to repetitive flood conditions?

- ☐ Yes
☐ No
☐ Not Sure

Figure 2-1. Sample Page from Questionnaire Distributed to the Public



Figure 2-2. Thurston County Flood Bulletin, Fall 2012

6 Ways to Protect Your Home

1. **Elevate** or relocate furnaces, water heaters, appliances and electrical panels. Better yet, elevate your home above possible flood levels on a new foundation.
2. **Install** back-flow valves or plugs for drains, toilets and other connections to prevent floodwaters from entering your home.
3. **Make openings** in foundation walls to allow water to flow in and out. This can help prevent collapse of the walls.
4. **Build and install** flood shields for doors and other openings to prevent the entrance of floodwaters.
5. **Store hazardous materials** like paint, pesticides and fertilizers inside plastic buckets off the floor. Take unwanted hazardous materials to the HazoHouse, Friday through Tuesday. Details at 754-3354.
6. **Install** sump pumps with backup power in crawl spaces or basements.



Questions? Call the county's Resource Stewardship office at 754-3355, ext 6647.

Building? Be Safe, not Sorry!

The county regulates floodplain development to protect the public and minimize flood losses. We require that homes vulnerable to floods include flood protection when built. We also restrict building new structures within the 100-year floodplain with limited exceptions. Regulations control filling, treecutting, grading and other development which may increase flood damage.

Information on development affecting individual lots in floodplains or in high groundwater areas is available at the county's Resource Stewardship office.

Staff can visit your property to answer questions specific to your site. The county also has limited historical data regarding flooding in unincorporated Thurston County. Call 754-3355, ext. 6647 for complete details.



Your Input Needed! Flood Mitigation Plan

The county is updating its Comprehensive Flood Mitigation Plan. There were two public meetings in August. Another public meeting will be scheduled in the future. For more information, including a citizen survey, please visit www.co.thurston.wa.us/planning/natural-res/natural-floodplan-update.htm or call 709-3079.

Figure 2-3. Flood Hazard Survey Advertisement in Flood Bulletin

Public Meetings

Open-house public meetings were held on August 20, 2012 at the Thurston County Courthouse and on August 21, 2012 at the Thurston County Emergency Management facilities. Each ran from 5:30 to 7:30 p.m. Postcards advertising the public meetings were sent to all addresses intersecting the floodplain within the planning area (see Figure 2-4). This amounted to over 8,500 mailings.

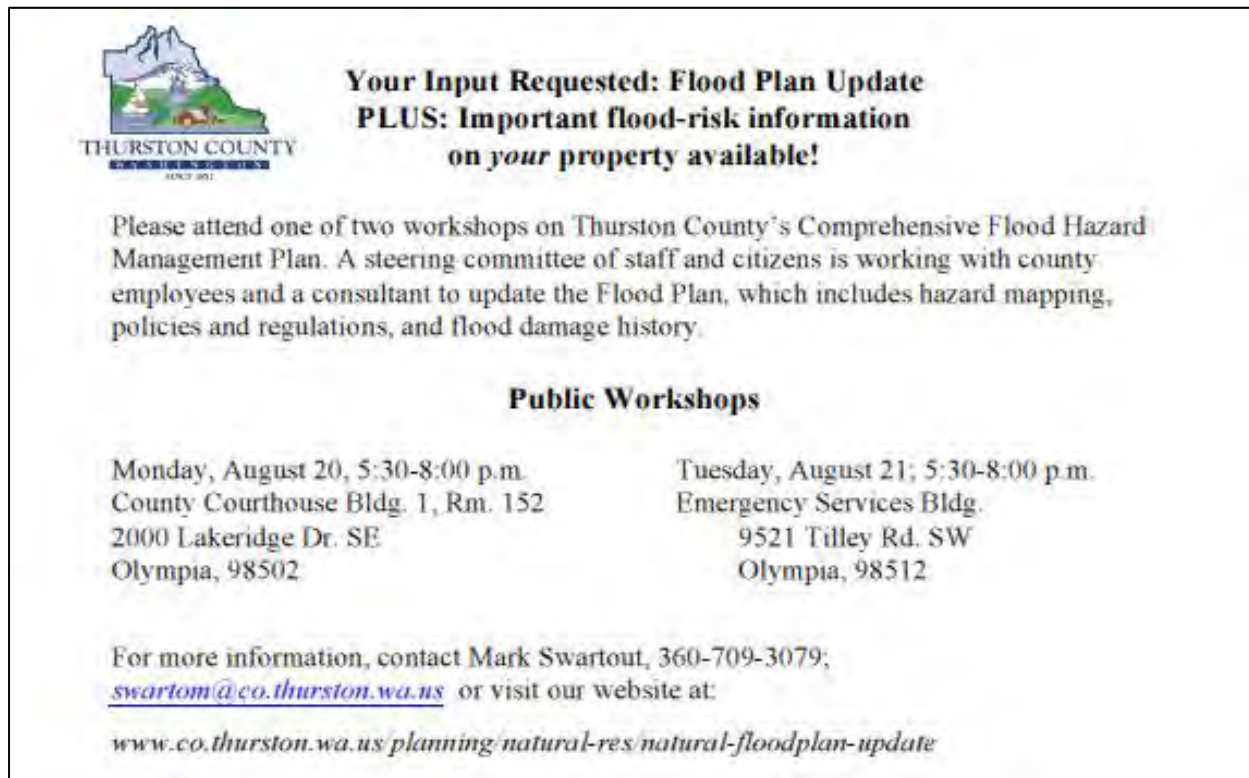


Figure 2-4. Postcard Mailed to All Floodplain Residents Advertising the Public Open Houses

The public meeting format allowed attendees to examine maps and handouts and have direct conversations with project staff. Reasons for planning and information generated for the risk assessment were shared with attendees via a PowerPoint presentation. A computer mapping workstation loaded with output from the HAZUS modeling allowed citizens to see information on their property, including exposure and damage estimates for flood hazard events (see Figure 2-5). Participating property owners were provided printouts of this information for their properties. This tool was effective in illustrating risk to the public. Planning team members were present to answer questions. Each citizen attending the open houses was asked to complete a questionnaire, and each was given an opportunity to provide written comments to the Steering Committee. Local media outlets were informed of the open houses by a press release from the planning team. Example meeting activities are shown in Figure 2-6 through Figure 2-9

A final public meeting to present the draft plan was held on Wednesday, November 14, 2012 at the Thurston County Emergency Management facilities. This meeting was advertised via a press release sent to all media outlets (see Figure 2-10 and Figure 2-11). This meeting was held at the beginning of the published public comment period, which ran until December 11, 2012.



Figure 2-5. Example Printout from HAZUS Workstation



Figure 2-6. Public Meeting #1, August 20, 2012

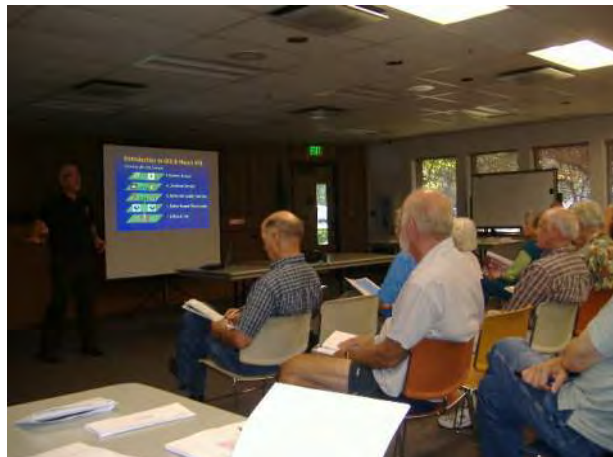


Figure 2-7. Public Meeting #1, August 20, 2012



Figure 2-8. Public Meeting #2, HAZUS Workstation, August 21, 2012



Figure 2-9. Public Meeting #2, Hazard Mapping, August 21, 2012

[HOME](#)
[NEWS](#)
[SPORTS](#)
[WEATHER](#)
[LOCAL](#)
[BUSINESS](#)
[ENTERTAINMENT](#)
[ABOUT](#)
[KMAS NEWSRADIO](#)

Public Invited to Comment on County Flood Mitigation Plan

Thurston County invites citizens to comment on a draft of the Thurston County Flood Hazard Mitigation Plan, which takes a "macro" view of countywide flood issues and identifies 32 actions through a facilitated process that focuses on meeting these objectives. With completion of this plan, the county can become one of the top-rated counties in the nation as determined by the federal Community Rating System (CRS). Currently, Thurston County has earned a 25% discount for flood insurance rates through discounts awarded for mitigation and preparedness actions. The plan reduces the risk for flooding through floodplain management and mitigation activities with specific tasks, assignments and deadlines. The plan, which fulfills requirements for obtaining state or federal assistance, also promotes education for floodplain residents about flood hazards, loss reduction measures and beneficial functions of floodplains.

The draft plan and instructions on submitting comments is available on the county's website at: <http://www.co.thurston.wa.us/planning/natural/natural-floodplan-update.htm>

The public can also comment on the plan at a public meeting on **Wednesday, November 14, from 8:30 to 7:00 p.m.** at the Emergency Coordination Center at 9521 Tilley Rd. SW.

Recent floods have shown that floods need to be addressed on a countywide basis. The floods of 2007-2009 cost county residents more than \$10 million in uninsured property losses. Even though drainage basin plans and flood plans have been adopted for some watersheds, these plans do not cover all unincorporated areas.

Comments on the draft flood mitigation plan will be accepted until the close of a Public Hearing on the subject held on **Tuesday, December 11 at 3:00 p.m.** at the Thurston County Courthouse, 2000 Lakeland Dr. SW, Building #1, Room 200.

Please direct comments and questions on the Draft Flood Plan to Mark Swartout, Natural Resources Program Manager, Thurston County Planning Department, swartout@co.thurston.wa.us

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Figure 2-10. Online Announcement of Final Public Meeting



Figure 2-11. Newspaper Announcement of Final Public Meeting

Internet

At the beginning of the plan development process, a website was created to keep the public posted on plan development milestones and to solicit relevant input (see Figure 2-12):

<http://www.co.thurston.wa.us/planning/natural-res/natural-floodplan-update.htm>

The site's address was publicized in all press releases, mailings, questionnaires and public meetings. Information on the plan development process, the Steering Committee, the questionnaire and phased drafts of the plan was made available to the public on the site throughout the process. Thurston County intends to keep a website active after the plan's completion to keep the public informed about successful mitigation projects and future plan updates.

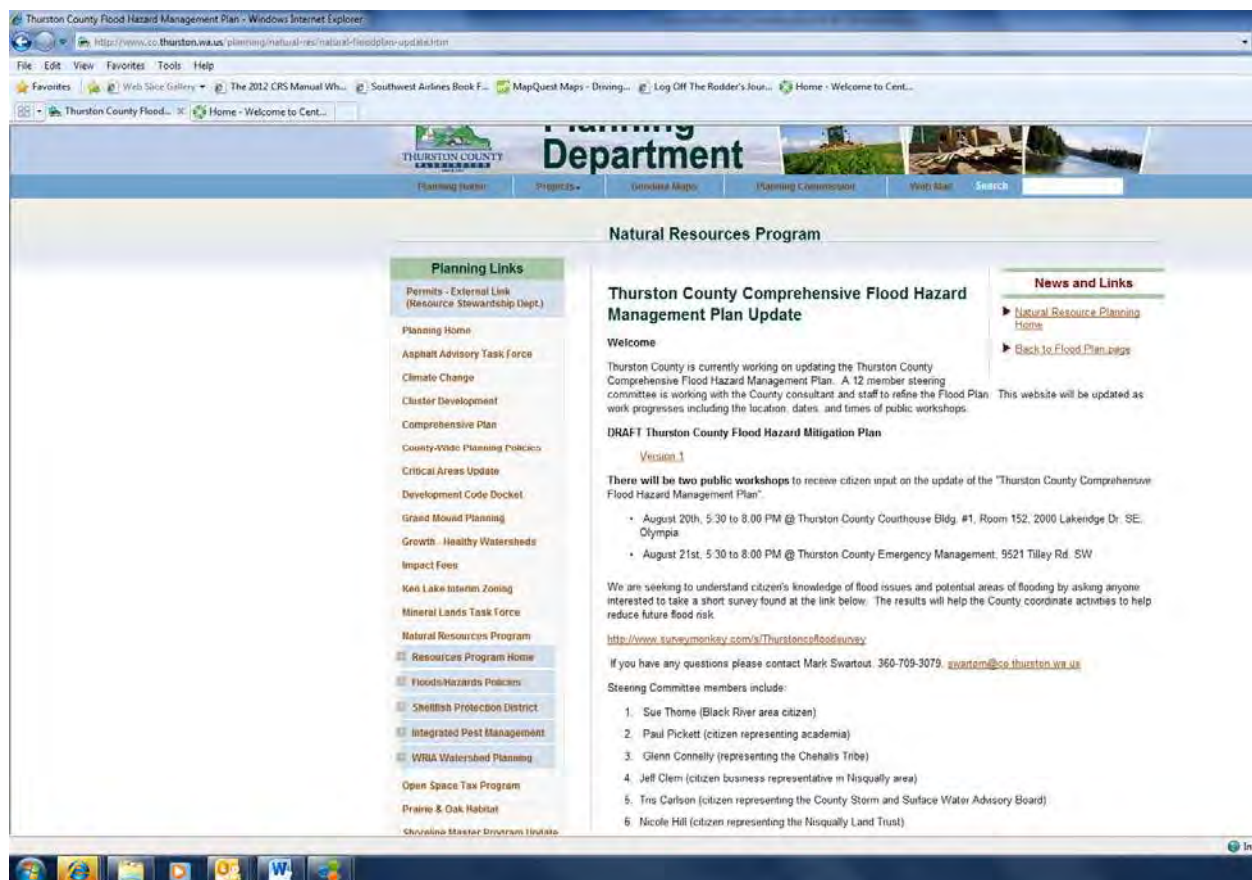


Figure 2-12. Sample Page from Flood Hazard Mitigation Plan Web Site

2.6.2 Public Involvement Results

By engaging the public through the public involvement strategy, the concept of mitigation was introduced to the public, and the Steering Committee received feedback that was used in developing components of the plan. Details of attendance and comments received are summarized in Table 2-2.

2.7 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 2-3 summarizes important milestones in the development of the plan.

**TABLE 2-2.
SUMMARY OF PUBLIC MEETINGS**

Date	Location	Number of Citizens in Attendance	Number of Comments Received	Number of Questionnaires Received
8/20/2012	Thurston County Courthouse	41	Numerous	5
8/21/2012	Thurston County Emergency Management	35	Numerous	6
11/14/2012	Thurston County Emergency Management	2	None	N/A
Total		78	Numerous	11

**TABLE 2-3.
PLAN DEVELOPMENT MILESTONES**

Date	Event	Description	Attendance
2/8/2012	Initiate consultant procurement	Seek a planning expert to facilitate the process	N/A
3/16/2012	Select Tetra Tech to facilitate plan development	Facilitation contractor secured	N/A
4/3/2012	Identify planning team	Formation of the planning team	N/A
4/16/2012	Steering Committee Meeting #1	<ul style="list-style-type: none"> Review purposes for update Organize Steering Committee Goal setting Public involvement strategy 	13
4/20/2012	Public Outreach strategy	Website set up for posting information related to plan development.	N/A
6/8/2012	Steering Committee Meeting #2	<ul style="list-style-type: none"> Approve final goals and guiding principles Establish objectives Identify critical facilities Finalize public meeting strategy 	12
7/25/2012	Steering Committee Meeting #3	<ul style="list-style-type: none"> Risk assessment preview Approve final objectives Alternative review strategy Finalize public meeting strategy 	13
8/20/2012	Public Meeting #1	Public open house to present risk assessment to the public	41
8/21/2012	Public Meeting # 2	Public open house to present risk assessment to the public	35
10/1/2012	Strengths, Weaknesses, Obstacles and Opportunities Meeting	Meeting with County staff to identify strengths, weaknesses, obstacles and opportunities within the planning area. Alternatives review and development of action plan	19
10/1/2012	Steering Committee Meeting #4	<ul style="list-style-type: none"> Risk assessment update Review public involvement results Alternatives review/action plan status Plan maintenance strategy What's next 	9

**TABLE 2-3.
PLAN DEVELOPMENT MILESTONES**

Date	Event	Description	Attendance
11/1/2012	Draft Plan	Internal review draft provided by planning team to Steering Committee	N/A
11/12/2012	Public Comment Period	Initial public comment period of draft plan opens. Draft plan posted on plan website with press release notifying public of plan availability	N/A
11/13/2012	Public Comment Period	Public notice published advertising the 12/11 public hearing by the Board of County Commissioners where they will adopt the plan.	N/A
11/14/2012	Public Outreach	Final public meeting on draft plan	2
12/11/2012	Adoption	Board of County Commissioners adopt plan during public hearing.	30
12/28/2012	Plan Approval	Final draft plan submitted to Insurance Services Office (ISO) for review and approval	N/A

CHAPTER 3.

THURSTON COUNTY PROFILE

Thurston County is located in Western Washington at the south end of Puget Sound (see Figure 3-1). With an area of 736 square miles, it is the 32nd largest of Washington's 39 counties. There are seven incorporated municipalities in the county, including the City of Olympia, which is the county seat and the Washington state capital. The county also includes portions of the Chehalis and Nisqually Indian Reservations.

3.1 HISTORICAL OVERVIEW

The following historical overview is summarized from the Thurston Regional Planning Council's 2011 report, *The Profile*.

Salish Indian groups from the tribes now known as Nisqually, Squaxin, and Chehalis gathered shellfish and frequented the inlets and prairies of Puget Sound for centuries before Euro-American exploration and settlement. The first Europeans to visit Thurston County were part of the British Vancouver Expedition, which explored the southernmost tip of Puget Sound in 1792. An expedition led by James McMillan visited the area in 1824. The first American expedition of the region, led by Lt. Commander Charles Wilke in 1841, mapped and named landmarks throughout the region. The Simmons/ Bush Party, the first American settlers, settled in Thurston County in 1845 near the falls of the Deschutes River, in what is now Tumwater. These settlers set up a gristmill and a sawmill that utilized the water power from the Deschutes River falls. Thurston County was created on January 12, 1852 in what was then the Oregon Territory. The county was named for Samuel Thurston, the first delegate to Congress from the Oregon Territory. Washington became a separate territory in November 1853. Olympia became the permanent capital of the Washington Territory in 1855.

In the 1870s, the coming of the transcontinental Northern Pacific Railroad and the Prairie Line between Puget Sound and the Columbia River encouraged significant growth in a number of Thurston County communities. The line passed through Bucoda, Tenino, Rainier and Yelm. Also at this time, Tumwater developed along the falls of the Deschutes River. Local industries included a sawmill, two gristmills, a tannery, a wooden pipe company, two sash and door manufacturers, and a furniture maker. New logging operations and areas of settlement grew in other areas during the 1880s. By 1889, 40 logging camps operated around Thurston County. The sandstone quarrying industry began in Tenino in 1889.

In the early years of the 20th century, growth in natural resource industries continued. New rail lines continued to encourage the creation of new communities. By 1922 the concrete Pacific Highway (State Route 1) had been constructed from the Canadian border, through Thurston County, to the Oregon border, transforming communities along its route. State government employment increased in Thurston County during the 1950s. A court decision during the decade mandated that the headquarters of state agencies be located in the capital city. This decision was later interpreted to mean that the headquarters should be located in the larger Olympia, Lacey and Tumwater area, spurring state employment growth in the three communities. During the 1960s, Thurston County was the site of a tribal effort to re-assert fishing rights granted by the Medicine Creek Treaty of 1854. These rights were guaranteed in a decision by federal Judge George Boldt, which was upheld by the U.S. Supreme Court in 1973. In 1967, the Washington State Legislature passed legislation authorizing the creation of The Evergreen State College. The school, located on approximately 1,000 acres on southern Cooper Point, opened to students in 1971.

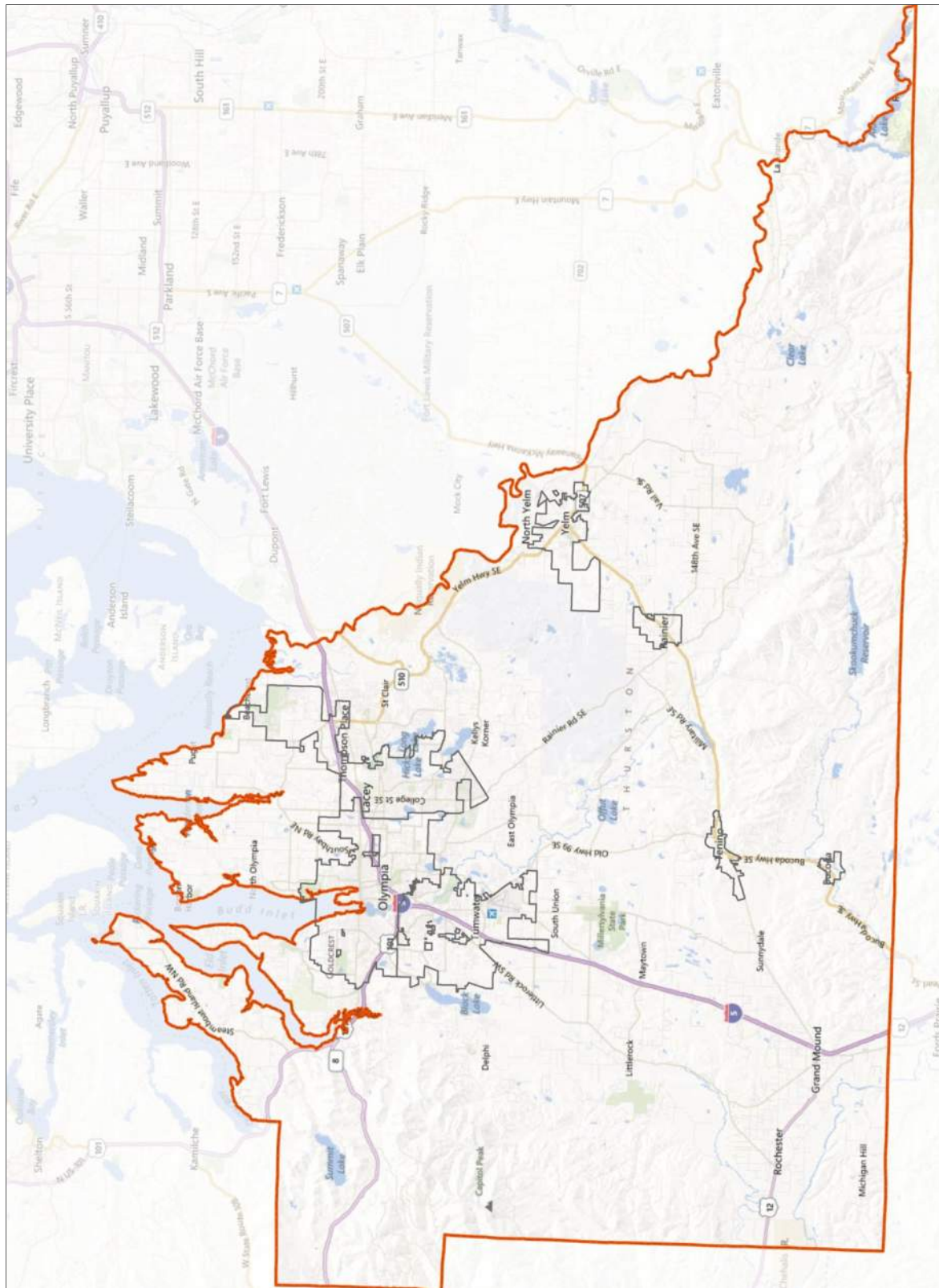


Figure 3-1. Main Features of Planning Area

Between 1960 and 1980, the county population more than doubled (from 55,059 to 124,624). Residential growth has continued since the 1970s, though at not as great of a rate countywide. Major development in certain areas however has occurred. Since the mid-1990s, Yelm has developed significantly through the influx of population related to the installation of a sewer system, and the City of Lacey has seen significant residential development.

3.2 PHYSICAL SETTING

3.2.1 Topography

Topography in the Thurston County area ranges from coastal lowlands to prairie flatlands and the foothills of the Cascades, with numerous lakes and ponds formed by glacial activity in the geologic past. The northern boundary of the county is defined by the shoreline of Puget Sound, including Budd, Henderson, and Eld Inlets. Totten Inlet divides Thurston and Mason Counties, and the Nisqually River separates Thurston from Pierce County (TRPC, 2011).

Peaks ranging from 1,700 to 3,000 feet in elevation mark the northwest and southeast corners of the county. Larch Mountain and Capitol Peak (both over 2,650 feet) are in the 92,000-acre Capitol State Forest in the northwest portion of the county. Quiemuth Peak, the highest point in Thurston County at 2,922 feet, rises in the extreme southeast corner near Alder Lake (TRPC, 2011).

3.2.2 Geology and Soils

Primary geological layers in Thurston County are as follows (Wallace and Molenaar, 1961):

- The oldest rocks known in Thurston County are of Tertiary age (2.6 to 65 million years ago). These rocks are chiefly marine and non-marine siltstone, claystone, and sandstone interbedded with rocks of volcanic origin. They are generally moderately hard and compact, but the siltstone and claystone may be locally soft and susceptible to sliding and slumping. These rocks generally have a low permeability and are very poor aquifers. Where they have been deeply weathered, dug wells usually supply enough water for household use.
- The earliest known deposits of Pleistocene age (12,000 to 2.6 million years ago) in Thurston County are a part of the Logan Hill formation in Lewis County. This formation crops out chiefly as rusty, cemented gravel that is greatly decayed and stained. The gravel particles are so soft they can be cut with a pocket knife. The formation, as it has been observed in Thurston County, is relatively impermeable and unimportant as an aquifer. In Lewis County, the lower portion of the Logan Hill formation yields a moderate amount of groundwater, although it is usually somewhat high in iron content.
- Most of the surface deposits in Thurston County consist of sand, gravel and till of the latest glaciation. The materials are relatively fresh and unaltered. A distinctive feature is the presence of a considerable quantity of pebbles, cobbles, and boulders that have a composition that is either uncommon or entirely foreign to the surrounding area. These deposits are named the Vashon drift, and they mantle much of the Puget Sound lowland from the Canadian border to Centralia. The Vashon drift was deposited both by ice and as outwash from a great tongue of ice extending south from ice fields in Canada and northern Washington. The deposits are of the following types:
 - **Advance Outwash**—As ice moved south, large quantities of sand and gravel were deposited by meltwater at the front and sides of the ice mass. These deposits consist typically of poorly sorted to moderately well-sorted, well-rounded gravel in a sandy matrix, interbedded with lenses of sand. The materials have a fresh, unweathered appearance and are generally moderately to very permeable. The advance outwash, which

is composed predominantly of permeable sand and gravel, is one of the most productive aquifers in the county.

- **Till**—Till, deposited directly by the ice, covers more of the Puget Sound lowland than does any other unit. Till is readily recognizable by its characteristic appearance. Unweathered, it is a grey to light bluish-grey concrete-like mixture of clay, silt, sand, pebbles, cobbles and boulders. Typically, silt predominates, and the spacing of pebbles and cobbles is similar to that of raisins in raisin bread. The whole aspect is one of toughness and compactness. Although the till is of low permeability and restricts or greatly impedes the downward percolation of water, small supplies of perched groundwater can sometimes be obtained from it under favorable conditions. Water is yielded mostly from cracks or permeable sandy streaks and zones within the till.
- **Recessional Outwash**—Sand and gravel that were deposited by glacial meltwater streams during the recession of the glacier to the north are referred to as recessional outwash. At a few places, sand and silt were deposited where water was ponded by irregularities of topography or by blocking of the drainage with ice. Except for these silt and sand deposits, the recessional outwash materials generally were laid down rapidly by swift, overloaded streams. Hence, the degree of sorting is variable and great lateral variation is common. Although poorly sorted, the outwash is moderately permeable. The recessional outwash is a productive aquifer in Thurston County.

3.2.3 Drainage

Thurston County is drained by five major rivers, described below in order from east to west (Wallace and Molenaar, 1961):

- The Nisqually River bounds the county on the east and is fed by glaciers on the south flank of Mount Rainier. It flows into Puget Sound at a point about 10 miles northeast of Olympia.
- The Deschutes River, rising in the hills southeast of Yelm, roughly parallels and is 5 to 10 miles southwest of the Nisqually River. It flows into Puget Sound through Budd Inlet at Olympia.
- The Skookumchuck River, which begins in the Bald Hills of Thurston and Lewis Counties, drains most of the hills in the south-central portion of the county south of the Deschutes drainage area. After its entrance into Thurston County, the Skookumchuck flows west along a circuitous route to Bucoda and then turns sharply to flow southwest to its confluence with the Chehalis River just west of Centralia in Lewis County.
- The Chehalis River flows northwest from Centralia and crosses the southwestern corner of Thurston County, where it drains the Michigan Hill area and receives water from Prairie Creek and Scatter Creek. The Chehalis discharges into the Pacific Ocean at Grays Harbor.
- The Black River drains a large portion of the easternmost Black Hills and much of the prairie area east of the river. The fall of the Black River is not great enough for effective drainage, so marshy areas occur through most of its course. Its confluence with the Chehalis is about one and a half miles southeast of Oakville in Grays Harbor County.

In addition to these major rivers, a portion of the northwest corner of Thurston County drains to Puget Sound through smaller streams flowing to Eld Inlet and Totten Inlet. Another separate drainage area discharges to Henderson Inlet, between the Nisqually and Deschutes River basins. The planning area's eight river and inlet basins, as shown on Figure 3-2, were used in the risk assessment performed for this plan.

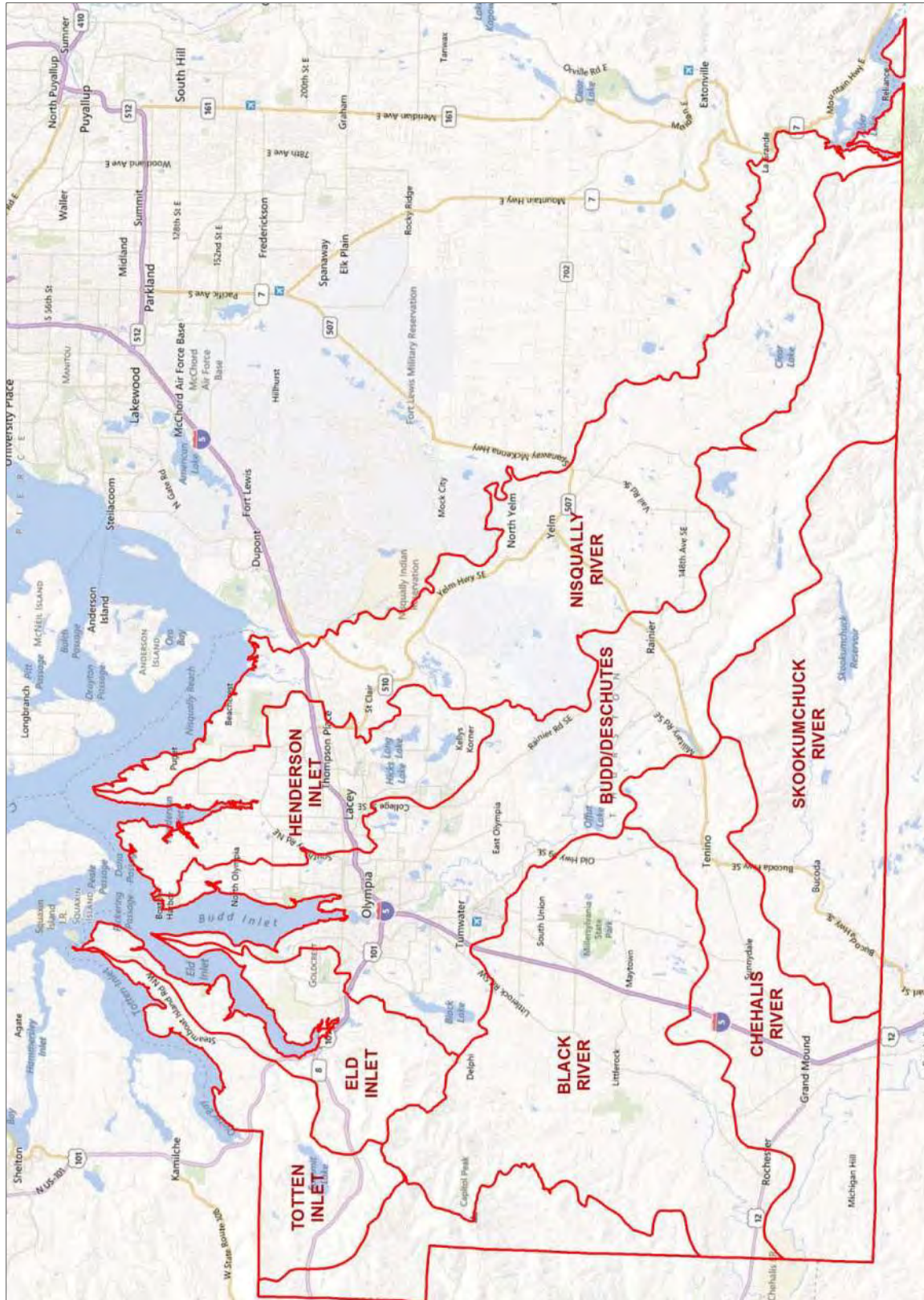


Figure 3-2. Planning Area River and Inlet Drainage Basins

3.2.4 Climate

Like most of Western Washington, Thurston County's weather is characterized by sunny summers and wet winters. The county has a marine climate with mild temperatures year-round. In summer, the average high temperature ranges between 70°F and 80°F. In winter, high temperatures are around 45°F. Olympia receives 50 inches of rainfall annually, spread out over a large number of days. With about 52 clear days out of every 365, Thurston County residents live under some form of cloud cover 86 percent of the year, with more than a trace of rain falling on almost half of the days of the year. Table 3-1 summarizes key climate data for the county (TRPC, 2011).

TABLE 3-1. AVERAGE THURSTON COUNTY CLIMATE DATA				
	Average Temperature (°F)		Average Precipitation (inches)	
	High	Low	Rainfall	Snowfall
Jan	44.6	31.7	8.0	7.3
Feb	49.2	32.4	5.6	3.7
Mar	53.3	33.8	5.1	1.9
Apr	58.9	36.5	3.3	0.1
May	65.7	41.6	2.0	0.0
Jun	70.9	46.7	1.5	0.0
Jul	77.2	49.5	0.7	0.0
Aug	77.0	49.5	1.1	0.0
Sep	71.5	45.3	2.0	0.0
Oct	60.5	39.7	4.7	0.0
Nov	50.4	35.6	8.2	1.3
Dec	44.8	32.6	8.1	3.9
Average	60.3	39.6	—	—
Total	—	—	50.3	18.2
Source: TRPC, 2011				

3.3 CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities and infrastructure are those that are essential to the health and welfare of the population. These become especially important after a hazard event. Critical facilities typically include police and fire stations, schools and emergency operations centers. Critical infrastructure can include the roads and bridges that provide ingress and egress and allow emergency vehicles access to those in need, and the utilities that provide water, electricity and communication services to the community. Also included are "Tier II" facilities and railroads, which hold or carry significant amounts of hazardous materials with a potential to impact public health and welfare in a hazard event. Through a facilitated process, the Steering Committee established a definition of critical facilities for this flood hazard mitigation plan that includes but is not limited to the following:

A critical facility is one that is deemed vital to the Thurston County planning area's ability to provide essential services while protecting life and property. A critical facility may be a system or an asset, either physical or virtual, the loss of which would have a profound impact across the planning area on security, the economy, public health or safety, the environment,

or any combination thereof. The following types of systems and assets are defined as critical facilities:

- Police stations, fire stations, paramedic stations, emergency vehicle and equipment storage facilities, and emergency operations and communications centers needed for disaster response before, during and after hazard events.
- Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events. These include water (potable, wastewater, stormwater, drainage and irrigation), utilities (transmission and distribution facilities for natural gas, power and geothermal) and communications (land-based telephone, cell phone, the internet, emergency broadcast facilities and emergency radios).
- Public gathering places that could be used as evacuation centers during large-scale disasters.
- Hospitals, extended care facilities, urgent care facilities and housing that may contain occupants not sufficiently mobile to avoid death or injury during a hazard event
- Transportation systems that convey vital supplies and services to, through and throughout the community. These include roads, bridges, railways, airports and pipelines
- Government and educational facilities central to governance and quality of life, along with response and recovery actions during and after a hazard event.
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, or water-reactive materials.
- Infrastructure designed to help safely convey high water events from the event source to the perimeter of the planning area including but not limited to dams, revetments and stormwater drainage facilities.
- Debris management and solid waste facilities.

An inventory of facilities that meet this definition was created and input to the HAZUS Comprehensive Data Management System. Two principle sources of information were used for this inventory:

- The HAZUS default entries contained in the Comprehensive Data Management System (HAZUS version 2.2)
- The inventory of critical facilities and infrastructure maintained by Thurston County Emergency Management to support the Critical Infrastructure/Key Resource initiative.

Figure 3-3 shows the location of critical facilities in the planning area. Due to the sensitivity of this information, a detailed list of facilities is not provided. The list is on file with Thurston County. Table 3-2 and Table 3-3 provide summaries of the general types of critical facilities and infrastructure in the planning area. All critical facilities and infrastructure were analyzed to help identify the flood risk and mitigation initiatives. Chapter 7 assesses facilities that are exposed and vulnerable to the flood hazard.

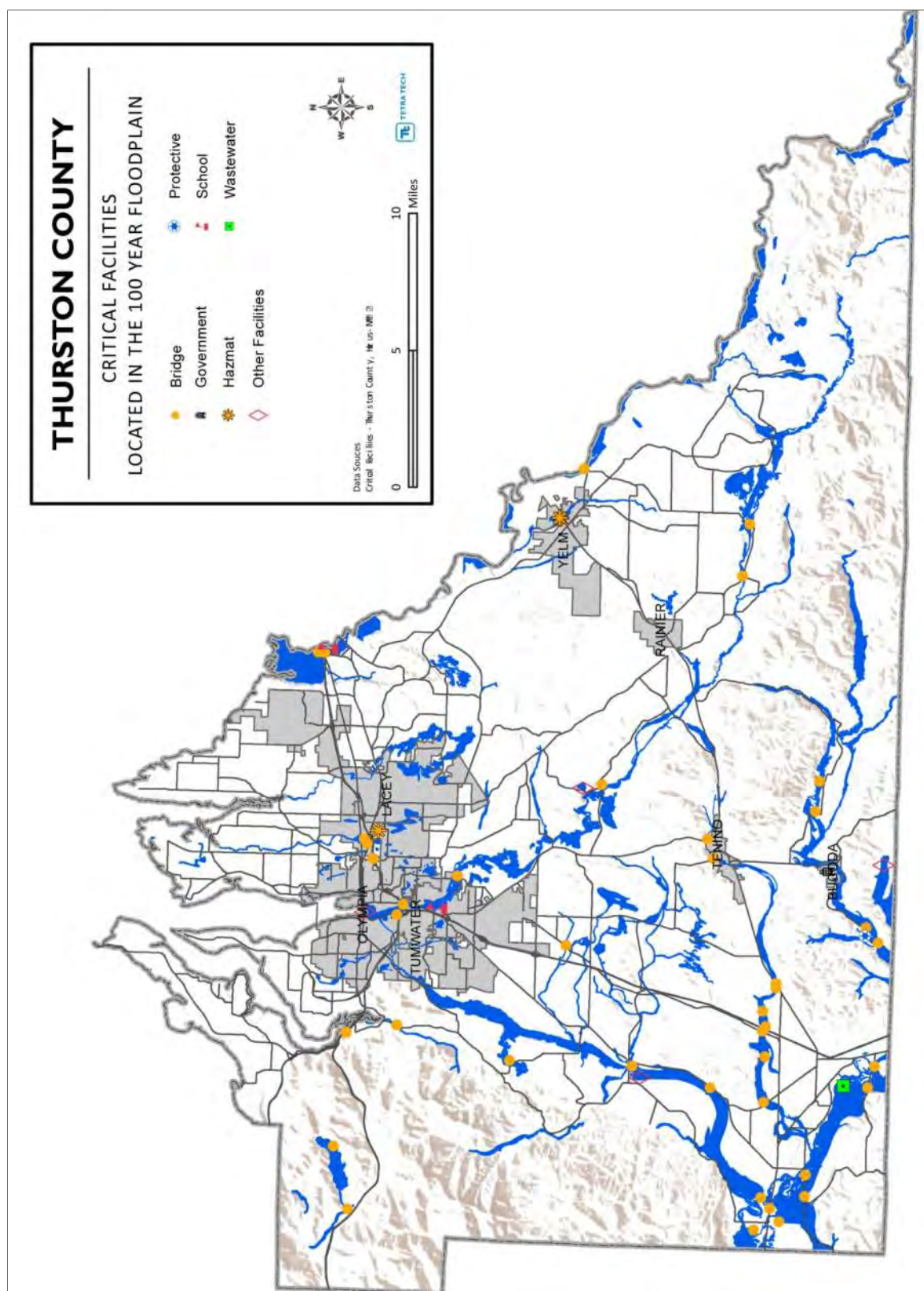


Figure 3-3. Identified Critical Facilities in the Planning Area

**TABLE 3-2.
PLANNING AREA CRITICAL FACILITIES**

Facility Type	Number in Planning Area
Medical and Health	84
Government Functions	83
Protective Functions	52
Schools	94
Hazmat	10
Other Critical Functions	57
Total	380

**TABLE 3-3.
PLANNING AREA CRITICAL INFRASTRUCTURE**

Infrastructure Type	Number in Planning Area
Bridges	187
Water Supply	10
Wastewater	6
Power	4
Communications	12
Other	23
Total	242

3.4 DEMOGRAPHICS

Some populations are at greater risk from hazard events such as floods because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), the disabled, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would help to extend focused public outreach and education to these most vulnerable citizens.

3.4.1 Population Characteristics

Knowledge of the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. The Washington State Office of Financial Management estimated Thurston County's population at 254,100 as of 2011, making it the sixth largest county by population in the state (OFM, 2012).

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population signifies economic decline. Figure 3-4 shows the planning area population change from 1900 to 2010 compared to that of the State of Washington (OFM, 2012). For most of its history, Thurston County has grown faster than the statewide average. The County and the state have both seen reduced population growth rates since a peak in the 1970s, but both continue to grow. Thurston County's population increased an average of 2 percent per year between 2000 and 2010, a total of 21.7 percent over that period. Table 3-4 shows the county population from 1995 to 2011.

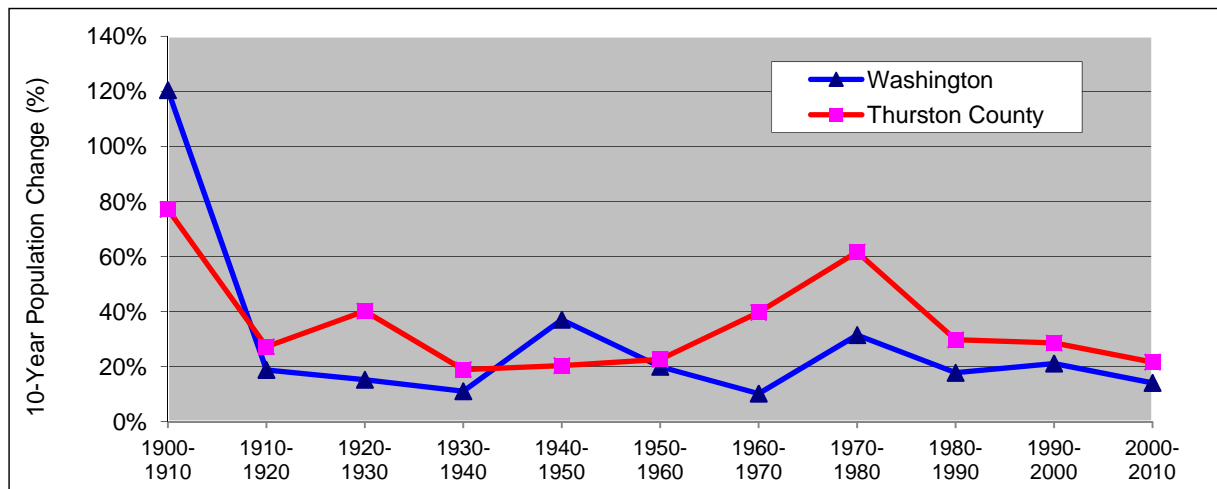


Figure 3-4. Washington and Thurston County Population Growth

TABLE 3-4. RECENT COUNTY POPULATION GROWTH	
Thurston County Population	
1995	186,400
2000	207,355
2005	224,100
2010	252,264
2011	254,100
Source: TRPC, 2011	

The Thurston Regional Planning Council has developed forecasts of future population as shown in Table 3-5. The projections estimate a population of 426,993 in Thurston County by 2040.

TABLE 3-5. PROJECTED FUTURE COUNTY POPULATION GROWTH	
Thurston County Population	
2015	274,892
2020	309,438
2025	340,136
2030	369,866
2035	398,039
2040	426,993
Source: TRPC, 2011	

3.4.2 Income

In the United States, individual households are expected to use private resources to prepare for, respond to and recover from disasters to some extent. This means that households living in poverty are automatically disadvantaged when confronting hazards such as flooding. Additionally, the poor typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes and floods than other types of housing. In urban areas, the poor often live in older houses and apartment complexes, which are more likely to be made of un-reinforced masonry, a building type that is particularly susceptible to damage during earthquakes. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level have a great deal to lose during an event and are the least prepared to deal with potential losses. The events following Hurricane Katrina in 2005 illustrated that personal household economics significantly impact people's decisions on evacuation. Individuals who cannot afford gas for their cars will likely decide not to evacuate.

Based on the most recent 5-year estimates (2006 – 2010) from the U.S. Census Bureau's American Community Survey, per capita income in the planning area was \$29,707 and the median household income was \$60,930. It is estimated that about 15.7 percent of households receive an income between \$100,000 and \$149,999 per year and 4.6 percent of household incomes are above \$150,000 annually. The Census Bureau estimates that 10.3 percent of the population in the planning area lives below the poverty level (U.S. Census, 2012).

3.4.3 Age Distribution

As a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from the flood hazard.

The overall age distribution for the planning area is illustrated in Figure 3-5. Based on the most recent 5-year estimates (2006 – 2010) from the U.S. Census Bureau’s American Community Survey, 12.5 percent of the planning area’s population is 65 or older, compared to the state average of 12.3 percent. According to U.S. Census data, 36.6 percent of the over-65 population has disabilities of some kind and 5.9 percent have incomes below the poverty line. Children under 18 account for 13 percent of individuals who are below the poverty line. The county’s population includes 18.9 percent who are 14 or younger, compared to the state average of 19.5 percent. (U.S. Census, 2012)

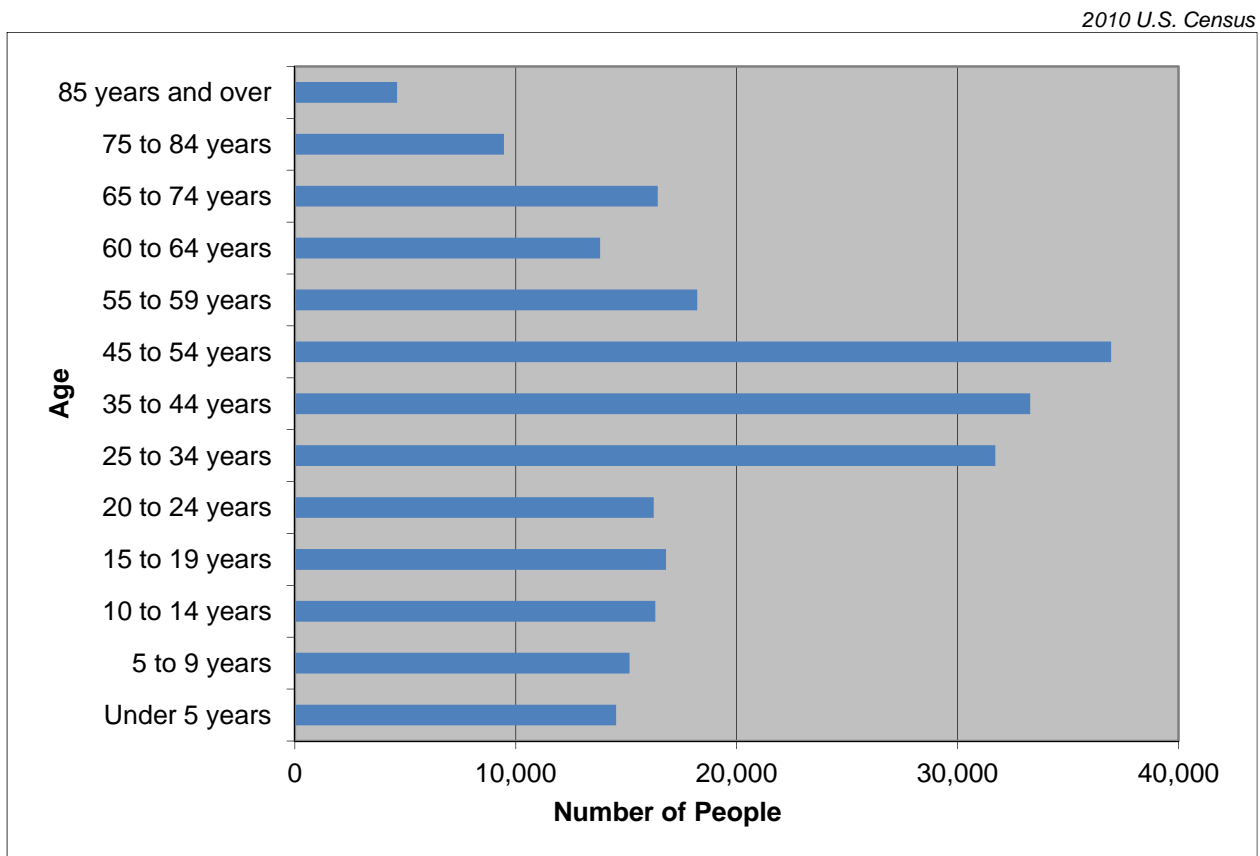


Figure 3-5. Planning Area Age Distribution

3.4.4 Race, Ethnicity and Language

Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability. According to the most recent 5-year estimates (2006 – 2010) from the U.S. Census Bureau’s American Community Survey, the racial composition of the planning area is predominantly white, at 83.4 percent. The largest minority populations are Asian at 5.3 percent and two or more races at 4.4 percent. Figure 3-6 shows the racial distribution in the planning area. (U.S. Census, 2012)

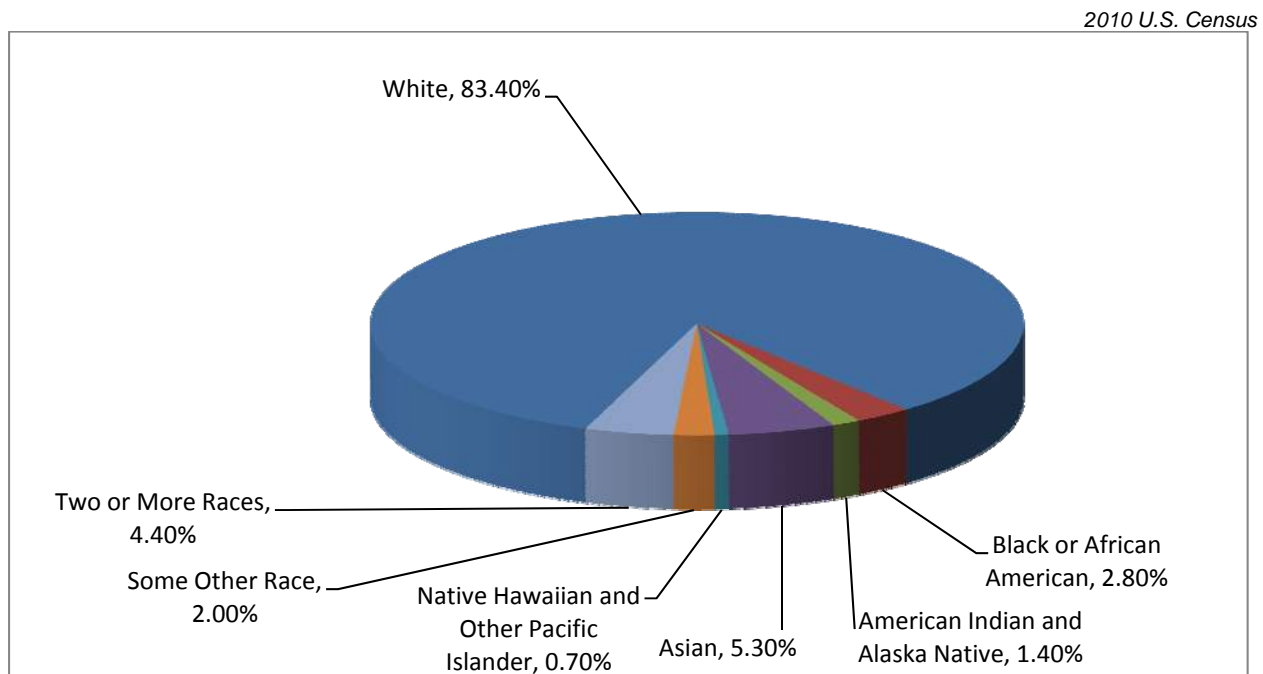


Figure 3-6. Planning Area Race Distribution

The planning area has a 7.1-percent foreign-born population. Other than English, the most commonly spoken languages in the planning area are Asian and Pacific Islander languages at 4.1 percent and Spanish at 3.6 percent. The census estimates that 3.5 percent of the residents speak English “less than very well.” (U.S. Census, 2012).

3.4.5 Disabled Populations

The 2010 U.S. Census estimates that 54 million non-institutionalized Americans with disabilities live in the U.S. This equates to about one-in-five persons. People with disabilities are more likely to have difficulty responding to a hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs in order to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability will allow emergency management personnel and first responders to have personnel available who can provide services needed by those with access and functional needs.

According to the 2008-2010 3-year Census estimates, there are 31,289 individuals with some form of disability within the planning area, representing 12.9 percent of the county total. (U.S. Census, 2012)

3.5 ECONOMY

3.5.1 Industry, Businesses and Institutions

The planning area’s economy is strongly based in the education/health care/social service industry (21 percent of employment), followed by public administration (18 percent) and retail trade (11 percent). Information (1 percent), wholesale trade (2 percent) and natural resources industries (2 percent) make up the smallest source of the local economy. Figure 3-7 shows the breakdown of industry types in the planning area. (U.S. Census, 2012)

2010 U.S. Census

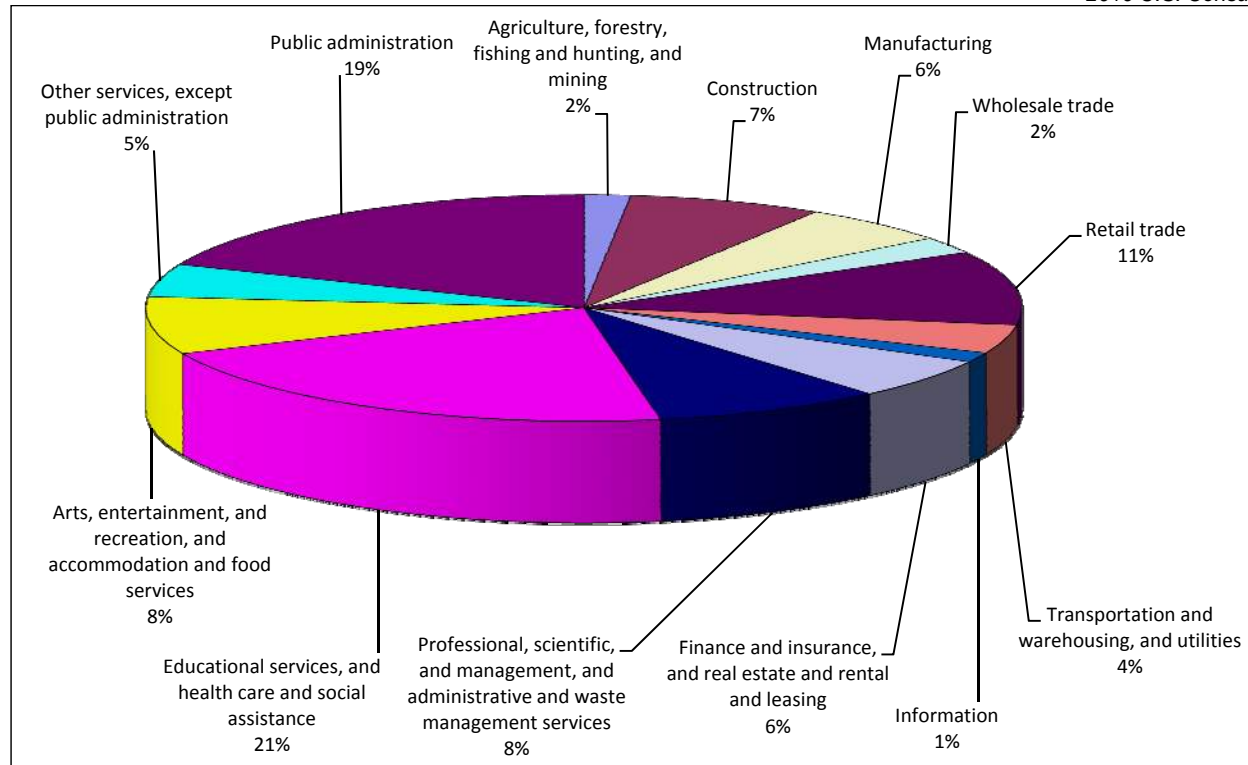


Figure 3-7. Industry in the Planning Area

The Thurston Regional Planning Council identifies the following large employers in Thurston County (TRPC, 2011):

- The State of Washington is the largest employer in the county, accounting for about 19,500 full- and part-time jobs in the county.
- Providence St. Peter Hospital is the largest private employer in Thurston County, employing an estimated 2,400 workers.
- With 1,498 employees, the Chehalis Tribe is one of the largest employers in the area.
- The Nisqually Tribe is also a major employer for the region. The tribe employs approximately 900 people.
- Resident active duty military personnel total 3,435 individuals, many of them employed at Joint Base Lewis-McChord, 9 miles north of Lacey along I-5.

3.5.2 Employment Trends and Occupations

According to the 2006-2010 5-year American Community Survey, 65.4 percent of the planning area's population 16 years old or older is in the labor force, including 62 percent of women in that age range and 71 percent of men (U.S. Census, 2012).

Figure 3-8 compares Washington's and Thurston County's unemployment trends from 1990 through 2010, based on data from the state Employment Security Department (ESD, 2012). Thurston County's unemployment rate was lowest in 1998 at 4.2 percent and in 2007 at 4.3 percent. The rate peaked at 8.2 percent in 2010, and has declined slightly since then. The county unemployment rate has been consistently lower than the statewide rate.

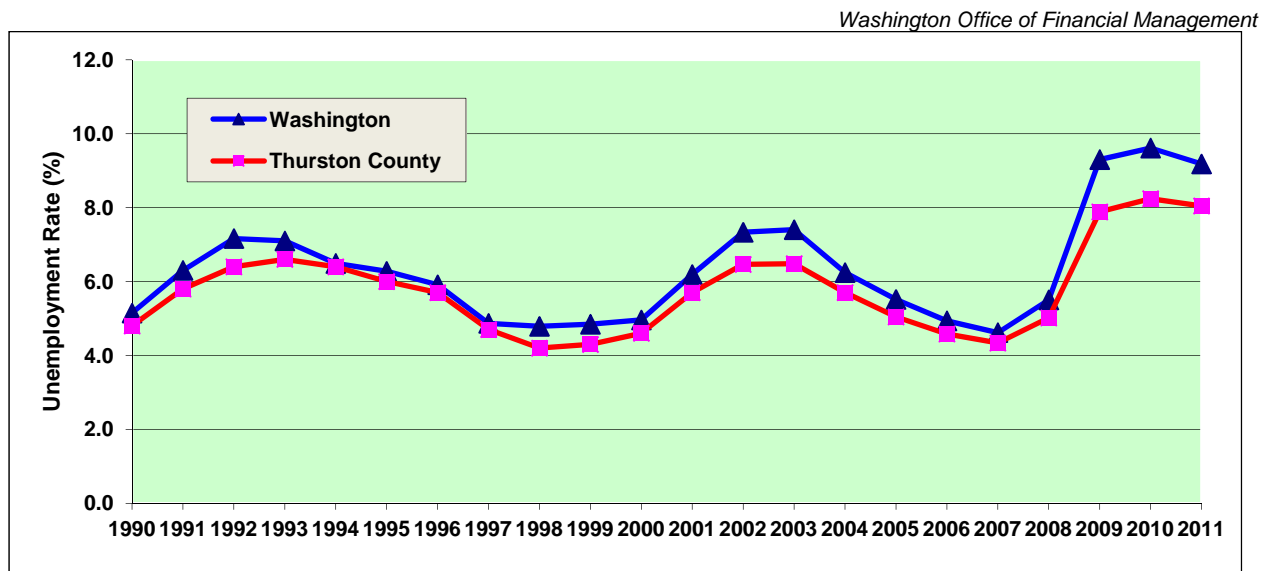


Figure 3-8. Washington and Thurston County Unemployment Rate

Figure 3-9 shows Census Bureau estimates of employment distribution by occupation category (U.S. Census, 2012). Management, business, science and arts occupations make up 41 percent of the jobs in the planning area. Sales and office occupations make up 25 percent of the local working population.

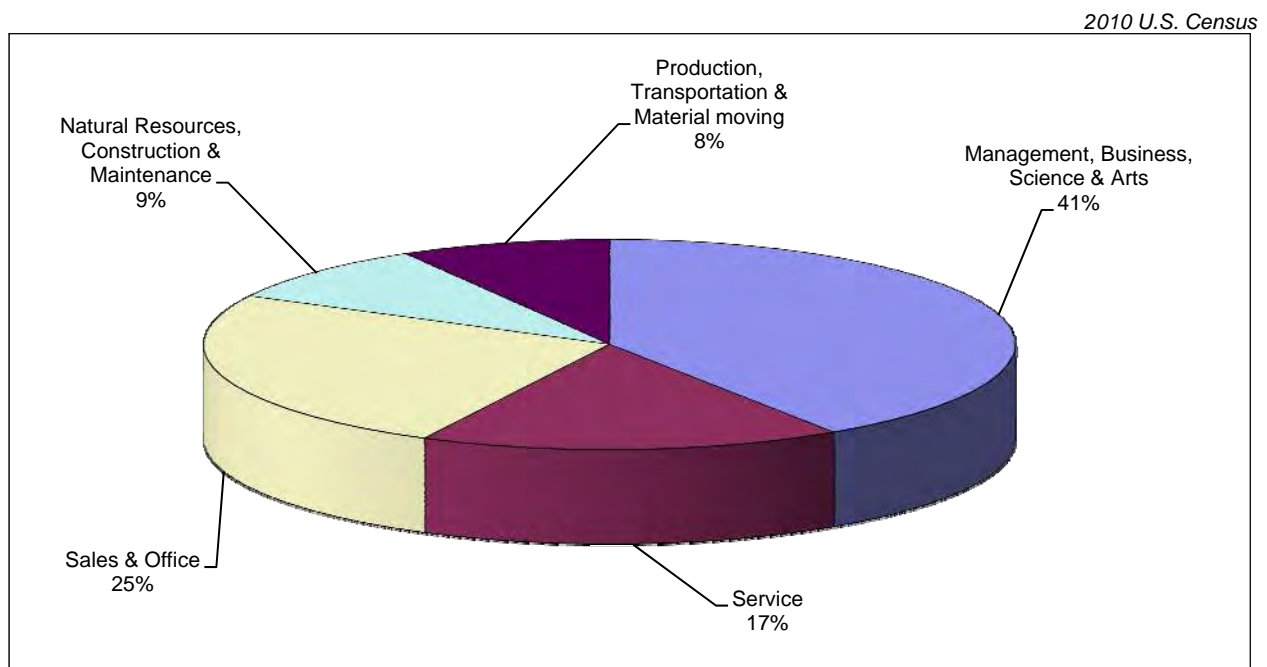


Figure 3-9. Occupations in the Planning Area

The U.S. Census estimates that 77 percent of workers in the planning area commute alone (by car, truck or van) to work, and mean travel time to work is 24.9 minutes (the state average is 25.1 minutes) (U.S. Census, 2012).

CHAPTER 4.

RELEVANT PROGRAMS AND REGULATIONS

Existing laws, ordinances and plans at the federal, state and local level can support or impact mitigation initiatives identified in this plan. Development of this plan included a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process. Pertinent federal, state and local laws are described below.

4.1 FEDERAL

4.1.1 Disaster Mitigation Act of 2000

The federal Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for state, local and Indian tribal governments as a condition of mitigation grant assistance. The DMA amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by replacing previous mitigation planning provisions with new requirements that emphasize the need for planning entities to coordinate mitigation planning and implementation efforts. The law added incentives for increased coordination and integration of mitigation activities at the state level by establishing two levels of state plans. The DMA also established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds to be available for development of state, local, and Indian tribal mitigation plans.

4.1.2 National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities in exchange for communities enacting floodplain regulations. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood (100-year flood) and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

Thurston County participates in the NFIP and has adopted regulations that meet the NFIP requirements. The County entered the NFIP in 1982, and the first Thurston County FIRM was issued December 1, 1982. Structures permitted or built in the planning area before then are called “pre-FIRM” structures, and

structures built afterwards are called “post-FIRM.” The insurance rate is different for the two types of structures. The effective date for the current FIRM is October 16, 2012. Thurston County is currently in good standing with the provisions of the NFIP.

4.1.3 The Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the CRS goals of reducing flood losses, facilitating accurate insurance rating and promoting awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation’s flood risk; over 66 percent of the NFIP’s policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

Thurston County has participated in the CRS program since 2000. The County has a Class 5 rating (out of 10), so citizens who live in a 100-year floodplain can receive a 25-percent discount on their flood insurance; outside the 100-year floodplain they receive a 10-percent discount. This equates to a savings ranging from \$92 to \$180 per policy, for a total countywide premium savings of a little over \$50,953.

As of October 2011, out of 1,189 communities in the U.S. participating in the CRS program, only 66 were rated Class 5 and only nine were rated higher (see Figure 4-1). The County received this rating because of its floodplain management program and critical areas ordinance. Together these regulatory programs reduce damage caused by flooding, which results in a reduction in insurance premiums. To maintain this rating, the County goes through an annual recertification and a re-verification every 3 years.

4.1.4 Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

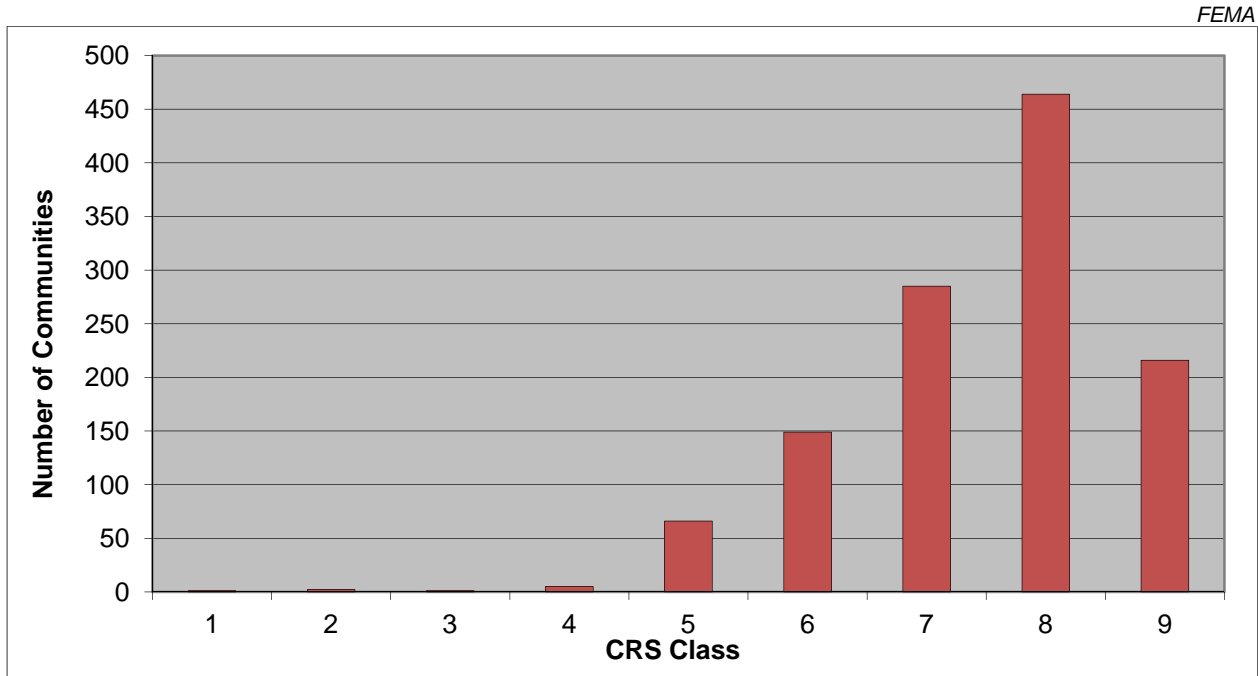


Figure 4-1. CRS Communities by Class Nationwide as of October 2011

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- **Endangered** means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- **Threatened** means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.
- **Critical habitat** means "specific geographical areas that are...essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

- **Section 4: Listing of a Species**—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- **Section 7: Consultation**—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a

species, it must propose mitigations or “reasonable and prudent” alternatives to the action; if the proponent rejects these, the action cannot proceed.

- **Section 9: Prohibition of Take**—It is unlawful to “take” an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- **Section 10: Permitted Take**—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a “Habitat Conservation Plan.”
- **Section 11: Citizen Lawsuits**—Civil actions initiated by any citizen can require the listing agency to enforce the ESA’s prohibition of taking or to meet the requirements of the consultation process.

With the listing of salmon and trout species as threatened or endangered, the ESA has impacted most of the Pacific Coast states. Although some of these areas have been more impacted by the ESA than others due to the known presence of listed species, the entire region has been impacted by mandates, programs and policies based on the presumption of the presence of listed species. Most West Coast jurisdictions must now take into account the impact of their programs on habitat.

4.1.5 The Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation’s surface waters so that they can support “the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water.”

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

4.2 STATE

4.2.1 Washington State Floodplain Management Law

Washington’s floodplain management law (Revised Code of Washington (RCW) 86.16, implemented through Washington Administrative Code (WAC) 173-158) states that prevention of flood damage is a matter of statewide public concern and places regulatory control with the Department of Ecology. RCW 86.16 is cited in floodplain management literature, including FEMA’s national assessment, as one of the first and strongest in the nation. A 1978 major challenge to the law—Maple Leaf Investors Inc. v. Department of Ecology—is cited in legal references to floodplain management issues. The court upheld the law, declaring that denial of a permit to build residential structures in the floodway is a valid exercise of police power and did not constitute a taking. RCW Chapter 86.12 (Flood Control by Counties) authorizes county governments to levy taxes, condemn properties and undertake flood control activities directed toward a public purpose.

4.2.2 Flood Control Assistance Account Program

Washington's first flood control maintenance program was passed in 1951, and was called the Flood Control Maintenance Program. In 1984, RCW 86.26 (State Participation in Flood Control Maintenance) established the Flood Control Assistance Account Program (FCAAP), which provides funding for local flood hazard management. FCAAP rules are found in WAC 173-145. Ecology distributes FCAAP matching grants to cities, counties and other special districts responsible for flood control. This is one of the few state programs in the U.S. that provides grant funding to local governments for floodplain management. The program has been funded for \$4 million per biennium since its establishment, with additional amounts provided after severe flooding events.

To be eligible for FCAAP assistance, flood hazard management activities must be approved by Ecology in consultation with the Washington Department of Fish and Wildlife. A comprehensive flood hazard management plan must have been completed and adopted by the appropriate local authority or be in the process of being prepared in order to receive FCAAP flood damage reduction project funds. This policy evolved through years of the Flood Control Maintenance Program and early years of FCAAP in response to the observation that poor management in one part of a watershed may cause flooding problems in another part.

Local jurisdictions must participate in the NFIP and be a member in good standing to qualify for an FCAAP grant. Grants up to 75 percent of total project cost are available for comprehensive flood hazard management planning. Flood damage reduction projects can receive grants up to 50 percent of total project cost, and must be consistent with the comprehensive flood hazard management plan. Emergency grants are available to respond to unusual flood conditions. FCAAP can also be used for the purchase of flood prone properties, for limited flood mapping and for flood warning systems. Funding currently is running about 60 percent for planning and 40 percent for projects.

Thurston County is currently in compliance and good standing with the FCAAP program. The June 1999 Thurston County Flood Hazard Management Plan was approved by the Washington Department of Ecology as the FCAAP plan of record for Thurston County. This Flood Hazard Mitigation Plan will be viewed as a supplement to the 1999 plan. The mitigation initiatives identified in this plan may be eligible for funding under FCAAP. FCAAP funds can be used as matching funds for some types of mitigation projects funded under the FEMA Hazard Mitigation Grant Program.

4.2.3 Shoreline Management Act

The 1971 Shoreline Management Act (RCW 90.58) was enacted to manage and protect the shorelines of the state by regulating development in the shoreline area. A major goal of the act is to prevent the "inherent harm in an uncoordinated and piecemeal development of the state's shorelines." Its jurisdiction includes the Pacific Ocean shoreline and the shorelines of Puget Sound, the Strait of Juan de Fuca, and rivers, streams and lakes above a certain size. It also regulates wetlands associated with these shorelines.

4.2.4 Growth Management Act

The 1990 Washington State Growth Management Act (RCW Chapter 36.70A) mandates that local jurisdictions adopt land use ordinances protect the following critical areas:

- Wetlands
- Critical aquifer recharge areas
- Fish and wildlife habitat conservation areas
- Frequently flooded areas

- Geologically hazardous areas.

The Growth Management Act regulates development in these areas, and therefore has the potential to affect hazard vulnerability and exposure at the local level.

4.2.5 Washington State Building Code

The Washington State Building Code Council adopted the 2006 editions of national model codes, with some amendments. The Council also adopted changes to the Washington State Energy Code and Ventilation and Indoor Air Quality Code. Washington's state-developed codes are mandatory statewide for residential and commercial buildings. The residential code exceeds the 2006 International Energy Conservation Code standards for most homes, and the commercial code meets or exceeds standards of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE 90.1-2004). For residential construction covered by ASHRAE 90.1-2007 (buildings with four or more stories), the state code is more stringent. The 2009 IBC went into effect as the Washington model code on July 1, 2010.

4.2.6 Comprehensive Emergency Management Planning

Washington's Comprehensive Emergency Management Planning law (RCW 38.52) establishes parameters to ensure that preparations of the state will be adequate to deal with disasters, to ensure the administration of state and federal programs providing disaster relief to individuals, to ensure adequate support for search and rescue operations, to protect the public peace, health and safety, and to preserve the lives and property of the people of the state. It achieves the following:

- Provides for emergency management by the state, and authorizes the creation of local organizations for emergency management in political subdivisions of the state.
- Confers emergency powers upon the governor and upon the executive heads of political subdivisions of the state.
- Provides for the rendering of mutual aid among political subdivisions of the state and with other states and for cooperation with the federal government with respect to the carrying out of emergency management functions.
- Provides a means of compensating emergency management workers who may suffer any injury or death, who suffer economic harm including personal property damage or loss, or who incur expenses for transportation, telephone or other methods of communication, and the use of personal supplies as a result of participation in emergency management activities.
- Provides programs, with intergovernmental cooperation, to educate and train the public to be prepared for emergencies.

It is policy under this law that emergency management functions of the state and its political subdivisions be coordinated to the maximum extent with comparable functions of the federal government and agencies of other states and localities, and of private agencies of every type, to the end that the most effective preparation and use may be made of manpower, resources, and facilities for dealing with disasters.

WAC 118-30-060(1) requires each political subdivision to base its comprehensive emergency management plan on a hazard analysis, and makes the following definitions related to hazards:

- Hazards are conditions that can threaten human life as the result of three main factors:
 - Natural conditions, such as weather and seismic activity
 - Human interference with natural processes, such as a levee that displaces the natural flow of floodwaters

- Human activity and its products, such as homes on a floodplain.
- The definitions for hazard, hazard event, hazard identification, and flood hazard include related concepts:
 - A hazard may be connected to human activity.
 - Hazards are extreme events.

Hazards generally pose a risk of damage, loss, or harm to people and/or their property

4.2.7 Watershed Management Act

Washington’s Watershed Management Act of 1998 encourages local communities to develop plans for protecting local water resources and habitat. Lawmakers wanted local governments and citizens to develop plans since they know their own regions best. WRIA is an acronym for “Water Resource Inventory Area.” WRIs are watershed planning areas established by the Department of Ecology. Washington State is divided into 62 WRIs, each loosely drawn around a natural watershed or group of watersheds. A watershed is an area of land that drains into a common river, lake or the ocean

4.3 LOCAL

4.3.1 Comprehensive Plans

Several comprehensive plans guide development of lands in unincorporated parts of Thurston County. Comprehensive Plans guide the county’s physical development and identify transportation and other public facilities needed to meet the needs of population growth. These plans are the framework for zoning and other development regulations, which must be consistent with comprehensive plans.

The Thurston County Comprehensive Plan deals mainly with rural areas of the county (land outside of urban growth areas that surround cities). The County also has subarea plans for the communities of the Nisqually Valley, Rochester and Grand Mound. Joint plans with cities guide land use in the unincorporated county areas between urban growth area boundaries and the city limits of Bucoda, Olympia, Lacey, Tumwater, Yelm, Tenino, and Rainier. These joint plans are jointly adopted by both the applicable city and Thurston County

4.3.2 Emergency Management Plan

The Comprehensive Emergency Management Plan is Thurston County’s framework for response to a disaster or emergency. The current version is a working draft that the County currently operates under; it is due for formal adoption in 2012. Several emergency support function documents are functional annexes to the basic plan, which outline general guidelines by which County organizations will carry out the responsibilities assigned in the plan. These emergency support function documents are being reorganized to be consistent with FEMA’s *National Response Framework* (FEMA, 20008).

4.3.3 Critical Areas Ordinance

Washington’s Growth Management Act requires local governments to protect five types of critical areas: important fish and wildlife habitat areas, wetlands, critical aquifer recharge areas, frequently flooded areas, and geologically hazardous areas, such as bluffs. Thurston County’s critical areas regulations are a response to that law; they regulate how development and redevelopment can safely occur on lands that contain critical areas. On July 24, 2012, the Board of County Commissioners adopted Ordinance No. 14773 amending the Thurston County Critical Areas Ordinance and other related chapters of the Thurston County Code.

4.3.4 Shoreline Master Program

Thurston County's Shoreline Master Program is a combined planning and regulatory document that contains policies, goals and specific land-use regulations for shorelines. The master program balances development, public access and shoreline protection. The most recent Shoreline Master Program update includes marine shorelines, rivers with a flow greater than 20 cubic feet per second, lakes larger than 20 acres, upland areas within 200 feet of these water bodies and the floodplains and wetlands associated with these shorelines. Thurston County's Shoreline Master Program was last updated in 1990, before new state guidelines were approved in 2003. Thurston County must update its Shoreline Master Program by 2011 in order to be consistent with the latest state requirements.

4.3.5 WRIA Planning

Although Washington's Watershed Management Act does not require planning, Thurston County and local governments have undertaken related planning activities. The Washington Department of Ecology is providing technical and financial support for the effort. Thurston County has participated in watershed planning for four WRIsAs (see Figure 4-2):

- The Nisqually River Watershed (WRIA 11)—This consists solely of the Nisqually River basin, which is a single drainage basin used for analysis in this Flood Hazard Mitigation Plan.
- The Deschutes Watershed (WRIA 13)—This consists of the entire Nisqually River and Henderson Inlet basins used for analysis in this Flood Hazard Mitigation Plan, as well as the eastern portion of the Eld Inlet basin.
- The Kennedy-Goldsborough Watershed (WRIA 14)—Most of this WRIA is outside the planning area of this Flood Hazard Mitigation Plan, but it includes the Totten Inlet basin and the western portion of the Eld Inlet basin used for analysis in this plan.
- The Upper and Lower Chehalis River Watershed (WRIsAs 22 and 23)—These two WRIsAs include the Chehalis, Skookumchuck and Black River basins used in the analysis for this Flood Hazard Mitigation Plan.

4.3.6 Capability Assessment

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs and policies, and evaluates its capacity to carry them out. Table 4-1 summarizes the legal and regulatory capability of Thurston County. Table 4-2 summarizes the administrative and technical capability. Table 4-3 summarizes fiscal capability.



Figure 4-2. Rivers and WRIA Boundaries Within the Planning Area

**TABLE 4-1.
LEGAL AND REGULATORY CAPABILITY**

	Local Authority	State or Federal Prohibitions	Other Jurisdictional Authority	State Mandated	Comments
Codes, Ordinances & Requirements					
Building Code	Y	N	N	Y	Thurston County Code 14.17.010 adopts State Building code (IBC). 8/3/2010
Zoning Code	Y	N	N	Y	Thurston County Code, Title 20, 1997
Subdivisions	Y	N	N	N	Thurston County Code, Title 18, 1997
Post-Disaster Recovery	N	N	N	N	
Real Estate Disclosure	N	N	N	N	
Growth Management	Y	N	N	Y	County Comprehensive Plan , 2010
Site Plan Review	Y	N	N	N	Thurston County Code, Title 18, 1997
Special Purpose (flood management, critical areas)	Y	N	N	Y	Thurston County Code, Title 15, Chapter 17.15, 7/24/2012
Planning Documents					
Comprehensive Plan	Y	N	N	Y	County Comprehensive Plan , 2010
Capital Improvement Plan	Y	N	N	N	The County has a 6-year CIP for roads, water, drainage and sewer that is updated annually.
Economic Development Plan	Y	N	N	N	County Comprehensive Plan includes an economic development chapter. Countywide planning policies for economic development and employment, 1992
Floodplain or Basin Plan	Y	N	N	N	This plan will become the floodplain management plan of record for the County
Stormwater Plan	Y	N	N	Y	Washington Department of Ecology, Stormwater Management Manual for Western Washington, 2012
Habitat Conservation Plan	Y	N	N	N	Thurston County Natural Resources Program-Planning Department
Shoreline Management Plan	Y	N	N	N	1990 Shoreline Master Program, to be updated
Emergency Response Plan	Y	N	N	N	2012 Comprehensive Emergency Management Plan
Continuity of Operations Plan	N	N	N	N	
Post Disaster Recovery Plan	N	N	N	N	
Terrorism Plan	Y	N	N	N	2012

**TABLE 4-2.
ADMINISTRATIVE AND TECHNICAL CAPABILITY**

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Planning, Public Works
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Works, Permit Assistance Center
Planners or engineers with an understanding of flooding hazards	Yes	Planning, Public Works
Staff with training in benefit/cost analysis	Yes	Planning, Emergency Management
Floodplain manager	Yes	Permit Assistance Center
Surveyors	Yes	Public Works
Personnel skilled or trained in GIS applications	Yes	Emergency Management, Geo Data Center
Scientist familiar with flooding hazards in local area	Yes	Planning Natural Resources Division
Emergency manager	Yes	Emergency Management
Grant writers	Yes	Emergency Management, Planning, Thurston Regional Planning Council

**TABLE 4-3.
FISCAL CAPABILITY**

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

PART 2 — RISK ASSESSMENT

CHAPTER 5.

RISK ASSESSMENT METHODOLOGY

5.1 PURPOSE OF RISK ASSESSMENT

This part of the flood hazard mitigation plan evaluates the risk of the flood hazard in the planning area (CRS Step 5). Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards such as flooding. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Exposure identification—Determine the extent of people, property, environment and economy exposed to the effects of the natural hazard.
- Vulnerability evaluation—Estimate potential damage from the natural hazard and associated costs.

The risk assessment describes the flooding hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk:

- Identify and profile the flooding hazard—The following information is given:
 - Principal sources of flooding in the planning area
 - Major past flood events
 - Geographic areas most affected by floods
 - Estimated flood event frequency
 - Estimates of flood severity
 - Warning time likely to be available for response
 - Secondary hazards associated with the flood hazard
 - Potential impacts of climate change on flooding
 - Expected future trends that could affect the flood hazard
 - Scenario of potential worst-case flood event.
- Determine exposure to the flood hazard—Exposure was determined by overlaying flood maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to flood events.
- Assess the vulnerability of exposed facilities—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each flood event and assessing structures, facilities, and systems that are exposed.

5.2 RISK ASSESSMENT APPROACH

5.2.1 FEMA's HAZUS-MH Software

In 1997, FEMA developed the standardized Hazards U.S. (HAZUS) model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. HAZUS was later

expanded into a multi-hazard methodology, HAZUS-MH, with new models for estimating potential losses from hurricanes and floods.

HAZUS-MH is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates FEMA review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

HAZUS-MH provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

5.2.2 Application for This Plan

To assess the flood hazard for this plan, a Level 2, user-defined analysis was performed for both general building stock and critical facilities. GIS building and assessor data (replacement cost values and detailed structure information) were loaded into HAZUS-MH. Finished floor elevations were established within the model using the following data:

- Available FEMA elevation certificates
- Date of construction of the structure.

An updated inventory was used in place of the HAZUS-MH defaults for essential facilities, transportation and utilities in the floodplain. Current planning area digital Flood Insurance Rate Maps were used to delineate flood hazard areas and estimate potential losses from the 100-year event flood. County flood-of-record data was also incorporated where available, and used to model flood-of-record events. Using the

digital Flood Insurance Rate Map floodplain boundaries and LIDAR data from a 2011 Thurston County project, flood depth grids were generated and integrated into the model.

At the request of the Steering Committee, risk assessment results for this plan were divided by incorporated city within the planning area as well as by drainage basin boundary. The drainage basin GIS layer of information was provided by the Natural Resources Division of the Thurston County Planning Department, using boundaries defined within the local WRIA planning processes. This system defines the following drainage basins:

- Black River
- Budd Inlet/Deschutes River
- Chehalis River
- Eld Inlet
- Henderson Inlet
- Nisqually River
- Skookumchuck River
- Totten Inlet.

Table 5-1 provides HAZUS model data documentation for this project.

5.2.3 Limitations

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent and severity of the flood hazard
- Mitigation initiatives already employed
- The amount of advance notice residents have to prepare for a flood event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. The results do not predict precise results and should be used only to understand relative risk.

**TABLE 5-1.
HAZUS MODEL DATA DOCUMENTATION**

Data	Source	Date	Format
Building information such as area, occupancy, date of construction, foundation type, stories	Thurston County Assessor	2012	Digital (GIS) format
Finished floor elevations	Thurston County Permit Assistance Center	2012	FEMA elevation certificates in CRS access data base. (Note: this data was available for only some of the structures in the floodplain)
Building replacement cost	RS Means	2012	Paper format. Updated RS means Values imported into HAZUS Model
Population data	Washington Office of Financial Management	5/1/2012	Digital (GIS) format
Flood hazard data	FEMA	10/16/2012	Digital (GIS) format
Flood hazard data	Thurston County Planning Department Natural Resources Division	2012	Surveyed high-water mark data converted to digital (GIS) depth grid
Drainage basin data	Thurston County Planning Department Natural Resources Division	2012	Eight basin boundaries in digital (GIS) format
Critical facilities and infrastructure	FEMA-HAZUS	2012	Comprehensive Data Management System default, HAZUS version 2.2, digital (GIS) format
Critical facilities and infrastructure	Thurston County Emergency Management	2012	Digital (Excel) format

CHAPTER 6.

THURSTON COUNTY FLOOD HAZARD PROFILE

6.1 GENERAL CONCEPTS

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon.

When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

6.1.1 Measuring Floods and Floodplains

The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The “annual flood” is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is used as the regulatory boundary by many agencies. Also referred to as the special flood hazard area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

DEFINITIONS

Flood—The inundation of normally dry land resulting from the rising and overflowing of a body of water.

Floodplain—The land area along the sides of a river that becomes inundated with water during a flood.

100-Year Floodplain—The area flooded by a flood that has a 1-percent chance of being equaled or exceeded each year. This is a statistical average only; a 100-year flood can occur more than once in a short period of time. The 1-percent annual chance flood is the standard used by most federal and state agencies.

Return Period—The average number of years between occurrences of a hazard (equal to the inverse of the annual likelihood of occurrence).

Riparian Zone—The area along the banks of a natural watercourse.

6.1.2 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive and larger species enter a rapid breeding cycle. Opportunistic feeders (particularly birds) move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

6.1.3 Effects of Human Activities

Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

6.2 PRINCIPAL FLOODING SOURCES IN THURSTON COUNTY

Of all natural hazards that affect Thurston County, floods are the most common and, on an annual average basis, the most costly. The following types of flooding occur in unincorporated Thurston County:

- River or stream (riverine) flooding
- Groundwater flooding
- Tidal flooding
- Flash flooding
- Urban flooding.

6.2.1 Riverine Flooding

River and stream floods occur because of prolonged heavy rainfall, a rapidly melting snow pack or a combination of these. Historically, Thurston County must experience two or three days of rainfall averaging 2 to 5 inches per day for this type of flooding to occur. The actual duration and rainfall amount needed to cause flooding depends on the initial condition of the river or stream, groundwater conditions, and runoff conditions. The county is also vulnerable to events beyond its borders. Both the Nisqually River and the Chehalis River have flooded in Thurston County because of events in their watersheds outside the county. The following sections describe the five river basins in the planning area that are sources of riverine flooding. Figure 3-2 and

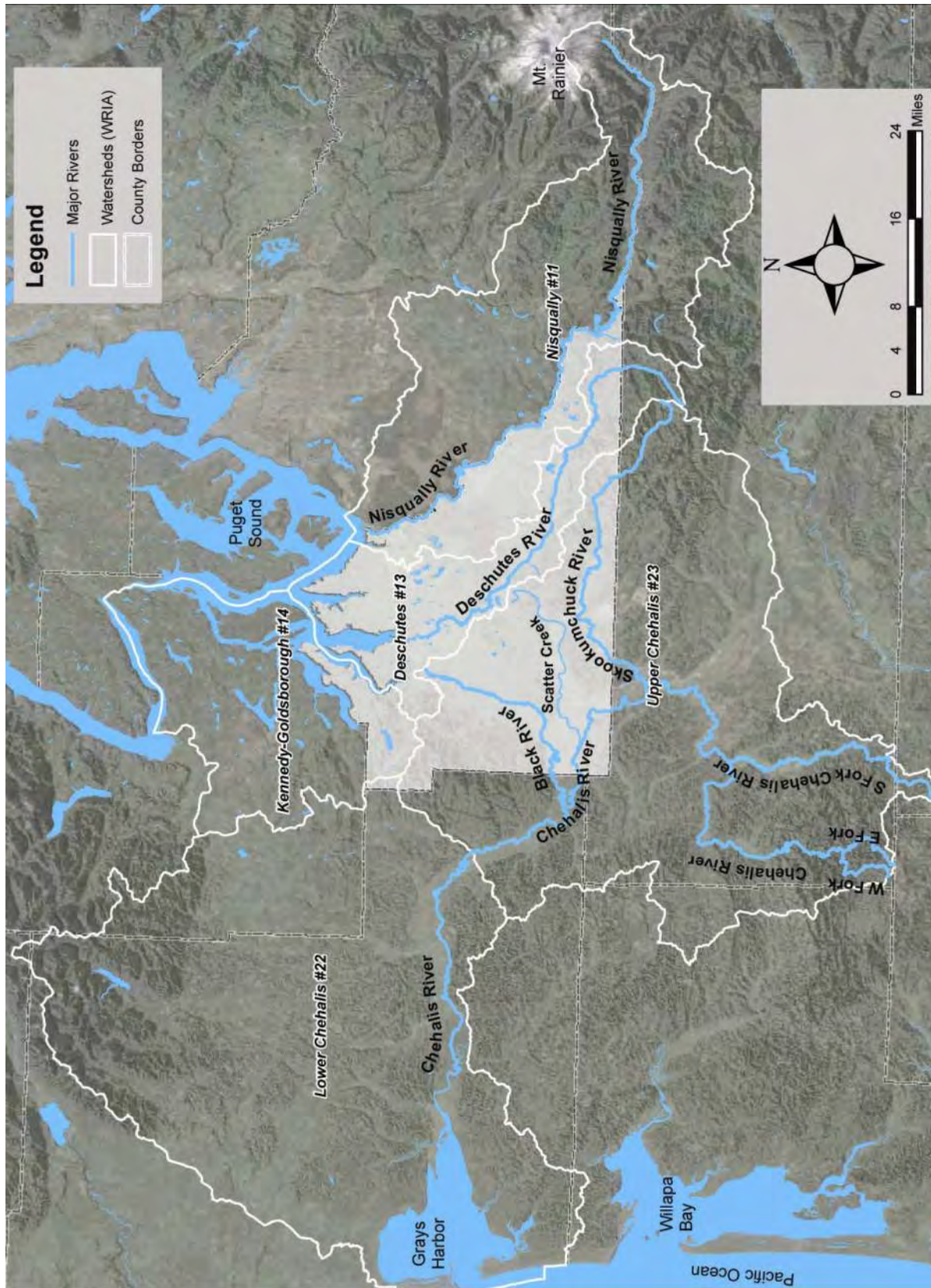


Figure 4-2. Rivers and WRIA Boundaries Within the Planning Area

show the rivers, drainage basins and WRIA planning areas within Thurston County.

Nisqually River Basin

The Nisqually River is the eastern boundary of Thurston County and flows into Puget Sound about 10 miles northeast of Olympia. Flooding on the Nisqually River is related largely to the amount of water released from LaGrande Dam in Pierce County near the southeast corner of Thurston County. This, in turn, is related to how much water enters Alder Lake and is released from Alder Dam. Feeder streams such as Ohop, Yelm, and Tanwax Creeks also influence flooding, as does high tide in the Nisqually Delta. Feeder streams only significantly exacerbate flooding when fed by lowland heavy snow that is melting rapidly due to a change from cold to warm weather. This kind of event is rare and can be mitigated by moderately lowering the level of Alder Lake prior to the arrival of a warm weather system when there is significant existing lowland snow.

The National Weather Service issues a flood warning for the Nisqually River when forecasting indicates that the river will reach a stage of 12 feet or higher at the McKenna gage. The County has defined the following impacts based on Nisqually River stage at the McKenna gage (Thurston County EM, 2012):

- **Action Stage**—At a stage of 8 feet, residents should be aware that the river is likely to flood.
- **Flood Stage**—At a stage of 10 feet, the Nisqually River will flood at the lower end near the mouth. High tide levels on Puget Sound may increase the amount of flooding. The Nisqually River will also spill over its banks between LaGrande and McKenna.
- **Moderate Flood Stage**—At a stage of 13 feet, the Nisqually River will flood from LaGrande downstream through McKenna to the mouth. Swift waters will flood roads, farms and some residential areas, including the residential care facility in McKenna. Erosion will likely damage properties along river banks.
- **Major Flood Stage**—At a stage of 14 feet, the Nisqually River will cause major flooding from LaGrande downstream through McKenna to the mouth. Deep and swift waters will flood roads, farms and residential areas, including the residential care facility in McKenna. Erosion may cause severe damage. Flooding will occur all along the river, including headwaters, tributaries and other streams within and near the Nisqually River Basin.

Recently, work was done in the Nisqually Delta to restore the natural estuary habitat. It is unknown how this reclamation will affect anticipated flooding impact levels.

For WRIA planning, the Nisqually River basin is a single planning area: WRIA 11. The portion of the basin within the planning area was used in the HAZUS modeling for this report.

Deschutes River Basin

The Deschutes River roughly parallels and is 5 to 10 miles southwest of the Nisqually River. It flows into Puget Sound at Olympia. The Deschutes is the fastest rising (and falling) river in Thurston County, responding quickly to local rainfall and runoff. The County has defined the following impacts based on Deschutes River stage at the Rainier Vail Loop Bridge gage (Thurston County EM, 2012):

- **Action Stage**—At a stage of 9 feet, the Deschutes River locally spills over its banks into low fields and forested lands, mainly along Vail Cutoff Road and Reichel Road (east of Vail).
- **Flood Stage**—At a stage of 11 feet, the Deschutes River will flood downstream in Tumwater Valley, including the golf course. Minor flooding will also occur in several residential areas, mainly Cougar Mountain and Driftwood Valley. Many roads and farm lands will also be flooded.

- **Moderate Flood Stage**—At a stage of 13.5 feet, the Deschutes River will flood residential areas, especially Cougar Mountain, Driftwood Valley and Falling Horseshoe. Downstream flooding will occur in areas of Tumwater Valley, including the golf course. Many roads and farm lands will also be flooded.
- **Major Flood Stage**—At a stage of 15 feet, the Deschutes River will cause major flooding, with swift and deep water flooding roads, farmlands and the residential areas of Cougar Mountain, Driftwood Valley, Falling Horseshoe and areas downstream in the Tumwater Valley. Flooding will occur all along the river including headwaters, tributaries and other streams within and near the Deschutes River Basin.

For WRIA planning, the Deschutes River basin is a part of WRIA 13, along with the Henderson Inlet basin. The HAZUS modeling for this report used the portion of this basin within the planning area, designated as the Budd Inlet/Deschutes River basin.

Skookumchuck River Basin

The Skookumchuck River drains most of the hills in the south-central portion of the county south of the Deschutes drainage area. The Skookumchuck flows west from the eastern county line to Bucoda and then turns sharply to flow southwest to its confluence with the Chehalis River near Centralia. The National Weather Service issues a flood warning for the Skookumchuck River when forecasts indicate that the river will reach a stage of 13.5 feet at the gage near Bucoda. The County has defined the following impacts based on Skookumchuck River stage at the Bucoda gage (Thurston County EM, 2012):

- **Action Stage**—At a stage of 11.5 feet, residents should be aware that the river is likely to flood.
- **Flood Stage**—At a stage of 13.5 feet, the Skookumchuck River will flood a few roads and low pasture lands near Bucoda.
- **Moderate Flood Stage**—At a stage of 15 feet, the Skookumchuck River will flood several residential and business areas around Bucoda. Flood waters will cover many roads.
- **Major Flood Stage**—At a stage of 17 feet, the Skookumchuck River will cause major flooding in the Bucoda area, with deep and swift flood waters inundating residential and business areas and numerous roads. Flooding will occur all along the river, including headwaters, tributaries and other streams within and near the Skookumchuck River Basin.

For WRIA planning, the Skookumchuck River basin is a portion of the Upper Chehalis planning area: WRIA 23. The portion of the Skookumchuck basin within the planning area was used in the HAZUS modeling for this report.

Chehalis River Basin

The Chehalis River flows northwest from Centralia and crosses the southwestern corner of Thurston County, where it drains the Michigan Hill area and receives water from Prairie Creek and Scatter Creek. The Chehalis discharges into the Pacific Ocean at Grays Harbor.

Due to its large drainage area, the Chehalis River tends to rise and fall slowly over a long period of time. The most predictable scenario for the Chehalis occurs when rains fall over all of southwestern Washington and all regional rivers and streams rise. However, the Chehalis can also experience flooding when there is little or no rain in Thurston or Grays Harbor Counties, but heavy rain in Lewis and Pacific Counties. This causes flooding to occur later than normal. A third scenario occurs when heavy rain falls in Grays Harbor County, but not in Thurston or Lewis counties. Feeder streams can fill the Chehalis and

cause water to back up into Thurston County. The County has defined the following impacts based on Chehalis River stage at the gage near Grand Mound (Thurston County EM, 2012):

- **Action Stage**—At a stage of 12.2 feet, the Chehalis River will locally spill out of its banks into nearby fields and over a few roads.
- **Flood Stage**—At a stage of 14 feet, the Chehalis River will flood several roads in Independence Valley, including James Road, Independence Road and Moon Road. Flood waters will also cover nearby farm lands.
- **Moderate Flood Stage**—At a stage of 15.5 feet, the Chehalis River will flood several roads in Independence Valley with swiftly moving water, including SR-12 and James, Independence, Moon and Anderson Roads. Floodwaters will cut off access to and from the Chehalis Reservation and inundate nearby farm lands. Some residential structures may be threatened
- **Major Flood Stage**—At a stage of 17 feet, the Chehalis River will cause major flooding, inundating roads and farm lands in Independence Valley. Deep and swift floodwaters will cover SR-12 and James, Independence and Moon Roads. Flooding will occur all along the river, including headwaters, tributaries and other streams within and near the Chehalis River Basin.

For WRIA planning, the Chehalis River basin covers two planning areas: the Upper Chehalis is WRIA 23 and the Lower Chehalis is WRIA 22. The portion of the Chehalis basin within the planning area, excluding the Black and Skookumchuck River basins, was used in the HAZUS modeling for this report.

Black River Basin

The Black River drains southwest from the south end of Black Lake into the Chehalis River near Oakville in Grays Harbor County. The Black River drainage is approximately 144 square miles, with 105 square miles in Thurston County. In general, the Black River is a slow flowing river with a broad floodplain. Most flooding along the main stem of the river is inundation flooding with low-velocity floodwater.

The west side of the Black River drainage drains the Capitol Forest area. Main tributaries in this part of the basin are Dempsey, Waddell, and Mima Creeks. This area ranges in elevation from 2,659 feet at Capitol Peak to 200 feet at the Black River valley floor. It is subject to high-intensity, short-duration rain events that can produce flash flooding in these creeks. This flooding can be compounded by snow in the watershed. In general, snowmelt alone does not cause flooding in this area.

The east side of the Black River basin drains the relatively flat area south of Tumwater, west of Offutt Lake and north of Tenino. The elevation difference of this area is approximately 200 feet. The main streams draining this area are Salmon and Beaver Creeks and Bloom Ditch. These are very slow-flowing water systems that tend to cause inundation flooding with no velocity. This side of the basin is susceptible to high-groundwater flooding during periods of extended rain.

Because of its flat topography, the Black River is also susceptible to flooding by waters backing up from the Chehalis River. This is especially true when flooding on the Chehalis River is concurrent with high tides along the coast.

In April 2005, the Washington State Department of Ecology established a river gauging station on the Black River where it crosses U.S. Highway 12. Unlike the gauging stations on the Chehalis at Prather Road Bridge and at Porter, this site has not been rated and is not modeled to forecast flood levels. However, the County has defined the following impacts based on Black River stage at the Highway 12 gage (Thurston County EM, 2012):

- **Action Stage**—At a stage of 6 feet, residents should be aware that the river is likely to flood.
- **Flood Stage**—At a stage height of 8 feet, the Black River has reached flood stage; the river will spill out of its banks into nearby fields and woods with limited water over a few spots on local roads.
- **Moderate Flood Stage**—At 10 feet, moderate flooding will occur. This stage corresponds to 15.5 feet at the Prather Road Bridge on the Chehalis River. At this level, the Chehalis River in Thurston County will flood several roads in Independence Valley with swiftly moving water, including U.S. Highway 12 and James, Independence, Moon and Anderson Roads. Floodwaters will cut off access to and from the Chehalis Reservation and inundate nearby farmlands. Some residential structures may be threatened.
- **Major Flood Stage**—Major flooding occurs when the Black River reaches a stage of 12 feet. During the December 2007 flood, the gauge on the Black River recorded a stage of 14.5 feet.

For WRIA planning, the Black River basin is a portion of the Upper Chehalis planning area: WRIA 23. The portion of Black River basin within the planning area was used in HAZUS modeling for this report.

6.2.2 Groundwater Flooding

Groundwater flooding occurs whenever there is a high water table and persistent heavy rains. The situation is caused in areas where an upper, thin layer of permeable soils overlays an impermeable layer of hard pan. As the ground absorbs more and more rain water, the groundwater table rises and causes flooding where it is higher than the land surface. The condition has historically been most severe in the second and subsequent years of consecutive wet years.

According to a U.S. Army Corps of Engineers' post-event report on the winter storm of 1996-1997, the frequency of a groundwater flooding disaster is probably on the order of 25 years. The 1996-1997 event was the first widespread groundwater flooding since 1972 and the worst on record until the winter of 1998-1999 which is now the "event of record." Statistically, the Corps estimates that there is approximately a 70-percent chance that the 1996-1997 flooding will be equaled or exceeded at least once during a 30-year cycle.

Thurston County data and historical data provided by the National Oceanic and Atmospheric Administration identify two types of weather patterns that trigger groundwater flooding events:

- **Type 1: Intense, Short-Duration Storms in Succession**—Type 1 storms are characterized by a weather system called the "Pineapple Express." This weather pattern draws tropical moisture from an area near Hawaii and conveys it directly to Western Washington and Oregon. These systems tend to deliver a wet-weather pattern that results in warm temperatures and heavy rainfall for up to a week at a time. They rapidly melt any snow that may have accumulated and produce rainfall that generally exceeds 6 inches per event. The groundwater system in Thurston County can typically handle one of these events without much flooding if it occurs early in the season. Groundwater flooding generally occurs when more than one of these systems impacts the region within a month, or if an event happens later in the season after normal winter rains have raised groundwater levels to within a few feet of the surface. Normal high groundwater levels occur in mid to late March; if a large storm coincides with this groundwater peak, the capacity of the system is exceeded and groundwater flooding can occur. These events are the driving factors of urban riverine flooding and landslides as well as groundwater flooding. This pattern has been increasing in frequency over the past decade and the overall intensity of the events is increasing.
- **Type 2: Persistent Low-Intensity Precipitation Pattern**—The Type 2 weather pattern is less common than the Type 1 pattern but it produces similar flooding. It is characterized by

some measurable low-intensity rainfall (generally less than 1 inch) every day for several weeks. These events gradually overwhelm the groundwater system by saturating the soil column. This pattern causes more widespread flooding throughout the county, both in areas that routinely flood and in areas that are generally not susceptible to groundwater flooding. Only two occurrences of this weather pattern have been identified in the last decade. It was first identified in the winter of 2006–2007. Later review of groundwater and precipitation records identified an occurrence in the winter of 2002–2003 that was less extreme but resulted in similar groundwater flooding. In both cases, groundwater flooding occurred in areas not previously identified as susceptible to such flooding. This suggests that a Type 2 event may represent a more widespread groundwater problem than the more common Type 1 event. The Type 2 pattern does not appear to cause riverine flooding or landslides, but data is insufficient at this time to be certain of this conclusion.

6.2.3 Tidal Flooding

Spring tides, the highest tides during any month, occur with each full and new moon. When these coincide with a northerly wind piling water in south Puget Sound, tidal flooding can occur. The tides can also enhance flooding in delta areas when rivers or creeks are at or near flood stage. The area at greatest risk to tidal flooding is the Olympia waterfront, but such flooding is also a threat to low-lying farmlands in the Nisqually Valley and along McLane Creek near Mud Bay. Tidal impact is of most concern in delta areas when rivers are at flood stage and high tide exacerbates the situation. Concerns about tidal flooding are anticipated to increase due to the impacts of global climate change and sea level rise. See Section 6.9 for further discussion of this issue.

6.2.4 Flash Flooding

Flash flooding is flooding characterized by a quick rise and fall of water level. Flash floods generally result from intense storms dropping large amounts of rain within a short period of time onto watersheds that cannot absorb or slow the flow. The natural terrain and vegetation in Thurston County helps to reduce the potential for flash floods. However, the Deschutes River and many smaller streams can experience flash floods due to their rapid response to rainfall, which can be difficult to forecast. This rapid response can be attributed to factors such as location within the watershed, channel capacity, contributory impacts and urbanization.

6.2.5 Urban Flooding

Thurston County has experienced rapid change due to urban development in once rural areas. Drainage facilities in recently urbanized areas are a series of pipes, roadside ditches and channels. Urban drainage flooding occurs when these conveyance systems lack the capacity to convey runoff to nearby creeks, streams and rivers. As drainage facilities are overwhelmed, roads and transportation corridors become conveyance facilities. The key factors that contribute to urban drainage flooding are rainfall intensity and duration. Topography, soil conditions, urbanization and groundcover also play an important role.

6.3 MAJOR FLOOD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. Thurston County has experienced 16 flooding events since 1972 for which presidential disaster declarations were issued, as summarized in Table 6-1.

**TABLE 6-1.
HISTORY OF THURSTON COUNTY FLOOD EVENTS WITH PRESIDENTIAL DISASTER
DECLARATIONS**

Event Dates	Declaration #	Type of event	Estimated Damage ^a
2/1/1972 – 2/1/1972	DR-322	Severe storms & flooding	N/A
3/24/1972 – 3/24/1972	DR-328	Heavy rains & flooding	N/A
1/25/1974 – 1/25/1974	DR-414	Severe storms, snowmelt & flooding	\$50,000
12/13/1975 – 12/13/1975	DR-492	Severe storms & flooding	\$38,461,538
12/10/1977 – 12/10/1977	DR-545	Severe storms, mudslides, & flooding	\$159,300
1/6/1990 – 1/14/1990	DR-852	Severe storms & flooding	\$3,846,153
11/9/1990 – 12/20/1990	DR-883	Severe storms & flooding	\$7,738,098
11/7/1995 – 12/18/1995	DR-1079	Severe storms, high wind, and flooding	\$556,575
1/26/1996 – 2/23/1996	DR-1100	High winds, severe storms and flooding	\$22,000,000
12/26/1996 – 2/10/1997	DR-1159	Severe winter storms, land & mudslides, flooding	\$2,840,000
3/18/1997 – 3/28/1997	DR-1172	Heavy rains, snow melt, flooding, land & mud slides	\$133,333
10/15/2003 – 10/23/2003	DR-1499	Severe storms and flooding	\$863,636
11/2/2006 – 11/11/2006	DR-1671	Severe storms, flooding, landslides, and mudslides	\$100,000
12/1/2007 – 12/17/2007	DR-1734	Severe storms, flooding, landslides, and mudslides	\$4,600,000
1/6/2009 – 1/16/2009	DR-1817	Severe winter storm, landslides, mudslides, and flooding	\$3,200,000
1/14/2012 – 1/23/2012	DR-4056	Severe winter storm, flooding, landslides, and mudslides	N/A

a. Data obtained from Spatial Hazard Events and Losses Database for the United States

Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Still, many flood events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for flooding. The following sections provide an overview of some of the more significant floods in the county.

6.3.1 January 6-16, 2009, Federal Disaster 1817: Severe Winter Storms, Landslides, Mudslides, and Flooding

In January 2009, a Pineapple Express system raised temperatures and dropped heavy rains throughout western Washington following one of the heaviest Pacific Northwest snow storms in decades. Severe flooding occurred throughout western Washington. The Chehalis, Skookumchuck, Deschutes, Nisqually, and Black Rivers all experienced major flooding. The Skookumchuck River crested at 17.72 feet on January 8, making it the second worst flood level in the river's recorded history. The Chehalis River crested at 18.18 feet near Grand Mound, causing major flooding in the Chehalis River Basin.

Interstate 5 was closed for 20 miles for nearly two days. State Route 12, State Route 8 and Highway 101 were also closed for varying durations, some for multiple days. During the height of the flood event, 49 county roads were closed. Over 200 homes were isolated in the Bald Hill Road/Clearwood area, over 100 homes in the Rochester, Grand Mound and Gate areas, and another 50 homes in the Bucoda vicinity.

Damage to homes throughout Thurston County was estimated at \$3 million. Damage was concentrated in and around the town of Bucoda, the Rochester community, and along the Deschutes River outside of Yelm. Damage to public facilities and roads around Thurston County and the overtime cost for city and county officials to respond to the flooding cost \$2.5 million.

6.3.2 December 1-7, 2007, Federal Disaster 1734: Severe Winter Storms, Flooding, Landslides, and Mudslides

Snow followed by a Pineapple Express on December 2 and 3 caused major flooding throughout southwest Washington. Heavy rainfall and melting snow resulted in record flooding on the Chehalis River. The Chehalis River crested at 20.23 feet, 6 feet over flood stage at the Grand Mound gage. Some sites in the Willapa Hills collected 14 to 18 inches of rain over the two-day period. Widespread flooding occurred in southwest Thurston County, heavily impacting the Rochester community, Grand Mound, and the Independence Valley area. Lewis County was especially hard hit, particularly around the more densely populated cities of Centralia and Chehalis and the farms around Adna and the Boisfort Valley.

The Deschutes and Black rivers also rose above their banks. The Deschutes River crested 2.75 feet above flood stage near Rainier and flooded residential areas and the Tumwater Valley. The region also experienced stream and urban flooding and flash flood conditions off of the hills of Capital Forest, resulting in washouts and landslides.

On December 4, Rochester Fire Department developed a command post for evacuation and rescue. The Rochester Fire District, the Thurston County Sheriff's Office Dive Team, local search and rescue volunteer groups, and the Washington State National Guard rescued 63 people—17 by helicopter. Nearly 300 people were rescued or forced to evacuate in Lewis County. Numerous people were forced from their homes to seek refuge in local area shelters. Thurston County opened a flood relief center at the Rochester Community Center to assist affected residents.

Thurston County documented 44 County roads and bridges that closed from storm and flood damage. Round-the-clock road repair and maintenance was carried out by the County and cities. Over 400 homes in southwest Thurston County were affected by road closures due to Chehalis River flooding. Interstate 5 closed for 20 miles between Chehalis and Grand Mound for five days. Some portions of Interstate 5 were covered with 10 feet of water. The Washington State Department of Transportation estimated that the closure resulted in \$47 million in lost of economic output statewide. Additional closures along Highway 101 and Highway 8 disrupted commute patterns for thousands of people who travel through or live or work in Thurston County. A railroad bridge over the Nisqually River suffered significant damage due to debris collection against the bridge, resulting in a disruption of statewide rail traffic. West coast rail traffic was also shut down for several days due to flooding.

Nearly 10 inches of rain resulted in the worst urban flooding ever experienced on the City of Olympia's west side. On the morning of December 3, 2007 during the peak commute period, the west side of Olympia experienced major traffic backups for hours due to road closures. One of the highest traffic volume intersections in the region, Cooper Point Road and Black Lake Boulevard off Highway 101, experienced major flooding resulting in permanent damage to the signal controller. Several motorists attempted to drive through the water only to become stranded and forced to abandon their vehicles. Some vehicles were eventually completely submerged. The Percival Creek Bridge on Cooper Point Road also experienced inundation forcing its closure. Several businesses on Olympia's west side were affected by floodwaters and power outages. Puget Sound Energy turned off power as a safety precaution requiring businesses to temporarily close their doors. The Woodshed, a furniture retailer, lost its entire inventory to 3 feet of water. Replacement cost was estimated at \$250,000.

On December 3, the Budd Inlet Sewer Treatment Plant was forced to discharge untreated wastewater into Budd Inlet due to the enormous volume of rainfall and runoff. At its peak, an estimated 1 million gallons per hour bypassed treatment processes and was sent through the emergency outfall near Fiddlehead Marina. After the flooding, many wells and water supplies were contaminated and non-functional in the unincorporated areas of the county. Public health advisories were issued to flood affected areas to inform the public to boil their water or consume only bottled water.

Preliminary cost estimates for response, preventive measures, and damage to public facilities throughout Thurston County exceeded \$4.6 million. Many of the local fire districts' response personnel were volunteer firefighters. The reported response costs reflect only a fraction of the actual costs to local governments. Damage to Thurston County roads and bridges for non-Federal Highway Administration system roads was \$2.7 million. Three sites of federal system roads incurred over \$32,000 in damage.

For this disaster, nearly 267 Thurston County residents applied to FEMA for assistance, with over \$6 million claims in property damage. FEMA awarded \$544,928 in aid and the Small Business Administration granted \$1.7 million to 30 homeowners and 2 businesses.

6.3.3 December 1996 (Federal Disaster 1159) to February 1997 Winter Storm and Flooding

1996 was the third wettest year of the 20th century and December was especially wet, receiving over twice its normal monthly rainfall. During this time period, flood-related damage included the following:

- 200 homes countywide were inundated.
- 200 drinking water wells became contaminated.
- Septic system failures occurred throughout the county.
- Response and recovery efforts cost Thurston County government over \$340,000.
- Response, recovery, and repair costs for other government entities and utilities exceeded \$750,000.
- Private property owners lost over \$1.75 million in uninsured losses.

6.3.4 February 1996, Federal Disaster 1100: Flooding

The February 1996 flood was one of the most devastating floods on record for Thurston County. Every major river and stream crested its banks. Record flooding occurred on the Nisqually River near McKenna when the river crested at 17.13 feet, 7 feet over flood stage on February 8, 1996. Record flooding also occurred on the Skookumchuck River near Bucoda when the river crested at 17.87 feet, 4 feet over flood stage. Major flooding also occurred on the Deschutes and Chehalis Rivers. The 1996 flood resulted in the following impacts:

- Over 350 homes were inspected, 190 were declared uninhabitable.
- 47 homes were destroyed in the Nisqually Valley.
- Over two dozen homes were destroyed elsewhere.
- Nearly 1,000 people evacuated their homes.
- 300 people required rescuing.
- More than 300 sections of the County road system were damaged.

- Wa He Lut, a contract U.S. Bureau of Indian Affairs School, was destroyed by the Nisqually River.
- I-5 was closed at the Lewis County line.
- The main north-south railroad line at the Pierce County line was closed due to the Nisqually River diverting part of its flow through a road tunnel that runs under the tracks, almost destroying the tunnel and weakening the rail support above.
- Response and recovery efforts cost Thurston County government over \$2 million.
- Response, recovery and repair costs for other government entities and utilities exceeded \$20 million.
- Private property owners experienced over \$22 million in uninsured losses.

One of the reasons that the Nisqually basin was the worst hit during this event is that Tacoma Power raised the level of the Alder Lake Dam to capacity during the first two days of the storm. The reservoir was over 17 feet below capacity at the start of the storm, as verified by historical records. Tacoma Power could have completely mitigated the effects of the event. This was a repeat of what happened in November 1995.

6.3.5 January 1990, Federal Disaster 852: Severe Storm and Flooding

The Deschutes River at Rainier crested at 17.01 feet, 6 feet over flood stage, setting the flood record. Major flooding also occurred on the Nisqually, Deschutes, Skookumchuck, and Chehalis Rivers. The Thurston region experienced the following impacts:

- I-5 closed for several days between Chehalis and Thurston County.
- Two people were killed by floodwaters in Lewis County.
- 83 elderly residents from the Nisqually Valley Care Center in McKenna were evacuated to a Red Cross Shelter at Yelm High School gymnasium.
- Floodwaters reached 4 feet deep on Bucoda streets and prompted nearly 600 residents to evacuate; one elderly man died from natural causes during the evacuation.
- Lowland Nisqually Valley residents were urged to evacuate their homes.
- Portions of downtown Olympia experienced urban flooding.

6.4 LOCATION

The major floods in the planning area have resulted from intense weather rainstorms between November and March. Flooding in portions of the planning area has been extensively documented by gage records, high water marks, damage surveys and personal accounts. This documentation was the basis for the June 16, 2009 FIRMs generated by FEMA for the planning area. To map the extent and location of the flood hazard for this plan, two sources of data were used (see Figure 6-1):

- The 2009 Flood Insurance Study (special flood hazard area only)
- Historical flood high-water mark data set maintained by Thurston County.

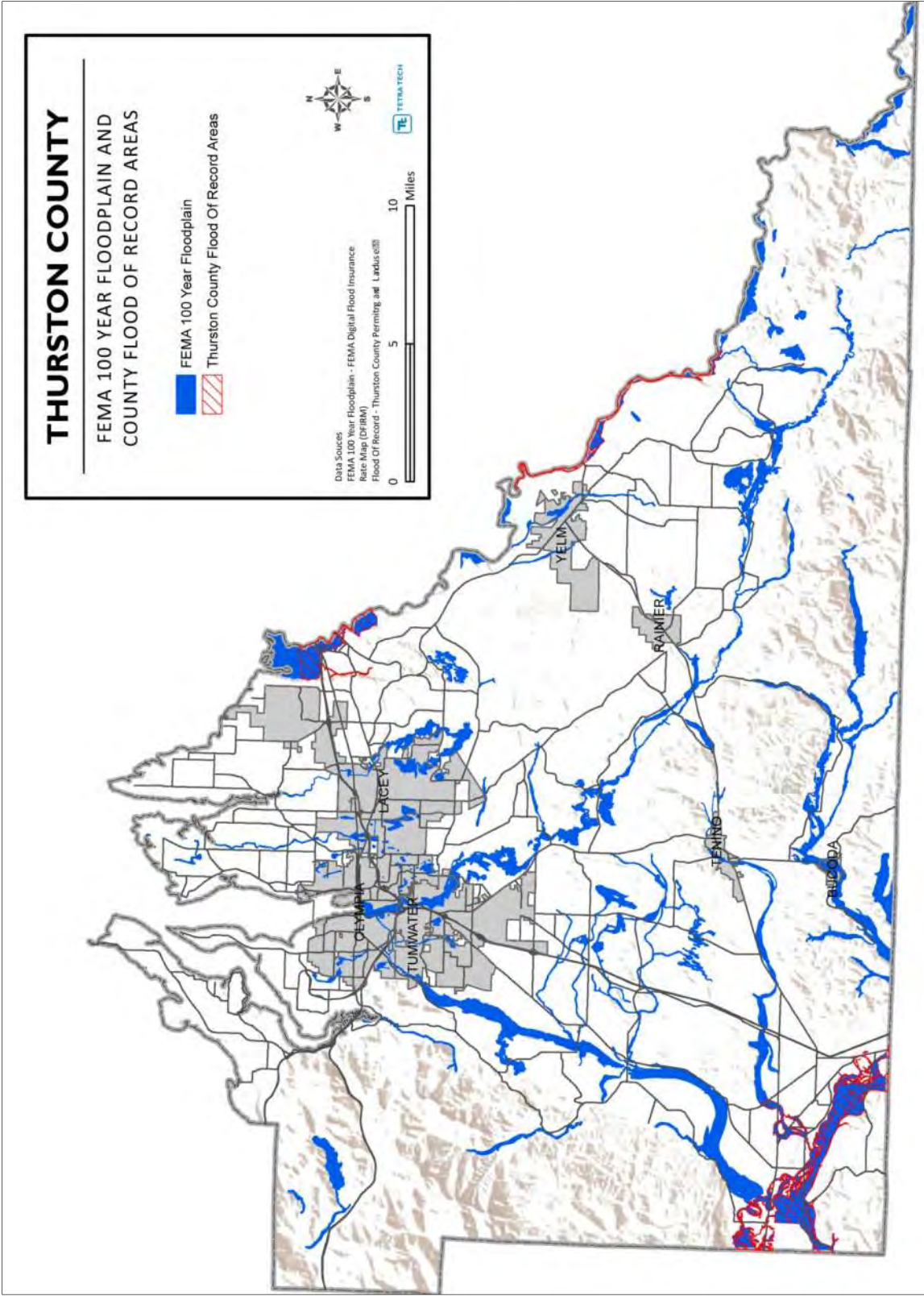


Figure 6-1. Mapped Flood Hazard Areas in Thurston County

6.5 FREQUENCY

Floods are commonly described as having a 10-, 50-, 100-, and 500-year recurrence interval, meaning that floods of these magnitudes have (respectively) a 10-, 2-, 1-, or 0.2-percent chance of occurring in any given year. These measurements reflect statistical averages only; it is possible for two or more rare floods (with a 100-year or higher recurrence interval) to occur within a short time period. Assigning recurrence intervals to historical floods on different rivers can help indicate the intensity of a storm over a large area. For example, the 1996 flood event exceeded the flood with 100-year recurrence interval on the Chehalis River, while the recurrence interval of that event for tributaries to the Chehalis such as the Skookumchuck River was determined to be 75 years.

Recent history has shown that Thurston County can expect an average of one episode of minor river flooding each winter. Large, damaging floods typically occur every 2 to 5 years. Urban portions of the county annually experience nuisance flooding related to drainage issues.

6.6 SEVERITY

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak discharges; Table 6-2 lists peak flows used by FEMA to map the floodplains of the planning area.

6.7 WARNING TIME

Due to the sequential pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Warning times for floods can be between 24 and 48 hours. Flash flooding can be less predictable, but potential hazard areas can be warned in advanced of potential flash flooding danger.

Each watershed has unique qualities that affect its response to rainfall. A hydrograph, which is a graph or chart illustrating stream flow in relation to time (see Figure 6-2), is a useful tool for examining a stream's response to rainfall. Once rainfall starts falling over a watershed, runoff begins and the stream begins to rise. Water depth in the stream channel (stage of flow) will continue to rise in response to runoff even after rainfall ends. Eventually, the runoff will reach a peak and the stage of flow will crest. It is at this point that the stream stage will remain the most stable, exhibiting little change over time until it begins to fall and eventually subside to a level below flooding stage.

The potential warning time a community has to respond to a flooding threat is a function of the time between the first measurable rainfall and the first occurrence of flooding. The time it takes to recognize a flooding threat reduces the potential warning time to the time that a community has to take actions to protect lives and property. Another element that characterizes a community's flood threat is the length of time floodwaters remain above flood stage.

The Thurston County flood threat system consists of a network of precipitation gages throughout the watershed and stream gages at strategic locations in the county that constantly monitor and report stream levels. This information is fed into a U.S. Geological Survey forecasting program, which assesses the flood threat based on the amount of flow in the stream (measured in cubic feet per second). In addition to this program, data and flood warning information is provided by the National Weather Service (NWS). All of this information is analyzed to evaluate the flood threat and possible evacuation needs.

TABLE 6-2.
SUMMARY OF PEAK DISCHARGES WITHIN THE PLANNING AREA

Source/Location	Drainage area (sq. mi.)	Discharge (cubic feet/second)			
		10- Year	50- Year	100- Year	500- Year
Deschutes River					
Downstream of Henderson Blvd.	160	5,990	7,960	8,800	10,800
Upstream of confluence with Spurgeon Creek	127	5,630	7,450	8,230	10,100
At Vail Loop Rd, Crossing	89.8	4,950	6,500	7,150	8,690
Upstream of confluence with Mitchell Creek	44.1	2,690	3,590	3,980	4,900
Upstream of limit of detailed study	33.3	2,120	2,860	3,180	3,930
Skookumchuck River					
At State Route 507	113	6,990	9,100	9,980	12,100
Upstream of Bucoda	90.2	6,400	8,290	9,060	10,900
Upstream of confluence with Thompson Creek	65.9	5,790	7,440	8,110	9,700
Scatter Creek					
At downstream limit of detailed study	15.5	403	561	633	803
At confluence with Scatter Creek tributary	11.0	314	436	492	622
Upstream confluence with Scatter Creek tributary	4.6	167	230	258	324
Scatter Creek Tributary					
At confluence with Scatter Creek	6.4	212	293	330	415
At State Route 507	10.3	66	90	102	126
Chehalis River					
U.S. Geological Survey Gauge #12027500 near Grand Mound	895	38,600	50,100	55,000	66,600
Black River					
At County limits	124	2,820 ^a	4,100 ^a	4,940 ^a	6,790
Downstream of confluence with Beaver Creek	99	1,550	2,220	2,490	3,200
Downstream of confluence with Waddell Creek	58.7	1,250	1,770	2,000	2,560
Outlet of Black Lake					
At Black Lake	5.0	219	303	342	431
Percival Creek					
At Sapp Rd., SW	1.8	94	128	145	180
At 54th Ave., SW	0.5	33	45	50	62
Woodland Creek					
At Pleasant Grade Rd., NE	24.6	151	205	228	284
Nisqually River					
At Mouth	711	21,500	29,000	33,000	45,000
Upstream of confluence with Horn Creek	488	21,000	28,000	32,000	44,000
Upstream of Confluence with Tanwax Creek	446	20,500	27,000	31,000	43,000
Yelm Creek					
From 1st St. to Centralia Canal	11.2	220	310	350	445
From 103rd Ave. to 1st St.	9.8	200	285	325	410
Upstream end of study reach, to 103rd Ave.	9.3	185	265	300	375
a. Includes effect of overflow from Chehalis River					

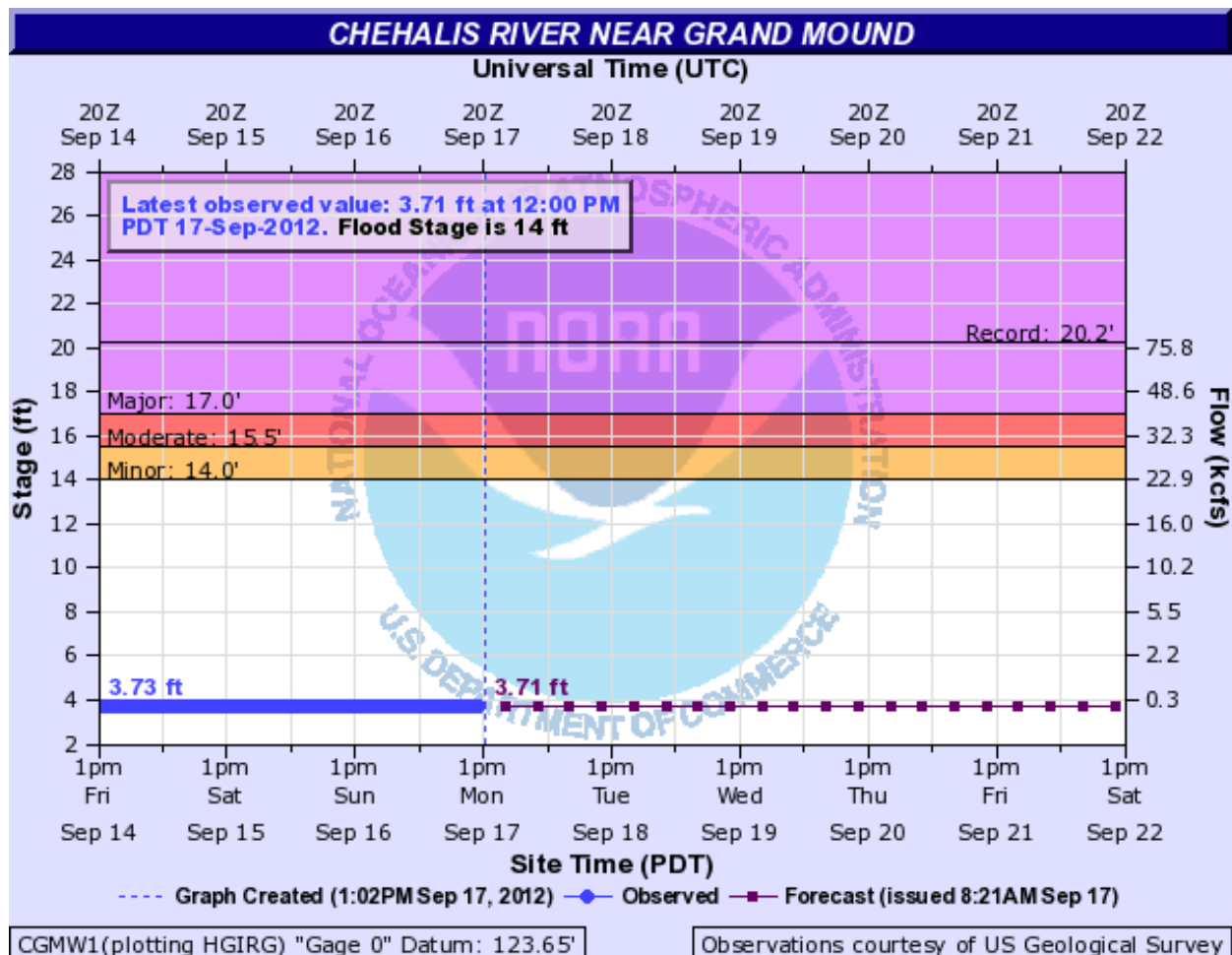


Figure 6-2. Chehalis River Hydrograph at Grand Mound

The NWS issues watches and warnings when forecasts indicate rivers may approach bank-full levels. When a watch is issued, the public should prepare for the possibility of a flood. When a warning is issued, the public is advised to stay tuned to a local radio station for further information and be prepared to take quick action if needed. A warning means a flood is imminent, generally within 12 hours, or is occurring. Local media broadcast NWS warnings. Thresholds for flood warnings have been established on the major rivers within Thurston county as follows:

- Nisqually River—Forecasted river stage of 12 feet or higher at the McKenna gage.
- Skookumchuck River—Forecasted river stage of 13.5 at the Bucoda gage. Low-lying flooding in Thurston County occurs at a height of 15 feet; major flooding at 17 feet.
- Chehalis River—Forecasted river stage of 14 feet at the Grand Mound gage. Major flooding occurs when the gage reaches 17.5 feet.
- Deschutes River—Forecasted river stage at 11 feet at the Vail Loop Bridge. Major flooding occurs when the height exceeds 13.5 feet. This river rises and falls at a faster rate than any other county river.

6.8 SECONDARY HAZARDS

The most problematic secondary hazard for flooding is bank erosion, which in some cases can be more harmful than actual flooding. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or storm sewers.

6.9 CLIMATE CHANGE

“Climate change” refers to changes over a long period of time in patterns of temperature, precipitation, humidity, wind and seasons. Climate change is expected to have significant impacts on the Pacific Northwest by mid-21st century. Climate plays a fundamental role in shaping ecosystems and the human economies and cultures that depend on them. It is generally perceived that climate change will have a measurable impact on the occurrence and severity of flooding. As hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, floodways, bypass channels and levees, as well as the design of local sewers and storm drains.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain area to contribute to peak storm runoff. High frequency flood events in particular (e.g. 10-year floods) will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding.

Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

For the Thurston County planning area, climate change is anticipated to impact flood conditions on two fronts—hydrology and sea level rise—as described in the following sections. While many models are currently being developed to assess the potential impacts of climate change, there are currently none available to support flood hazard mitigation planning. As these models are developed in the future, this risk assessment may be enhanced to better measure these impacts.

6.9.1 Hydrology

Changes in temperature and precipitation will continue to decrease snow pack, affecting stream flow and water quality throughout the Pacific Northwest. Warmer temperatures will result in more winter precipitation falling as rain rather than snow, particularly in mid-elevation basins where average winter temperatures are near freezing. This change will result in less winter snow accumulation and higher winter stream flows. Earlier peak spring stream flow and lower summer stream flows are likely in rivers that depend on snowmelt, which includes most rivers in the Pacific Northwest.

The decline of the region’s snowpack is predicted to be greatest at low and middle elevations due to increases in air temperature and less precipitation falling as snow. The average decline in snowpack in the

Cascade Mountains, for example, was about 25 percent over the last 40 to 70 years, with most of the decline due to the 2.5°F increase in cool season air temperatures over that period. As a result, seasonal stream flow timing will likely shift significantly in sensitive watersheds.

Thurston County's rivers are not as impacted by snowpack as other rivers in western Washington, and therefore would not feel the impacts from changes to snowpack as much as others. However, any change in hydrograph associated with more concentrated, intense rainfall would have a great deal of impact on Thurston County's rivers.

Rivers with dams operating as flood control facilities could experience significant impacts from a changed hydrograph. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hydrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased flows earlier in a storm cycle in order to maintain required margins of safety. Such early releases of flow can increase flood potential downstream. Throughout the western United States, communities downstream of dams are already experiencing increases in stream flows caused by earlier releases from dams.

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection and emergency response.

6.9.2 Sea Level Rise

Local sea level rise is produced by the combined effects of global sea level rise and local factors such as the following:

- Vertical land deformation, caused by phenomena such as:
 - Tectonic movement
 - Isostatic rebound (the rising of compressed earth after removal of a load such as glaciers)
- Seasonal ocean elevation changes due to atmospheric effects.

The melting of mountain glaciers and the Greenland and Antarctic ice sheets, along with the thermal expansion of the oceans, will likely continue to increase sea level for many hundreds of years into the future. The fourth Assessment Report of the Intergovernmental Panel on Climate Change projects global sea level rise over the course of this century to be between 7 and 15 inches for the lowest emissions scenario, and between 10 and 23 inches for the highest emissions scenario. Based on current science, the

“medium” estimate of 21st century sea level rise in Washington is that local sea level rise in Puget Sound will closely match global sea level rise. On the northwest Olympic Peninsula, very little relative sea level rise will be apparent, due to rates of local tectonic uplift that currently exceed projected rates of global sea level rise. On the central and southern Washington coast, the number of continuous monitoring sites with sufficiently long data records is small, adding to the uncertainty of sea level rise estimates for this region. Available data points suggest that uplift is occurring in this region, but at rates lower than those observed on the northwest Olympic Peninsula.

As a result of sea level rise, low-lying coastal areas will eventually be inundated by seawater or periodically over-washed by waves and storm surges. Coastal wetlands will become increasingly brackish as seawater inundates freshwater wetlands. New brackish and freshwater wetland areas will be created as seawater inundates low-lying inland areas or as the freshwater table is pushed upward by the higher stand of seawater.

6.10 FUTURE TRENDS

In 1983, Thurston County, together with the cities of Lacey, Olympia and Tumwater, initiated growth management in Washington State under an inter-local agreement called the Urban Growth Management Agreement. This agreement established an urban growth area boundary around the three cities large enough to accommodate growth for 20 years. Revisions to the agreement in 1988 generally reduced the boundary. In 1990, Washington State adopted the Growth Management Act, which among other things required Thurston County to establish urban growth boundaries, rural areas and natural resource lands. This was basically an extension of what the County had already been doing since 1983. The County and all of the cities and towns have adopted plans and development regulations that are currently in compliance with the Growth Management Act. These plans and regulations will dictate how floodplains, watersheds and critical areas are impacted by all future development and redevelopment activities.

Several comprehensive plans guide development in unincorporated parts of Thurston County, as described in Section 4.3.1. The County’s Comprehensive Plan has adopted goals, objectives, policies and actions with regards to frequently flooded areas. The county has developed several plans and initiatives to promote healthy watersheds and to manage stormwater runoff. These plan components strive to steer future trends in development away from increasing flood risks in Thurston County. Thurston County’s critical areas regulations regulate how development and redevelopment can safely occur on lands that contain critical areas, as described in Section 4.3.3. Additionally, Thurston County participates in the NFIP and has adopted flood damage prevention regulations in response to its requirements. Thurston County has committed to maintaining its good standing under the NFIP through initiatives identified in this plan.

Thurston County’s population increased an average of 2 percent per year between 2000 and 2010, a total of 21.7 percent over that period. It is estimated that Thurston County’s population will increase by 66% by the year 2040 (see section 3.4.1). The cumulative implementation of these plans and regulations will reduce the impacts of this future growth on the floodplains and critical areas of Thurston County, as well as lessen the impacts of flooding on future development. State mandated growth management, stormwater management and critical areas regulation has proven to be highly effective in limiting an increase in flood risk within the state of Washington. There is no reason to think that this effectiveness can’t continue through the performance period of this plan.

6.11 SCENARIO

The primary water courses in the planning area have the potential to flood at regular intervals (2 to 5 years on the average), generally in response to a succession of intense winter rainstorms. Storm patterns of warm, moist air usually occur between early November and late March. A series of such weather events can cause severe flooding in the planning area. The worst-case scenario is a series of storms that flood numerous drainage basins in a short time. This could overwhelm response and floodplain management capabilities within the planning area. Major roads could be blocked, preventing critical access for many residents and critical functions. High in-channel flows could cause water courses to scour, possibly washing out roads and creating more isolation problems. In the case of multi-basin flooding, Thurston County would not be able to make repairs quickly enough to restore critical facilities and infrastructure. The floodplains mapped and identified by Thurston County will continue to take the brunt of these floods. Additionally, as the grounds become saturated, groundwater flooding issues typical for the planning area would be significantly enhanced.

6.12 ISSUES

Important issues associated with flood hazards in the planning area include but are not limited to the following issues identified by the planning team:

- There needs to be a sustained effort to gather historical damage data, such as high water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- Existing floodplain-compatible uses such as agricultural and open space need to be maintained. There is constant pressure to convert these existing uses to more intense uses within the planning area during times of moderate to high growth.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in the county.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- The potential impact of climate change on flood conditions in the planning area needs to be better understood.
- The capability for prediction forecast modeling needs to be enhanced.
- Flood warning capability should be tied to flood phases.
- There needs to be enhanced modeling to better understand the true flood risk.
- Floodplain restoration/reconnection opportunities should be identified as a means to reduce flood risk.
- Post-flood disaster response and recovery actions need to be solidified.
- Staff capacity is required to maintain the existing level of floodplain management within the planning area.
- Floodplain management actions require interagency coordination.

CHAPTER 7. RISK ASSESSMENT

7.1 FLOOD HAZARD EXPOSURE

The Level 2 HAZUS-MH protocol was used to assess the risk and vulnerability to flooding in the planning area. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the HAZUS-MH default data was enhanced using local GIS data from local, state and federal sources. Data outputs were generated by various geographical areas to support other planning initiatives such as the Natural Hazards Mitigation Plan, Comprehensive Plan and WRIA plans. These areas include cities, urban growth areas (UGA), unincorporated county outside the UGAs, total unincorporated area (inside and outside the UGAs), and the portions of drainage basins within the planning area (see Section 5.2.2 for the list of drainage basins used).

7.1.1 Population

Population counts of those living in the floodplain in the planning area were generated by analyzing census blocks that intersect with the 100-year floodplain identified on FIRMs. Census blocks do not follow the boundaries of the floodplain. Therefore, the methodology used to generate these estimates counted census block groups whose centers are in the floodplain or where the majority of the population most likely lives in or near the floodplain. HAZUS-MH estimated the number of buildings within the floodplain in each block, and then estimated the total population by multiplying the number of residential structures by the average Thurston County household size of 2.46 persons per household (based on the 2010 census). This methodology may underestimate the population at risk to flooding by as much as half. However, it is preferable to the census block approach, which can overstate risk by as much as 10 times.

Using this approach, it was estimated that the population within the 100-year floodplain in the planning area is 6,310 (2.46 percent of the total planning area population). Of this population, it is estimated that the exposed population in the unincorporated portions of the county is 4,643. This represents approximately 3.40 percent of the total population for the unincorporated portions of the county.

7.1.2 Property

Structures in the Floodplain

Table 7-1 summarizes the total area and number of structures in the floodplain. The HAZUS-MH model determined that there are 2,039 structures within the 100-year floodplain. In the 100-year floodplain, about 89 percent are residential, and 8.4 percent are commercial, industrial or agricultural. Structure exposure was also analyzed by drainage basin as shown in Table 7-2. It should be noted that are no buildings owned or operated by Thurston County located within the floodplain.

Exposed Value

Table 7-3 summarizes the estimated value of exposed buildings. The analysis estimated \$511.8 million of building-and-contents exposure to the 100-year flood, representing 1.35 percent of the total assessed value of the planning area. Table 7-4 breaks down the value by drainage basin.

**TABLE 7-1.
AREA AND STRUCTURES WITHIN THE 100-YEAR FLOODPLAIN BY JURISDICTION**

	Area (Acres)	Number of Structures							Total
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	
Bucoda	182	164	4	0	3	3	4	0	178
Grand Mound UGA	11	1	0	0	0	0	0	0	1
Lacey	517	10	0	0	0	0	1	0	11
Lacey UGA	798	27	0	0	0	0	1	0	28
Olympia	876	146	27	0	0	0	4	0	177
Olympia UGA	137	16	0	0	0	0	0	0	16
Rainier UGA	4	3	1	0	0	0	0	0	4
Tenino	34	2	0	0	0	0	0	0	2
Tenino UGA	9	2	0	0	0	0	0	0	2
Tumwater	480	28	1	2	0	0	10	0	41
Tumwater UGA	503	39	1	0	2	0	0	0	42
Yelm	145	15	3	1	0	1	1	0	21
Yelm UGA	75	6	0	0	0	0	0	0	6
Unincorporated outside UGA	28,694	1365	16	0	116	0	12	1	1,510
Total	32,465	1,824	53	3	121	4	33	1	2,039
Total Cities	2,235	365	35	3	3	4	20	0	430
Total UGA	1,537	94	2	0	2	0	1	0	99
Total Unincorporated	30,231	1459	18	0	118	0	13	1	1,609

**TABLE 7-2.
AREA AND STRUCTURES WITHIN THE 100-YEAR FLOODPLAIN BY DRAINAGE BASIN**

Drainage Basin	Area (Acres)	Number of Structures							Total
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	
Black River	7,142	194	6	0	20	0	3	0	223
Budd/Deschutes	6,970	453	30	2	20	0	14	0	519
Chehalis River	5,280	253	0	0	51	0	1	0	305
Eld Inlet	642	193	1	0	1	0	0	1	196
Henderson Inlet	1,808	116	3	0	2	0	2	0	123
Nisqually River	5,612	330	9	1	10	1	5	0	356
Skookumchuck R.	4,138	249	4	0	16	3	6	0	278
Totten Inlet	873	36	0	0	1	0	2	0	39
Total	32,465	1,824	53	3	121	4	33	1	2,039

TABLE 7-3.
VALUE OF EXPOSED BUILDINGS WITHIN 100-YEAR FLOODPLAIN BY JURISDICTION

	Estimated Flood Exposure			% of Total Assessed Value
	Structure	Contents	Total	
Bucoda	\$8,524,700	\$5,549,840	\$14,074,540	54.04
Grand Mound UGA	\$76,400	\$45,840	\$122,240	—
Lacey	\$1,762,300	\$1,062,100	\$2,824,400	0.04
Lacey UGA	\$4,843,800	\$3,381,600	\$8,225,400	—
Olympia	\$41,351,200	\$28,954,000	\$70,305,200	0.59
Olympia UGA	\$2,266,500	\$1,359,900	\$3,626,400	—
Rainier UGA	\$332,500	\$213,980	\$546,480	—
Tenino	\$106,700	\$64,020	\$170,720	0.10
Tenino UGA	\$155,800	\$93,480	\$249,280	—
Tumwater	\$10,020,750	\$8,967,755	\$18,988,505	0.62
Tumwater UGA	\$7,871,100	\$5,337,420	\$13,208,520	—
Yelm	\$5,661,000	\$4,490,710	\$10,151,710	1.26
Yelm UGA	\$487,100	\$292,260	\$779,360	—
Unincorporated outside UGA	\$217,120,150	\$151,436,930	\$368,557,080	2.54
Total	\$300,580,000	\$211,249,835	\$511,829,835	1.35
Total Cities	\$67,426,650	\$49,088,425	\$116,515,075	0.52
Total UGA	\$16,033,200	\$10,724,480	\$26,757,680	—
Total Unincorporated	\$233,153,350	\$162,161,410	\$395,314,760	2.54

TABLE 7-4.
VALUE OF EXPOSED BUILDINGS WITHIN 100-YEAR FLOODPLAIN BY DRAINAGE BASIN

	Estimated Flood Exposure			% of Total Assessed Value
	Structure	Contents	Total	
Black River	\$29,956,400	\$21,936,680	\$51,893,080	3.41%
Budd/Deschutes	\$86,915,000	\$60,916,285	\$147,831,285	0.79%
Chehalis River	\$54,399,500	\$44,275,540	\$98,675,040	9.01%
Eld Inlet	\$40,042,800	\$24,169,780	\$64,212,580	2.04%
Henderson Inlet	\$20,803,200	\$13,091,880	\$33,895,080	0.42%
Nisqually River	\$43,158,400	\$29,850,550	\$73,008,950	1.51%
Skookumchuck River	\$17,385,700	\$12,116,840	\$29,502,540	20.28%
Totten Inlet	\$7,919,000	\$4,892,280	\$12,811,280	2.45
Total	\$300,580,000	\$211,249,835	\$511,829,835	1.34

Land Use in the Floodplain

Some land uses are more vulnerable to flooding, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Table 7-5 shows the existing land use of all parcels in the 100-year floodplain in the planning area, including vacant parcels and those in public/open space uses. About 76 percent of the parcels in the 100-year floodplain are zoned for agricultural or low-density uses. Approximately 10 percent of area is zoned for an open space use. These are favorable, lower-risk uses for the floodplain. The amount of the floodplain that contains vacant, developable land is not known. This would be valuable information for gauging the future development potential of the floodplain.

TABLE 7-5. LAND USE WITHIN THE FLOODPLAIN		
Land Use	100-Year Floodplain	
	Area (acres)	% of total
Arterial Commercial	1.78	0.0055%
Green Belt	183.94	0.5666%
Heavy Commercial	0.00	0.0000%
High Density Corridor 4	0.00	0.0000%
Highway Commercial	10.27	0.0316%
Lake	588.70	1.8133%
Light Industrial	19.23	0.0592%
Light Industrial Commercial	20.55	0.0633%
Long Term Agriculture	5923.38	18.2454%
Long Term Forestry	2809.88	8.6551%
Low Density Residential	0.08	0.0003%
Low Density Residential 0-4	111.35	0.3430%
McAllister Geologically Sensitive Area	427.32	1.3162%
Military Reservation	327.62	1.0091%
Mixed Use Moderate Density	0.02	0.0000%
Moderate Density Residential	0.39	0.0012%
Multifamily Medium Density Residential 9-15 Units Per Acre	2.58	0.0079%
Neighborhood Convenience Commercial	1.78	0.0055%
Neighborhood Village	0.00	0.0000%
Nisqually Agriculture	45.73	0.1409%
Open Space	402.82	1.2408%
Open Space Institutional	7.97	0.0246%
Open Space Park	0.72	0.0022%
Open Space School	0.00	0.0000%
Planned Industrial Park	9.26	0.0285%
Public Parks Trails And Preserves	2863.17	8.8193%
Public/Semi-Public	0.00	0.0000%
Residential 1 Unit Per 5 Acre	0.39	0.0012%
Residential 4-8	504.05	1.5526%
Residential 6-12	10.88	0.0335%

**TABLE 7-5.
LAND USE WITHIN THE FLOODPLAIN**

Land Use	100-Year Floodplain	
	Area (acres)	% of total
Residential Lamird 1/1	380.63	1.1724%
Residential Lamird 1/2	66.53	0.2049%
Residential Lamird 2/1	1535.90	4.7309%
Residential Low Impact 2-4 Units Per Acre	0.36	0.0011%
Residential Sensitive Resource 2-4 Units Per Acre	1.84	0.0057%
Rural 1/10	199.13	0.6134%
Rural 1/20	3417.49	10.5267%
Rural Commercial	9.17	0.0282%
Rural Residential 1/5	326.08	1.0044%
Rural Residential Resource 1/5	11912.90	36.6945%
Rural Resource Industrial	23.47	0.0723%
Single Family Environmentally Sensitive	0.05	0.0001%
Single Family Low Density Residential 4-7 Units Per Acre	200.52	0.6176%
Single Family Medium Density Residential 6-9 Units Per Acre	15.84	0.0488%
Single Family Residential 4	50.54	0.1557%
Two Family Residential 6-12	0.00	0.0000%
Urban Reserve 1/5	50.69	0.1561
Total	32465	100

7.1.3 Critical Facilities and Infrastructure

Table 7-6 and Table 7-7 summarize the planning area critical facilities and infrastructure in the 100-year floodplain. Details are provided in the following sections.

Tier II Facilities

Tier II facilities are those that use or store materials that can harm the environment if damaged by a flood. Six businesses in the 100-year floodplain report having Tier II hazardous materials. During a flood event, containers holding these materials can rupture and leak into the surrounding area, having a disastrous effect on the environment as well as residents.

Utilities and Infrastructure

It is important to determine who may be at risk if infrastructure is damaged by flooding. Roads or railroads that are blocked or damaged can isolate residents and can prevent access throughout the planning area, including for emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by floods or debris also can cause isolation. Water and sewer systems can be flooded or backed up, causing health problems. Underground utilities can be damaged. Dikes can fail or be overtopped, inundating the land that they protect. The following sections describe specific types of critical infrastructure.

TABLE 7-6. CRITICAL FACILITIES IN THE FLOODPLAIN	
Number of Facilities in 100-Year Floodplain	
Medical and Health Services	0
Government Function	2
Protective	2
Hazardous Materials	6
Schools	3
Other	0
Total	13

TABLE 7-7. CRITICAL INFRASTRUCTURE IN THE FLOODPLAIN	
Number of Facilities in 100-Year Floodplain	
Bridges	45
Water Supply	0
Wastewater	1
Power	0
Communications	0
Other	4
Total	50

Roads

The following major roads in the planning area pass through the 100-year floodplain and thus are exposed to flooding:

- Interstate 5
- U.S. Highway 101
- State Route 507
- State Route 510
- State Route 12
- Old Highway 99 SW
- Old Highway 99 SE
- Little Rock Road SW

Some of these roads are built above the flood level, and others function as levees to prevent flooding. Still, in severe flood events these roads can be blocked or damaged, preventing access to some areas.

Bridges

Flooding events can significantly impact road bridges, which provide the only ingress and egress to some neighborhoods. There are 45 bridges that are in or cross over the 100-year floodplain in the planning area.

Water and Sewer Infrastructure

Water and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from flood events, also causing localized urban

flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers and streams.

Dams

There are 33 dams in or adjacent to Thurston County. Many of them serve more than one purpose, such as hydroelectric power generation, irrigation and recreation. Dam failures can be caused by nature, such as flooding or an earthquake, but mostly they are caused by human error such as poor construction, operation, maintenance or repair. The effects of a dam failure are highly variable, depending on the dam, the amount of water stored behind the dam, the current stream flow, and the size and proximity of the downstream population. There are many effects of a major dam failure: loss of life, destruction of homes and property, damage to roads, bridges, power lines and other infrastructure, loss of power generation and flood control capabilities, disruption of fish stock and spawning beds, and the erosion of stream and river banks. Many dam failures have occurred in Washington State over the last 40 years, but none have been in or affected Thurston County.

Washington State's Downstream Hazard Classification system for dams assigns a hazard rating of "Low," "Significant" or "High" for areas at risk of economic loss and environmental damage should a dam fail. In Thurston County, most dams are rated low, a few are rated significant and three are rated high. The high hazard dams are Alder and La Grande Dams on the Nisqually River and the Skookumchuck Dam on the Skookumchuck River (see Table 7-8). Failure of any of these dams could affect a population of 300 or more, inundate major transportation routes and industries, and have long-term effects on water quality and wildlife. The high hazard dams in Thurston County are primarily for electrical power generation and are licensed by the Federal Energy Regulatory Commission. Accordingly, they are inspected regularly and staffed 24 hours a day.

TABLE 7-8. HIGH HAZARD DAMS IN THURSTON COUNTY			
Name of Dam	River or Stream	Storage (acre-feet)	Hazard Class
Alder Dam	Nisqually River (Alder Lake)	231,936	1A
La Grande Dam	Nisqually River (La Grande Reservoir)	2,676	1B
Skookumchuck Dam	Skookumchuck River (Skookumchuck Reservoir)	35,000	1A

Of the high-hazard dams, only the Skookumchuck is an earthen dam; La Grande and Alder are both concrete structures. All three are well-maintained and comply with current dam safety regulations. Therefore, barring a natural disaster or terrorist action, the 1998 Thurston County Hazard Identification and Vulnerability Analysis assigned a low risk rating to all three dams.

The failure of a high hazard dam would threaten a small but important segment of Thurston County, suggesting moderate vulnerability. As high hazard dams, dam inundation mapping for these facilities does exist as part of their emergency action plans. However, this data is not readily available to local governments in a format that can support planning due to security interest.

Levees

There are no FEMA accredited levees within the planning area. There is a non-certified levee along the Nisqually River that provides minor flood protection to developed properties.

7.1.4 Environment

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways. Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees, and logjams from timber harvesting can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

Many species of mammals, birds, reptiles, amphibians and fish live in Thurston County in plant communities that are dependent upon streams, wetlands and floodplains. Changes in hydrologic conditions can result in a change in the plant community. Wildlife and fish are impacted when plant communities are eliminated or fundamentally altered to reduce habitat. Wildlife populations are limited by shelter, space, food and water. Since water supply is a major limiting factor for many animals, riparian communities are of special importance. Riparian areas are the zones along the edge of a river or stream that are influenced by or are an influence upon the water body. Human disturbance to riparian areas can limit wildlife's access to water, remove breeding or nesting sites, and eliminate suitable areas for rearing young. Wildlife rely on riparian areas and are associated with the flood hazard in the following ways:

- Mammals depend upon a supply of water for their existence. Riparian communities have a greater diversity and structure of vegetation than other upland areas. Beavers and muskrats are now recolonizing streams, wetlands and fallow farm fields, which are converted wetlands. As residences are built in rural areas, there is an increasing concern with beaver dams causing flooding of low-lying areas and abandoned farm ditches being filled in, which can lead to localized flooding.
- A great number of birds are associated with riparian areas. They swim, dive, feed along the shoreline, or snatch food from above. Puget Sound, rivers, lakes and wetlands are important feeding and resting areas for migratory and resident waterfowl. Other threatened or endangered species (such as the bald eagle or the peregrine falcon) eat prey from these riparian areas. Some species have become adapted to changes to shoreline environments. For example, resident populations of Canada geese, which do not leave the Olympia area, have increased 600 percent over the past decade, according to the Black Hills Audubon Society.
- Amphibians and reptiles are some of the least common forms of wildlife in riparian areas. However, some state threatened species, such as the western pond turtle and the spotted frog, are known to inhabit the waterways and wetlands of Thurston County.
- Fish habitat throughout the county varies widely based on natural conditions and human influence. Many ditches were dug throughout the county to make low, wet ground better for farming. As the water drained away and the wetlands were converted to farm fields, natural stream conditions were altered throughout the county. Agriculture along many rivers extends to the water's edge and smaller side channels have been tilled to drain better. Within developing areas, small streams were placed in pipes and wetland filled in to support urban development. While salmonids prefer clear, free-flowing streams, other species like the Olympic mud-minnow inhabit the calm, backwater areas of sloughs and wetlands.

Protection of these biological resources within the floodplains of the planning area is very important to Thurston County. Equipped with planning tools such as WRIA planning, comprehensive planning, critical areas ordinances, open space planning and participation in regional planning initiatives such as the Chehalis Watershed Cooperative, Thurston County has been able to establish a diverse inventory of preserve areas that maintain the natural and beneficial functions of the floodplain. This has been

established through proactive land use regulations, and property acquisitions that have identified critical habitat to be preserved. The combination of these two tools has resulted in a floodplain that is predominantly free of high-density development as shown in Table 7-5. Parks and preserve areas that promote the natural and beneficial functions of floodplains include the following:

- Woodland Creek Wetlands Preserve
- Black River-Mima Prairie Glacial Heritage Preserve
- Johnson Point Wetlands Preserve
- Black River Natural Area.

7.2 FLOOD HAZARD VULNERABILITY

Many areas exposed to flooding may not experience serious flooding or flood damage. This section describes vulnerabilities in terms of population, property, infrastructure and environment. Two areas of the regulated floodplain within the planning area have been focused on for this analysis:

- The special flood hazard area (SFHA) depicted on the current Flood Insurance Rate Map (FIRM) for Thurston County.
- The portions of the planning area for which the County has maintained flood-of-record data from past flood events. Thurston County Code considers this to be the best available data when flood-of-record data shows more flood risk than shown on the FIRM.

The County does not currently have flood-of-record data for all of the mapped SFHA, and the extent of the floods of record has not been mapped. Therefore, the vulnerability analysis focuses on the difference in flood depths where flood-of-record data is available. It provides two sets of data output that should be interpreted separately, not cumulatively. For example, loss values shown for flood-of-record areas are not in addition to those reflected in the SFHA; they represent the total damage estimated for the flood event that generated the flood depths.

7.2.1 Population

Vulnerable Populations

A geographic analysis of demographics using the HAZUS-MH model identified populations vulnerable to the flood hazard as follows:

- **Economically Disadvantaged Populations**—It is estimated that 16 percent of the people within the 100-year floodplain are economically disadvantaged, defined as having household incomes of \$15,000 or less.
- **Population over 65 Years Old**—It is estimated that 2 percent of the population in the census blocks that intersect the 100-year floodplain are over 65 years old. Approximately 20 percent of the over-65 population in the floodplain also have incomes considered to be economically disadvantaged and are considered to be extremely vulnerable.
- **Population under 16 Years Old**—It is estimated that 11.5 percent of the population within census blocks located in or near the 100-year floodplain are under 16 years of age.

Impacts of the 100-year flood on persons and households in the planning area were estimated as follows through the Level 2 HAZUS-MH analysis:

- Number of Displaced Households: 8,156
- Number of Persons Requiring Short-Term Shelter: 4,274

Public Health and Safety

Floods and their aftermath present threats to public health and safety. Floodwater is generally contaminated by pollutants such as sewage, human and animal feces, pesticides and insecticides, fertilizers, oil, asbestos, and rusting building materials. This was evidenced by health and environmental tests carried out on floodwaters in New Orleans during and after Hurricane Katrina. The tests revealed bacteria and lead hazards to human health, and the public was warned to avoid exposure to the contaminated water. The following health and safety risks are commonly associated with flood events:

- **Unsafe food**—Floodwaters contain disease-causing bacteria, dirt, oil, human and animal wastes, and farm and industrial chemicals. They carry away whatever lies on the ground and upstream. Their contact with food items, including food crops in agricultural lands, can make that food unsafe to eat and hazardous to human health. Power failures caused by floods damage stored food. Refrigerated and frozen foods are affected during the outage periods, and thus must be carefully monitored and examined prior to consumption. Foods kept inside cardboard, plastic bags, jars, bottles, and paper packaging are subject to disposal if contaminated by floodwaters. Even though the packages do not appear to be wet, they may be unhygienic with mold contamination and deteriorate rapidly.
- **Contaminated drinking and washing water and poor sanitation**—Flooding impairs clean water sources with pollutants and affects sanitary toilets. Direct and indirect contact with the contaminants—whether through direct food intake, vector insects such as flies, unclean hands, or dirty plates and utensils—can result in waterborne illnesses and life-threatening infectious disease. The pollutants also saturate into the groundwater or can infiltrate into sanitary sewer lines through the ground. Wastewater treatment plants, if flooded and caused to malfunction, can be overloaded with polluted runoff waters and sewage beyond their disposal capacity, resulting in backflows of raw sewage to homes and low-lying grounds. Private wells can be contaminated or damaged severely by floodwaters, while private sewage disposal systems can become a cause of infection and illnesses if they are broken or overflow. In this manner, unclean drinking and washing water and sanitation, coupled with lack of adequate sewage treatment, can lead to disease outbreaks, including life-threatening cholera, typhoid, dysentery and some forms of hepatitis. The key to preventing a health catastrophe is basic hygiene available from clean and safe water and toilets.
- **Mosquitoes and animals**—Prolonged rainfall and floods provide new breeding grounds for mosquitoes—wet areas and stagnant pools—and can lead to an increase in the number of mosquito-borne diseases such as malaria and dengue and West Nile fevers. Rats and other rodents and wild animals also can carry viruses and diseases. The public should avoid such animals and should dispose of dead animals in accordance with guidelines issued by local animal control authorities. Leptospirosis—a bacterial disease associated predominantly with rats—often accompanies floods in developing countries (Leptospirosis Information Center), although the risk is very low in industrialized regions unless cuts or wounds have direct contact with disease-contaminated floodwaters or animals.
- **Molds and mildews**—Excessive exposure to molds and mildews can cause flood victims—especially those with allergies and asthma—to contract upper respiratory diseases and to trigger cold-like symptoms such as sore throat, watery eyes, wheezing and dizziness. Molds grow in as short a period as 24 to 48 hours in wet and damp areas of buildings and homes that have not been cleaned after flooding, such as water-infiltrated walls, floors, carpets, toilets and bathrooms. Very small mold spores can be easily inhaled by human bodies and, in large enough quantities, cause allergic reactions, asthma episodes, and other respiratory problems. Infants, children, elderly people and pregnant women are considered most vulnerable to mold-induced health problems.

- **Carbon monoxide poisoning**—Carbon monoxide poisoning is as a potential hazard after major floods. Carbon monoxide can be found in combustion fumes, such as those generated by small gasoline engines, stoves, generators, lanterns and gas ranges, or by burning charcoal or wood. In the event of power outages following floods, flood victims tend to use alternative sources of fuels for heating, cooling, or cooking inside enclosed or partly enclosed houses, garages or buildings without an adequate level of air ventilation. Carbon monoxide builds up from these sources and poisons the people and animals inside.
- **Hazards when reentering and cleaning flooded homes and buildings**—Flooded buildings can pose significant health hazards after floodwaters recede. Electrical power systems, including fallen power lines, can become hazardous. People should avoid turning on or off the main power while standing in remaining floodwater. Gas leaks that from pipelines or propane tanks can trigger fire and explosion when entering and cleaning damaged buildings or working to restore utility service. Flood debris—such as broken bottles, wood, stones and walls—may cause wounds and injuries when removing contaminated mud and cleaning damaged buildings. Extreme caution must be used with possible chemical hazards during flood recovery. Containers of hazardous chemicals, including pesticides, insecticides, fertilizers, car batteries, propane tanks and other industrial chemicals, may be hidden or buried under flood debris. A health hazard can also occur when hazardous dust and mold in ducts, fans and ventilators of air-conditioning and heating equipment are circulated through a building and inhaled by those engaged in cleanup and restoration.
- **Mental stress and fatigue**—Various reports identify a major health hazard of floods as mental stress or psychological distress due to exposure to extreme disaster events. Having experienced a devastating flood, seen loved ones lost or injured, and homes damaged or destroyed, flood victims can experience long-term psychological impact. The expense and effort required to repair flood-damaged homes places severe financial and psychological burdens on the people affected, in particular the unprepared and uninsured. Post-flood recovery—especially when it becomes prolonged—can cause mental disorders, anxiety, anger, depression, lethargy, hyperactivity, sleeplessness, and, in an extreme case, suicide. Behavior changes may also occur in children such as an increase in bed-wetting and aggression. There is also a long-term concern among the affected that their homes can be flooded again in the future.

Documentation of these types of impacts within the planning area is limited. Current loss estimation models such as HAZUS are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

7.2.2 Property

HAZUS-MH calculates losses to structures from flooding by looking at depth of flooding and type of structure. Using historical flood insurance claim data, HAZUS-MH estimates the percentage of damage to structures and their contents using damage functions based on historical averages. For this analysis, local data on facilities was used instead of the default building-and-inventory data provided with HAZUS-MH. The results are summarized in Table 7-9 through Table 7-11 for the 100-year and flood-of-record events. Up to \$70.9 million of flood loss is estimated for a 100-year flood event in the planning area. This represents 13.9 percent of the total exposure to the 100-year flood and 0.19 percent of the total assessed value of the planning area. It is estimated that there would be \$49.6 million of flood loss from a flood-of-record comparable event, representing 42.1 percent of the total exposure in the areas for which flood-of-record information is available and 0.67 percent of the total assessed value in those areas.

**TABLE 7-9.
LOSS ESTIMATES FOR 100-YEAR FLOOD BY JURISDICTION**

	Structures Impacted ^a	Estimated Loss Associated with Flood			% of Total Assessed Value
		Structure	Contents	Total	
Bucoda	148	\$1,195,159	\$692,137	\$1,887,444	7.25
Grand Mound UGA	0	\$0	\$0	\$ 0	0
Lacey	2	\$25,254	\$11,132	\$36,388	0.00056
Lacey UGA	9	\$159,861	\$54,905	\$214,775	--
Olympia	170	\$5,074,344	\$3,214,311	\$8,288,825	0.07
Olympia UGA	9	\$173,981	\$59,712	\$233,702	--
Rainier UGA	4	\$56,592	\$27,190	\$83,786	--
Tenino	2	\$17,755	\$9,441	\$27,198	0.02
Tenino UGA	0	\$0	\$0	\$ 0	0
Tumwater	39	\$971,698	\$1,890,583	\$2,862,320	0.09
Tumwater UGA	30	\$701,093	\$565,461	\$1,266,584	--
Yelm	13	\$349,662	\$266,023	\$615,698	0.08
Yelm UGA	4	\$57,798	\$19,266	\$77,068	--
Unincorporated outside UGA	1,153	\$25,353,009	\$29,997,475	\$55,351,637	0.36
Total	1,583	\$34,136,206	\$36,807,636	\$70,945,425	0.19
Total Cities		\$7,633,872	\$6,083,627	\$13,717,499	0.06
Total UGA		\$1,149,324	\$726,534	\$1,875,858	--
Total Unincorporated		\$26,502,334	\$30,724,009	\$57,226,343	0.15

a. Impacted structures are those structures with finished floor elevations below the flood event water surface elevation. These structures are the most likely to receive significant damage in a flood event.

**TABLE 7-10.
LOSS ESTIMATES FOR 100-YEAR FLOOD BY DRAINAGE BASIN**

Drainage Basin	Structures Impacted ^a	Estimated Loss Associated with Flood			% of Total Assessed Value
		Structure	Contents	Total	
Black River	200	\$4,111,821	\$4,049,638	\$8,161,459	0.54
Budd/Deschutes	426	\$9,425,345	\$7,700,491	\$17,125,836	0.09
Chehalis River	280	\$8,604,108	\$16,763,122	\$25,367,229	2.32
Eld Inlet	105	\$3,380,548	\$1,737,566	\$5,118,104	0.16
Henderson Inlet	71	\$1,620,200	\$684,209	\$2,304,409	0.03
Nisqually River	248	\$4,168,350	\$3,463,367	\$7,631,716	0.16
Skookumchuck River	235	\$2,376,185	\$2,075,114	\$4,451,299	0.05
Totten Inlet	18	\$449,650	\$333,640	\$783,290	0.15
Total	1,583	\$34,136,206	\$36,807,147	\$70,943,842	0.19

a. Impacted structures are those structures with finished floor elevations below the flood event water surface elevation. These structures are the most likely to receive significant damage in a flood event.

**TABLE 7-11.
LOSS ESTIMATES FOR FLOOD OF RECORD BY DRAINAGE BASIN**

Planning area	Structures	Estimated Loss Associated with Flood			% of Total
	Impacted ^a	Structure	Contents	Total	Assessed Value
Black River	60	\$1,299,065	\$1,288,207	\$2,587,272	0.17%
Chehalis River	123	\$14,872,675	\$25,436,280	\$40,308,955	3.68%
Nisqually River	139	\$2,851,311	\$3,865,567	\$6,716,878	0.14
Total	322	\$19,023,051	\$30,590,054	\$49,613,105	0.67

a. Impacted structures are those structures with finished floor elevations below the flood event water surface elevation. These structures are the most likely to receive significant damage in a flood event.

National Flood Insurance Program

Table 7-12 lists flood insurance statistics that help identify vulnerability in the planning area. Eight planning area communities participate in the NFIP, with 998 flood insurance policies providing \$231.1 million in coverage. According to FEMA statistics, 295 flood insurance claims were paid between January 1, 1978 and August 31, 2012, for a total of \$4.2 million, an average of \$14,266 per claim.

**TABLE 7-12.
FLOOD INSURANCE STATISTICS FOR THURSTON COUNTY**

Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 8/31/2012	Insurance In Force	Total Annual Premium	Claims, 11/1978 to 8/31/2012	Value of Claims paid, 11/1978 to 8/31/2012
Bucoda	9/20/1981	72	\$10,843,100	\$62,509	43	\$257,010.48
Lacey	7/16/1980	15	\$3,678,000	\$4,660	3	\$8,088.08
Olympia	2/17/1982	94	\$30,714,000	\$99,308	20	\$369,197.88
Rainier	10/16/2012	2	\$630,000	\$708	0	\$0
Tenino	6/4/1980	7	\$1,411,100	\$2,524	7	\$105,231.94
Tumwater	8/01/1980	12	\$3,025,000	\$5,336	2	\$12,514.40
Yelm	6/16/1999	33	\$7,617,200	\$23,718	2	\$7,602.70
Unincorporated	12/01/1982	763	\$173,194,400	\$389,521	218	\$3,448,798.39
Total		998	\$231,112,800	\$521,115	295	\$4,208,444

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before a FIRM is adopted are more vulnerable to flooding because they do not meet code or are located in hazardous areas. The first FIRMs in the planning area were available in 1980.

The following information from flood insurance statistics is relevant to reducing flood risk:

- The use of flood insurance in the planning area is below the national average. Only 19.1 percent of insurable buildings in the planning area are covered by flood insurance. According to an NFIP study, about 49 percent of single-family homes in special flood hazard areas are covered by flood insurance nationwide.
- The amount of insurance in force represents approximately 45 percent of the total value of the assets exposed within the SFHA.
- The average claim paid in the planning area represents about 5.7 percent of the 2012 average assessed value of structures in the floodplain.
- The percentage of policies and claims outside a mapped floodplain suggests that not all of the flood risk in the planning area is reflected in current mapping. Based on information from the NFIP, 41 percent of policies in the planning area are on structures within an identified SFHA, and 59 percent are for structures outside such areas. It may be that a high number of these policies are in areas with groundwater flood issues, which are not reflected on the FIRM.

Repetitive Loss

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

- Four or more paid losses in excess of \$1,000
- Two paid losses in excess of \$1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property.

Repetitive loss properties make up only 1 to 2 percent of flood insurance policies in force nationally, yet they account for 40 percent of the nation's flood insurance claim payments. In 1998, FEMA reported that the NFIP's 75,000 repetitive loss structures have already cost \$2.8 billion in flood insurance payments and that numerous other flood-prone structures remain in the floodplain at high risk. The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. A recent report on repetitive losses by the National Wildlife Federation found that 20 percent of these properties are outside any mapped 100-year floodplain. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies.

FEMA-sponsored programs, such as the CRS, require participating communities to identify repetitive loss areas. A repetitive loss area is the portion of a floodplain holding structures that FEMA has identified as meeting the definition of repetitive loss. Identifying repetitive loss areas helps to identify structures that are at risk but are not on FEMA's list of repetitive loss structures because no flood insurance policy was in force at the time of loss. Figure 7-1 shows the repetitive loss areas in the planning area. FEMA's list of repetitive loss properties identifies 42 such properties in the planning area as of July 12, 2012. The breakdown of the properties by jurisdiction is presented in Table 7-13.

A review of repetitive loss properties was performed for the unincorporated county only, because the County is currently the only community in the planning area participating in the CRS program, for which the repetitive loss area review is a requirement. The review identified that all but two of the identified repetitive loss properties are within a mapped special flood hazard area. The lone properties outside the SFHA are within county-mapped groundwater flooding areas that are zone B on the FIRM.

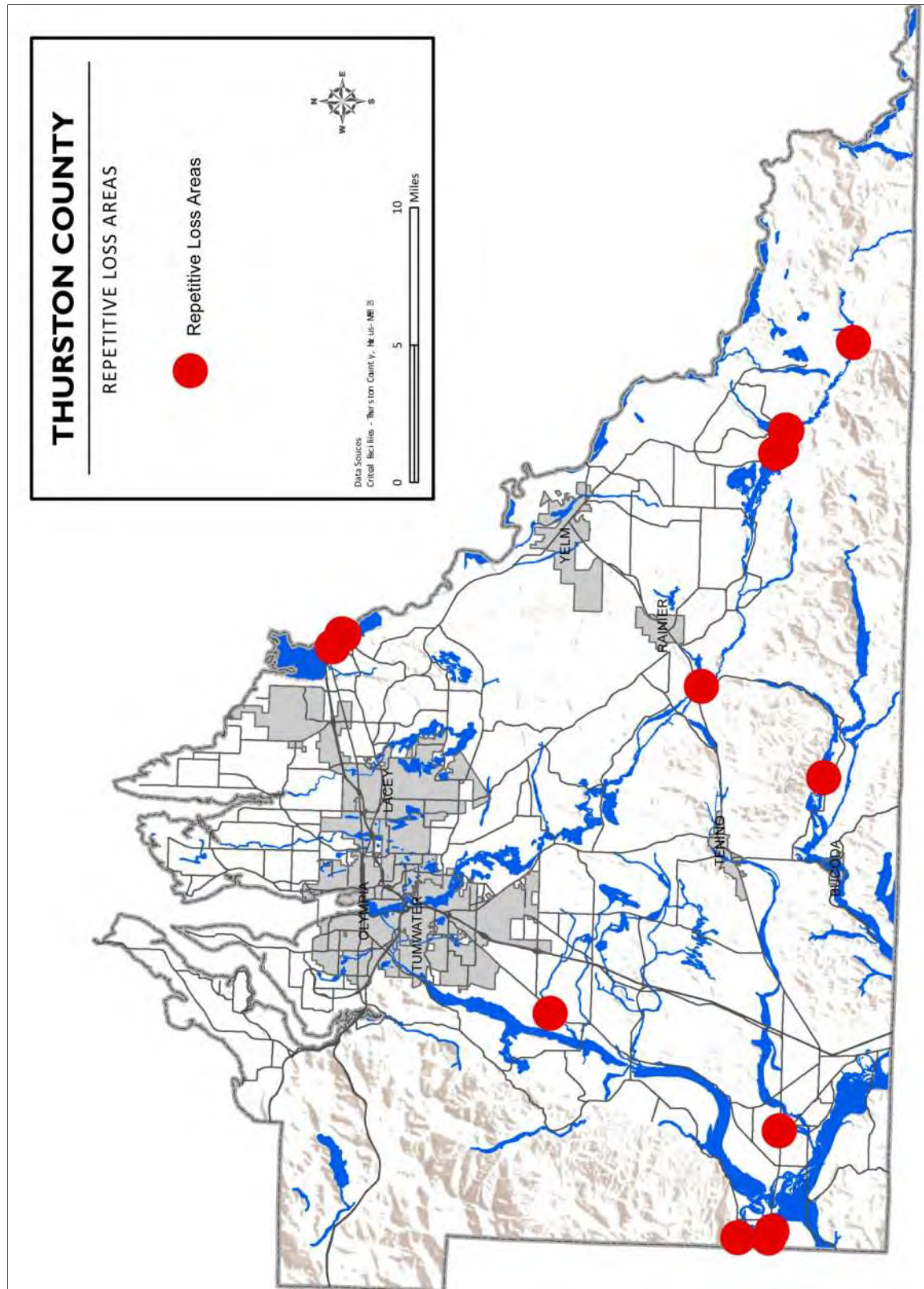


Figure 7-1. Repetitive Loss Areas in Thurston County

**TABLE 7-13.
REPETITIVE LOSS PROPERTIES IN THURSTON COUNTY**

Jurisdiction	Repetitive Loss Properties	Properties That Have Been Mitigated	Number of Corrections	Corrected Number of Repetitive Loss Properties
Bucoda	6	0	0	6
Lacey	0	0	0	0
Olympia	10	0	0	10
Rainier	0	0	0	0
Tenino	6	0	0	6
Tumwater	0	0	0	0
Yelm	0	0	0	0
Unincorporated	20	6	0	14
Total	42	6	0	36

Based on FEMA Report of Repetitive Losses, 07/12/2012

A further review of the repetitive loss data found that all dates of repetitive losses coincide with dates of known flooding in the county. Therefore, it can be concluded that the overall cause of repetitive flooding is the same as has been profiled in this plan and is covered by available mapping. With the potential for flood events every three to seven years, Thurston County considers all of the mapped floodplain areas as susceptible to repetitive flooding. These areas are subject to provisions of the Thurston County flood damage prevention ordinance. Additionally, as required under the CRS program, Thurston County disseminates flood protection information to these areas annually, identified for the river basins in which each repetitive loss area is found.

7.2.3 Critical Facilities and Infrastructure

HAZUS-MH estimates the loss potential of critical facilities exposed to the flood risk using depth/damage function curves to estimate the percent of damage to critical facility buildings and contents and the functional down-time of the facilities (the time to restore a facility to 100 percent of its functionality). This helps to gauge how long the planning area could have limited usage of critical facilities. The analysis estimated the following losses to critical facilities for the 100-year flood event:

- 4.8 percent damage to structures
- 39.2 percent damage to contents
- An estimated 135 days to restore these facilities to full functionality.

7.2.4 Environment

The environment vulnerable to flood hazard is the same as the environment exposed to the hazard. Loss estimation platforms such as HAZUS-MH are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment was not available at the time of this plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

PART 3 — MITIGATION STRATEGY

CHAPTER 8.

GUIDING PRINCIPLE, GOALS AND OBJECTIVES

This chapter identifies goals for reducing long-term vulnerabilities to flooding (CRS Step 6). The Natural Hazards Mitigation Plan for the Thurston Region identifies six guiding principles and eight goals. It was the Steering Committee's decision to adopt a derivation of the guiding principles and goals established for the Natural Hazards Mitigation Plan to set the course for eventual integration of the two plans. From the guiding principles and goals, objectives were identified, and the objectives were used in the selection and prioritization of recommended mitigation initiatives. These planning components all directly support one another. Goals were selected that met multiple guiding principles. Objectives were selected that met multiple goals. Mitigation initiatives were prioritized based on meeting multiple objectives.

8.1 GUIDING PRINCIPLES

The Natural Hazards Mitigation Plan's guiding principles were adapted for the flood plan as follows:

1. Provide a methodical approach to flood hazard planning that can integrate with other planning mechanisms that enhance or support floodplain management.
2. Enhance the public's awareness and understanding of the flood hazard.
3. Create a decision-making tool for policy and decision makers.
4. Promote compliance with state and federal program requirements.
5. Ensure inter-jurisdictional coordination on all floodplain management activities.

8.2 GOALS

The Natural Hazards Mitigation Plan's goals were adapted for the flood plan as follows:

1. Foster all sectors of the community working together to create a flood-hazard-resilient community.
2. Ensure that local and state government entities have the capabilities to develop, implement and maintain effective floodplain management programs in the Thurston region.
3. Ensure that the communities in the Thurston region collectively maintain the capacity to initiate and sustain emergency operations during and after a flood disaster.
4. Ensure that local government operations are not significantly disrupted by flood hazard events.
5. Reduce the vulnerability to flood hazards in order to protect the life, health, safety and welfare of the community's residents and visitors.
6. Reduce the adverse impact on critical facilities and infrastructure from flood hazard events within the Thurston region.
7. Increase public awareness of vulnerability to flood hazards and preparation for floods.
8. Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of flood hazard events.

The effectiveness of a mitigation strategy is assessed by determining how well these goals are achieved.

8.3 OBJECTIVES

The following objectives were selected that meet multiple goals:

1. Eliminate or minimize disruption of local government operations caused by flood hazard events.
2. Maintain a regionally coordinated warning and emergency response program that can detect the flood threat and provide timely warning.
3. Utilizing best available data and science, continually improve understanding of the location and potential impacts of flood hazards, the vulnerability of building types and community development patterns, and the measures needed to protect life safety.
4. Continually provide state, county and local agencies with updated information about flood hazards, vulnerabilities and mitigation initiatives.
5. Establish partnerships among all levels of government and the business community to improve and implement regionally consistent floodplain management practices (such as prevention, property protection, public education and awareness, natural resource protection, emergency services, and capital improvements).
6. Develop or improve early warning emergency response systems and evacuation procedures for flood hazard events.
7. Work to lower emergency service response times, including through improvement to transportation facilities.
8. Consider the impacts of flood hazards in all planning processes that address current and future land uses within the planning area.
9. Evaluate the risks to public safety and existing development (e.g., critical facilities, infrastructure, and structures) in flood hazard areas.
10. Sponsor and support public outreach and education activities to improve awareness of flood hazards, and recommend roles that property owners can take to prepare, respond, recover and protect themselves from the impacts of these events.
11. Consider the impacts that future development will have on the environment's capacity to withstand the impacts of flood events and the opportunities this development may create for environmental restoration.

CHAPTER 9. MITIGATION INITIATIVES

9.1 MITIGATION ALTERNATIVES

The planning team developed a catalog of flood hazard mitigation alternatives through a facilitated process with County staff involved in floodplain management. A session held October 1, 2012 to look at local strengths, weaknesses, obstacles and opportunities was the basis for the alternatives considered as well as the mitigation initiatives selected for implementation. The catalog represents the comprehensive range of alternatives considered for complying with Step 7 of the CRS 10-step process. The Steering Committee reviewed this catalog in conjunction with the findings of public outreach efforts, the risk assessment results and the Natural Hazards Mitigation Plan for the Thurston Region. The catalog was enhanced based on this review and then used by County staff to select hazard mitigation initiatives.

Catalogs of flood hazard mitigation alternatives were developed that present a broad range of alternatives to be considered for use in the planning area (CRS Step 7). The catalogs are listed in Table 9-1 through Table 9-4. The catalogs present alternatives that are categorized in two ways:

- By what the alternative would do:
 - Manipulate a hazard
 - Reduce exposure to a hazard
 - Reduce vulnerability to a hazard
 - Increase the ability to respond to or be prepared for a hazard
- By who would have responsibility for implementation:
 - Individuals
 - Businesses
 - Government.

Flood hazard mitigation initiatives recommended in this plan were selected from among the alternatives presented in the catalogs. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the goals and objectives, and are within the capabilities of Thurston County to implement. It should be noted that some of these actions may not be feasible based on the County's selection criteria. The purpose of the catalog was to equip the Steering Committee with a list of what could be considered to reduce risk of the flood hazard within the planning area. All actions identified in table 9-5 of this plan were selected based on the selection criteria identified in this chapter. Initiatives included in the catalog not selected by the County in the action plan were not selected based on the following:

- The action is not feasible
- The action is already being implemented
- There was an apparently more cost-effective alternative
- The action did not have public or political support

9.2 SELECTED MITIGATION INITIATIVES

The Steering Committee determined that some initiatives from the flood hazard mitigation catalog could be implemented to provide flood hazard mitigation benefits. Table 9-5 lists the recommended initiatives, the lead agency for each, and the proposed timeline. The parameters for the timeline are as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

**TABLE 9-1.
MITIGATION ALTERNATIVES TO MANIPULATE THE FLOOD HAZARD**

Personal Scale	Corporate Scale	Government Scale
<ol style="list-style-type: none"> 1. Clear stormwater drains and culverts 2. Institute low-impact development techniques on property 	<ol style="list-style-type: none"> 1. Clear stormwater drains and culverts 2. Institute low-impact development techniques on property 	<ol style="list-style-type: none"> 1. Maintain drainage system 2. Institute low-impact development techniques on property 3. Dredging, levee construction, and providing regional retention areas 4. Structural flood control, levees, channelization, or revetments. 5. Stormwater management regulations and master planning 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff 7. Maintain/restore natural floodplain functions

**TABLE 9-2.
MITIGATION ALTERNATIVES TO REDUCE EXPOSURE TO THE FLOOD HAZARD**

Personal Scale	Corporate Scale	Government Scale
<ol style="list-style-type: none"> 1. Locate outside of hazard area 2. Elevate utilities above base flood elevation 3. Institute low impact development techniques on property 	<ol style="list-style-type: none"> 1. Locate business critical facilities or functions outside hazard area 2. Institute low impact development techniques on property 	<ol style="list-style-type: none"> 1. Locate or relocate critical facilities outside of hazard area 2. Acquire or relocate identified repetitive loss properties 3. Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. 4. Adopt land development criteria such as planned unit developments, density transfers, clustering 5. Institute low impact development techniques on property 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff

**TABLE 9-3.
MITIGATION ALTERNATIVES TO REDUCE VULNERABILITY TO THE FLOOD HAZARD**

Personal Scale	Corporate Scale	Government Scale
<ol style="list-style-type: none"> 1. Retrofit structures (elevate structures above base flood elevation) 2. Elevate items within house above base flood elevation 3. Build new homes above base flood elevation 4. Flood-proof existing structures 	<ol style="list-style-type: none"> 1. Build redundancy for critical functions or retrofit critical buildings 2. Provide flood-proofing measures when new critical infrastructure must be located in floodplains 	<ol style="list-style-type: none"> 1. Harden infrastructure, bridge replacement program 2. Provide redundancy for critical functions and infrastructure 3. Adopt appropriate regulatory standards, such as: increased freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions. 4. Augment existing regulations to account for the impacts of Climate Change 5. Stormwater management regulations and master planning. 6. Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities.

**TABLE 9-4.
MITIGATION ALTERNATIVES TO INCREASE PREPARATION OR RESPONSE CAPABILITY**

Personal Scale	Corporate Scale	Government Scale
<ol style="list-style-type: none"> 1. Buy flood insurance 2. Develop household mitigation plan, such as retrofit savings, communication capability with outside, 72-hour self-sufficiency during and after an event 	<ol style="list-style-type: none"> 1. Keep cash reserves for reconstruction 2. Support and implement hazard disclosure for the sale/re-sale of property in identified risk zones. 3. Solicit cost-sharing through partnerships with other stakeholders on projects with multiple benefits. 4. Develop a flood response plan 	<ol style="list-style-type: none"> 1. Produce better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) 4. Incorporate retrofitting or replacement of critical system elements in capital improvement plan 5. Develop strategy to take advantage of post-disaster opportunities 6. Warehouse critical infrastructure components 7. Develop and adopt a continuity of operations plan 8. Consider participation in the Community Rating System 9. Maintain existing data and gather new data needed to define risks and vulnerability 10. Train emergency responders 11. Identify critical facilities/infrastructure that require early notification during flood responses 12. Create a dam/levee failure response plan 13. Enhance flood threat recognition capability 14. Create a building and elevation inventory of structures in the floodplain 15. Develop and implement a public information strategy 16. Charge a hazard mitigation fee 17. Integrate floodplain management policies into other planning mechanisms within the planning area. 18. Consider the probable impacts of climate change on the risk associated with the flood hazard 19. Consider the residual risk associated with structural flood control in future land use decisions 20. Enforce National Flood Insurance Program 21. Adopt a Stormwater Management Master Plan 22. Create flood hazard identification maps that reflect future conditions including the probable impacts from climate change.

**TABLE 9-5.
ACTION PLAN—FLOOD MITIGATION INITIATIVES (FMI)**

Lead Department	Possible Funding Sources or Resources	Estimated Project Cost	Time Line	Objectives	Covered in previous plan (Yes or No), Initiative #
FMI-1 —Identify properties that are potential candidates for elevation, relocation or buyout based on an evaluation of flood risks, project feasibility, and planned flood risk reduction capital projects. A list of targeted high-priority acquisitions should be prepared and annually updated. An example of a high-priority project would be a property identified by FEMA as a repetitive loss property. Once the list is established, pursue funding opportunities to implement the projects.					
Resource Stewardship / Planning / Central Services—	Community Development Block Grant / Federal Grants	High	Short-term, Ongoing	5, 9, 10	Yes, TC-FH-15
FMI-2 —Using the best available data on flood risk, conduct outreach to property owners to alert them to the risks and ways to deal with them, to inform them about potential opportunities to mitigate the risks, and to assess their interest in participation should funding be available. Property owners who are interested in participating in one of these programs should be informed that having flood insurance might help qualify them for funding assistance.					
Emergency Management / Resource Stewardship / Planning	Department Budgets	Low	Ongoing	3, 4, 10	No
FMI-3 —Continue a conservative approach to woody debris management and maintenance, using state- or County-established best management practices.					
Resource Stewardship / Emergency Management / Planning	Department Budgets	Low	Ongoing	1, 5, 9	No
FMI-4 —Continue to maintain compliance and good standing with the programmatic requirements of the National Flood Insurance Program.					
Resource Stewardship / Planning	Department budgets	Low	Ongoing	3, 4, 5, 8, 9, 10, 11	No
FMI-5 —Strive to maintain Thurston County’s Community Rating System classification of no higher than Class 5, as a primary measure of successful flood risk reduction.					
Planning	Department Budget	Low	Ongoing	3, 4, 5, 8, 9, 10, 11	Yes, TC-FH-1
FMI-6 —Expand multi-jurisdictional and multi-stakeholder coordination efforts and seek inter-local agreements or other contractual relationships in support of achieving long-term comprehensive flood risk reduction solutions, potentially in conjunction with salmon recovery efforts and regional flood risk reduction efforts.					
Emergency Management / Resource Stewardship / Planning	Department Budgets	Low	Ongoing	1, 2, 4, 5	No

**TABLE 9-5.
ACTION PLAN—FLOOD MITIGATION INITIATIVES (FMI)**

Lead Department	Possible Funding Sources or Resources	Estimated Project Cost	Time Line	Objectives	Covered in previous plan (Yes or No), Initiative #
FMI-7 —Undertake a feasibility study on the formation of a countywide flood control zone district. This study should focus on the following: <ul style="list-style-type: none"> • What are the capital costs of flood risk reduction projects within the county? • What would be the costs to the constituents of Thurston County to implement a flood control zone district? • How would this affect other Thurston County programs? • What would be the benefit to the constituents of Thurston County? • Recommendations for structure and organization of the district. 					
Planning / Resource Stewardship / Commissioners	County funding sources	High	2014-2018 short term	All objectives	No
FMI-8 —Analyze the findings of the flood control zone district feasibility report and determine if its recommendations should be adopted. Create a prioritized list of flood risk reduction projects and programs throughout the county that could be funded under this mechanism.					
Planning / Resource Stewardship / Commissioners	County funding sources	High	2018 – 2022 long term	All objectives	No
FMI-9 —Invest in flood prediction and forecast modeling to support all facets of the Thurston County floodplain management program, including but not limited to flood hazard identification, flood threat recognition in support of flood notification programs, climate change adaptation, and risk assessment.					
Resource Stewardship / Emergency Management	Department Budgets / Grants	Medium	2013 – 2015 (Short-term)	3, 4, 5, 6, 10, 11	Yes, TC-FH-23
FMI-10 —Complete an inventory of all publicly maintained stormwater facilities.					
Resource Stewardship / Public Works	Department budget	Medium	2013 – 2014 short term	3, 4, 5, 8, 9	No
FMI-11 —Create an inventory and establish a priority list for culvert replacement that takes into account fish passage, flood depth reduction and future losses avoided.					
Public Works / Resource Stewardship / Central Services – Geo Data	Department Budget	Low	2012 – 2013 short term	3, 4, 5, 8, 9	No
FMI-12 —Utilizing the best available data, science and technology, enhance the existing flood notification program, striving to identify a notification protocol within systems that have real-time flood threat recognition capability.					
Emergency Management	Department Budget / Grants	Medium	2013 – 2014 short term	2, 3, 6, 9, 10	Yes, TC-MH-4
FMI-13 —Update the County emergency response plan to reflect any changes to flood notification protocol within the county.					
Emergency Management	Department Budget / Grant	Medium	2013 – 2015 short term	1, 2, 3, 5, 6	Yes, TC-MH-4

**TABLE 9-5.
ACTION PLAN—FLOOD MITIGATION INITIATIVES (FMI)**

Lead Department	Possible Funding Sources or Resources	Estimated Project Cost	Time Line	Objectives	Covered in previous plan (Yes or No), Initiative #
FMI-14 —Utilizing the best available data, science and technology, maintain and enhance as data becomes available the Level 2, user-defined HAZUS-MH model that was constructed to support this planning effort.					
Emergency Management / Central Services – Geo Data	Department Budgets	Medium	2013-2014 short term	3, 4, 5, 8, 9, 10, 11	No
FMI-15 —Develop a post-flood disaster action plan that establishes protocols for the County such as substantial damage determination, the recording of perishable data (such as high water marks), grant support, staffing, continuity of operations, and recovery.					
Emergency Management / Public Works / Resource Stewardship	Department Budgets / Grant	Low	2013-2014 short term	1, 5, 9	No
FMI-16 —Perform a comprehensive assessment of floodplain restoration, reconnection and enhancement of floodplain storage opportunities in the county.					
Planning / Resource Stewardship	Grants	Medium	2013-2015 short term	3, 5, 8, 11	No
FMI-17 —Work with the County departments responsible for implementation and maintenance of the County’s capital improvements programs to identify flood hazard mitigation projects that are eligible for hazard mitigation grants. Once projects are identified, pursue grant funding for those projects shown to be cost-effective.					
Public Works / Resource Stewardship	Department Budgets	Low	2013 short term	1, 3, 9	No
FMI-18 —Collaborate with Pierce County and Tacoma Power to identify appropriate operational procedures of Alder Lake Dam that will minimize the flood risk on the Nisqually River.					
Emergency Management	Department Budget	Low	2013 – 2014 short term	1, 3, 5, 9, 10	Yes, TC-FH-25
FMI-19 —Continue to develop and implement an annual public outreach strategy that seeks to leverage public information resources and capabilities within the county.					
Emergency Management / Planning	Department Budget	Low	Ongoing	3, 5, 10	No
FMI-20 —Continue to pursue/ maintain Thurston County floodplain management program compliance with the National Marine Fisheries Service biological opinion regarding the National Flood Insurance Program.					
Planning / Resource Stewardship	Department Budget	Low	Ongoing	3, 4, 5, 8, 11	No

**TABLE 9-5.
ACTION PLAN—FLOOD MITIGATION INITIATIVES (FMI)**

Lead Department	Possible Funding Sources or Resources	Estimated Project Cost	Time Line	Objectives	Covered in previous plan (Yes or No), Initiative #
FMI-21 —Establish a link between the Thurston County Flood Hazard Mitigation Plan and the Natural Hazards Mitigation Plan for the Thurston Region. The Flood Hazard Mitigation Plan will become the flood hazard component of the Natural Hazards Mitigation Plan upon its next update. All future updates to the two plans will occur on the same planning cycle upon plan integration.					
Emergency Management, Thurston Regional Planning Council	Department Budgets, Grants, Thurston Regional Planning Council funds	Medium	2014 short term	1, 3, 5, 10	No
FMI-22 —Obtain digital data and create GIS maps of the flood inundation from possible failures of the Skookumchuck Dam on the Skookumchuck River and the Alder and LaGrande Dams on the Nisqually River. Using this data, assess the risk associated with these facilities utilizing the best available data and science.					
Emergency Management / Central Services – Geo Data	Grant	Medium	2014 – 2015 short term	1, 3, 4, 5, 9, 10	No
FMI-23 —Develop evacuation plans for communities and residents downstream from the Nisqually and Skookumchuck River dams.					
Emergency Management / Resource Stewardship / Public Works/ County Sheriff / Central Services – Geo Data	Grant and Local Match	Low	2013 – 2015 short term	1, 2, 6, 10	Yes, TC-FH-25
FMI-24 —Draft a prioritized list of road segments and bridges that should be elevated above the 100-year floodplain and culverts that will fail under flood flow. Upgrade these structures if state or federal funds become available.					
Public Works / Resource Stewardship / Central Services – Geo Data	Thurston County CIP, Grants	Low	2013 – 2015 short term	1, 3, 9	Yes, TC-FH-22
FMI-25 —Develop a southeast flood detour plan for the Thurston County Comprehensive Emergency Management Plan.					
Emergency Management / Public Works / Central Services – Geo Data	Emergency Management funds/Grants	Low	2013 – 2015 short term	6, 7, 9, 10	Yes, TC-FH-24
FMI-26 —Map the channel migration zones for all rivers in the region and the extent of high quality riparian habitat.					
Resource Stewardship / Central Services – Geo Data	Department Budgets/Grants	High	2013 – 2015 short-term, depends on funding	3, 4, 8, 11	Yes, TC-FH-8

**TABLE 9-5.
ACTION PLAN—FLOOD MITIGATION INITIATIVES (FMI)**

Lead Department	Possible Funding Sources or Resources	Estimated Project Cost	Time Line	Objectives	Covered in previous plan (Yes or No), Initiative #
FMI-27 —To support initiative # FMI-1, undertake a study of identified repetitive flood loss areas to determine the following: <ul style="list-style-type: none"> • Repetitive losses not captured by flood insurance data • Causes of the repetitive flooding • Assets impacted by the repetitive flooding (this would include assets such as livestock, out-buildings and rescue costs not already identified by FEMA) • Possible alternatives to remediate the repetitive flooding 					
Resource Stewardship / Planning	Department Budgets, Grants	Medium	2013 – 2018 long term, depends on funding	3, 4, 8, 9, 10, 11	Yes, TC-FH-21
FMI-28 —Revise shoreline regulations to encourage shoreline protective structures to be bioengineered.					
Resource Stewardship / Planning	Department Budgets, Grants	Low	2013-2015	3, 8, 11	Yes, TC-FH-11
FMI-29 —Review the recommendations of adopted stormwater drainage basin plans to determine which ones are still relevant for implementation.					
Resource Stewardship	Stormwater impact Fees and Grants	Medium	Ongoing	1, 4, 9, 11	Yes, TC-FH-20
FMI-30 —Prepare new drainage basin plans for the high groundwater areas.					
Resource Stewardship – Salmon Creek drainage basin is completed	Fees and Grants	Medium	2014 – 2018	3, 4, 9, 11	Yes, TC-FH-14
FMI-31 —To support implementation of the Thurston County Critical Areas Ordinance, encourage research that establishes best management practices for bioengineering and other techniques that provide streambank protection and improve fisheries through the use of large woody debris. Support local demonstration projects that could support such research.					
Resource Stewardship / Public Works / Thurston Conservation District / South Sound Salmon Enhancement Group	Grants	High	2013 – 2018 long term	3, 4, 9, 11	Yes, TC-FH-18
FMI-32 —Where feasible, consider the adoption of appropriate higher regulatory standards (including but not limited to freeboard, comp storage, lower substantial damage thresholds, setbacks and fill restrictions) as means to reduce future flood risk and support a no-adverse-impact philosophy of floodplain management.					
Resource Stewardship / Thurston County Board of Commissioners	Department Budgets	Low	Long-term	8, 9, 11	No

9.3 BENEFIT/COST REVIEW

The action plan is prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (CRS Step 8). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.
- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, Thurston County may seek financial assistance under the FEMA HMGP or Hazard Mitigation Assistance programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, Thurston County reserves the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

9.4 ACTION PLAN PRIORITIZATION

Table 9-6 lists the priority of each initiative as assigned by the planning team, using the same parameters used in selecting the initiatives. A qualitative benefit-cost review was performed for each of these initiatives. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives, has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for a grant program. High priority projects can be completed in the short term (1 to 5 years). The key factors for high priority projects are that they have funding secured and can be completed in the short term.

**TABLE 9-6.
PRIORITIZATION OF MITIGATION INITIATIVES**

Initiative	# of Objectives Met	Benefits	Costs	Do Benefits equal or exceed Costs?	Is project Grant eligible?	Can Project be funded under existing programs/ budgets?	Priority (High, Med., Low)
FMI-1	3	High	High	Yes	Yes	No	Medium
FMI-2	3	Low	Low	Yes	No	Yes	High
FMI-3	3	Medium	Low	Yes	No	Yes	High
FMI-4	7	Medium	Low	Yes	No	Yes	High
FMI-5	7	Medium	Low	Yes	No	Yes	High
FMI-6	4	High	Low	Yes	No	Yes	High
FMI-7	11	High	High	Yes	No	No	Medium
FMI-8	11	High	High	Yes	No	No	Medium
FMI-9	6	High	Medium	Yes	Yes	Yes	High
FMI-10	5	Medium	Medium	Yes	No	Yes	High
FMI-11	5	High	Low	Yes	Yes	Yes	High
FMI-12	5	High	Medium	Yes	Yes	Yes	High
FMI-13	5	High	Medium	Yes	Yes	Yes	High
FMI-14	7	Medium	Medium	Yes	Yes	Yes	High
FMI-15	3	Medium	Low	Yes	No	No	Medium
FMI-16	4	Medium	Medium	Yes	No	No	Medium
FMI-17	3	Medium	Low	Yes	No	Yes	High
FMI-18	5	High	Low	Yes	No	Yes	High
FMI-19	3	Low	Low	Yes	No	Yes	High
FMI-20	5	Low	Low	Yes	No	Yes	High
FMI-21	4	Medium	Medium	Yes	Yes	Yes	High
FMI-22	6	High	Medium	Yes	No	Yes	High
FMI-23	4	High	Low	Yes	No	Yes	High
FMI-24	3	Medium	Low	Yes	No	Yes	High
FMI-25	4	High	Low	Yes	No	Yes	High
FMI-26	4	High	High	Yes	No	No	Medium
FMI-27	6	Medium	Medium	Yes	Yes	No	Medium
FMI-28	3	Medium	Low	Yes	No	Yes	High
FMI-29	4	Medium	Medium	Yes	No	Yes	High
FMI-30	4	Medium	Medium	Yes	No	Yes	High
FMI-31	4	High	High	Yes	No	No	Medium
FMI-32	3	High	Low	Yes	No	Yes	Medium

- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured. The key factors for medium priority projects are that they are eligible for funding, but do not yet have funding secured, and they can be completed within the short term.
- **Low Priority**—A project that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for FEMA grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for grant funding from other programs. Low priority projects are “blue-sky” projects. How they will be financed is unknown, and they can be completed over a long term.

9.5 ANALYSIS OF MITIGATION INITIATIVES

Each recommended initiatives was classified based on the hazard it addresses and the type of mitigation it involves. Mitigation types used for this categorization are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform citizens and elected officials about flood hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

Table 9-7 presents the results of this analysis.

**TABLE 9-7.
ANALYSIS OF MITIGATION INITIATIVES**

Mitigation Type	Applicable Mitigation Initiatives (FMI #'s)
1. Prevention	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 17, 21, 22, 24, 26, 27, 28, 29, 30, 32
2. Property Protection	4, 5, 7, 8
3. Public Education and Awareness	2, 4, 5, 6, 7, 8, 14, 19
4. Natural Resource Protection	3, 5, 6, 7, 8, 16, 20, 28, 31
5. Emergency Services	5, 6, 7, 8, 9, 12, 13, 14, 15, 18, 22, 23, 25
6. Structural Projects	6, 7, 8, 11, 16, 17, 24

PART 4 — PLAN MAINTENANCE

CHAPTER 10. PLAN ADOPTION

This chapter documents formal adoption of the Thurston County Flood Hazard Mitigation Plan by Thurston County's governing body (CRS Step 9). The Thurston County Board of Commissioners adopted the plan on December 11, 2012. Thurston County will formally adopt the plan. A copy of the resolution is provided in Figure 10-1.

RESOLUTION No. 14822

A RESOLUTION approving and adopting the Thurston County Comprehensive Flood Hazard Mitigation Plan.

WHEREAS, Thurston County participates in the National Flood Insurance Program; and

WHEREAS, Thurston County participates in the Nation Flood Insurance Program's Community Rating System (CRS); and

WHEREAS, Thurston County currently is rated as a Class 5 community in the CRS program, which results in a 25% reduction in flood insurance premiums for property owners located in the County's floodplains; and

WHEREAS, Thurston County qualifies for a Class 3 rating, which provides a 35% reduction in flood insurance premiums, but is unable to attain it without revising its Comprehensive Flood Hazard Mitigation Plan; and

WHEREAS, the revised Comprehensive Flood Hazard Mitigation Plan meets the CRS program's pre-requisites for an improved rating over Class 5 in the Community Rating System; and

WHEREAS, the revised Comprehensive Flood Hazard Mitigation Plan is intended to reduce private and public property damages due to future floods; and

WHEREAS, the Board of County Commissioners has had an opportunity to review the Comprehensive Flood Hazard Mitigation Plan, and finds that it is in the best interest of Thurston County to adopt the Plan;

NOW, THEREFORE, BE IT RESOLVED that the Board of County Commissioners approves the Comprehensive Flood Hazard Mitigation Plan as shown in attachment A.

ADOPTED: December 11, 2012

ATTEST:

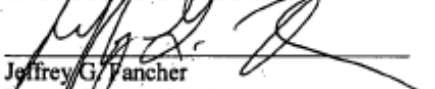

Clerk of the Board

BOARD OF COUNTY COMMISSIONERS
Thurston County, Washington


Chair

APPROVED AS TO FORM:

JON TUNHEIM
PROSECUTING ATTORNEY


Jeffrey G. Vancher
Deputy Prosecuting Attorney


Vice-Chair


Commissioner

Figure 10-1. Resolution Adopting Flood Hazard Mitigation Plan

CHAPTER 11.

PLAN MAINTENANCE STRATEGY

This chapter presents a plan maintenance process that includes the following (CRS Step 10):

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan over a 5-year cycle
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A discussion on how the community will continue public participation in the plan maintenance process.

The plan maintenance strategy is the formal process that will ensure that the flood hazard mitigation plan remains an active and relevant document and that Thurston County maintains its eligibility for applicable funding sources. It includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. The strategy also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

11.1.1 Plan Implementation

The effectiveness of the flood hazard mitigation plan depends on its implementation and incorporation of its action items into existing local plans, policies and programs. Together, the action items in the Plan provide a framework for activities that Thurston County can implement over the next 5 years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation initiatives that will be implemented through existing plans, policies, and programs.

The Thurston County Planning Department's Natural Resources Program will have lead responsibility for overseeing the plan implementation and maintenance strategy. Plan implementation and evaluation will be a shared responsibility among all agencies identified as lead agencies in the mitigation action plan.

11.1.2 Steering Committee

The Steering Committee is a total volunteer body that oversaw the development of the Plan and made recommendations on key elements of the plan, including the maintenance strategy. It was the Steering Committee's position that an oversight committee with representation similar to that of the Steering Committee should have an active role in the Plan maintenance strategy. Therefore, it is recommended that a steering committee remain a viable body involved in key elements of the Plan maintenance strategy. The new steering committee should include representation from stakeholders in the planning area.

The principal role of a steering committee in this plan maintenance strategy will be to review the annual progress report and provide input to the Thurston County Planning Department on possible enhancements to be considered at the next update. Future plan updates will be overseen by a steering committee similar to the one that participated in this plan development process, so keeping an interim steering committee

intact will provide a head start on future updates. It will be the steering committee's role to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

11.1.3 Annual Progress Report

The minimum task of the ongoing annual steering committee meeting will be the evaluation of the progress of its individual action plan during a 12-month performance period. This review will include the following:

- Summary of any flood hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation.

The planning team has created a template for preparing a progress report (see Appendix D). The plan maintenance steering committee will provide feedback to the planning team on items included in the template. The planning team will then prepare a formal annual report on the progress of the plan. This report should be used as follows:

- Posted on the Natural Resources Program website page dedicated to the flood hazard mitigation plan
- Provided to the local media through a press release
- Presented to the Thurston County Commissioners to inform them of the progress of mitigation initiatives implemented during the reporting period
- Provided as part of the CRS annual re-certification package. The CRS requires an annual recertification to be submitted by October 1 of every calendar year for which the community has not received a formal audit. To meet this recertification timeline, the planning team will strive to complete progress reports between June and September each year.

Annual progress reporting is credited under CRS Step 10.

11.1.4 Plan Update

Thurston County intends to update the flood hazard mitigation plan on a 5-year cycle from the date of initial plan adoption (CRS Step 10). This cycle may be accelerated to less than 5 years based on the following triggers:

- A Presidential Disaster Declaration that impacts the planning area
- A hazard event that causes loss of life
- A comprehensive update of Thurston County comprehensive plan.

It will not be the intent of future updates to develop a complete new flood hazard mitigation plan for the planning area. The update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any initiatives completed, dropped, or changed and to account for changes in the risk assessment or new policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The Thurston County Board of Commissioners will adopt the updated plan.

It is Thurston County's intention to fully integrate this Flood Hazard Mitigation Plan into the Natural Hazards Mitigation Plan for the Thurston Region at some time. This will allow for a uniform update cycle for both plans and eliminate redundant planning.

11.1.5 Continuing Public Involvement

The public will continue to be apprised of the plan's progress through the Natural Resources Program website and by providing copies of annual progress reports to the media. The website will not only house the final plan, it will become the one-stop shop for information regarding the plan and plan implementation. Copies of the plan will be distributed to the Thurston County library system. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of Thurston County at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

11.1.6 Incorporation into Other Planning Mechanisms

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time this plan was prepared. The Thurston County Comprehensive Plan is considered to be an integral part of this plan. Thurston County, through adoption of a comprehensive plan and zoning ordinance, has planned for the impact of flooding. The plan development process provided the opportunity to review and expand on policies in these planning mechanisms. The comprehensive plan and the flood hazard mitigation plan are complementary documents that work together to achieve the goal of reducing risk exposure. An update to a comprehensive plan may trigger an update to the flood hazard mitigation plan.

Thurston County will create a linkage between the flood hazard mitigation plan and the comprehensive plan by identifying a mitigation initiative as such and giving that initiative a high priority. Other planning processes and programs to be coordinated with the recommendations of the flood hazard mitigation plan include the following:

- Natural Hazards Mitigation Plan for the Thurston Region
- Emergency response plans
- Capital improvement programs
- Municipal codes

- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

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APPENDIX A.
ACRONYMS AND DEFINITIONS

APPENDIX A. ACRONYMS AND DEFINITIONS

ACRONYMS

CIP—Capital Improvement Plan
CRS—Community Rating System
DHS—Department of Homeland Security
DMA —Disaster Mitigation Act
EPA—U.S. Environmental Protection Agency
ESA—Endangered Species Act
FEMA—Federal Emergency Management Agency
FIRM—Flood Insurance Rate Map
GIS—Geographic Information System
HAZUS-MH—Hazards, United States-Multi Hazard
HMGP—Hazard Mitigation Grant Program
IBC—International Building Code
IRC—International Residential Code
LIDAR—Light Detection and Ranging
NFIP—National Flood Insurance Program
NOAA—National Oceanic and Atmospheric Administration
NWS—National Weather Service
SFHA—Special Flood Hazard Area
TRPC—Thurston Regional Planning Council
UGA—Urban Growth Area

DEFINITIONS

100-Year Flood: The term “100-year flood” can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program.

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre

foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Asset: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the “100-year” or “1% chance” flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as “watersheds” and “drainage basins.”

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation initiatives, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community’s current capacity to address threats associated with flooding. The assessment includes two components: an inventory of an agency’s mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community’s actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Community Rating System (CRS): The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: A critical facility is one that is deemed vital to the Thurston County planning area’s ability to provide essential services while protecting life and property. A critical facility may be a system

or an asset, either physical or virtual, the loss of which would have a profound impact on the security, economy, public health or safety, environment, or any combination of thereof, across the planning area. For the purposes of the Thurston County Flood Hazard Mitigation Plan, the following types of systems and assets are defined as critical facilities:

- Police stations, fire stations, paramedic stations, emergency vehicle and equipment storage facilities, and emergency operations and communications centers needed for disaster response before, during, and after hazard events.
- Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events. These include water (potable, wastewater, storm water, drainage and irrigation), utilities (transmission and distribution facilities for natural gas, power, geothermal) and communications (land-based telephone, cell phone, the internet emergency broadcast facilities and emergency radios).
- Public gathering places that could be utilized as evacuation centers during large scale disasters.
- Hospitals, extended care facilities, urgent care facilities and housing that may contain occupants not sufficiently mobile to avoid death or injury during a hazard event
- Transportation systems that convey vital supplies and services to, through and throughout the community. These include roads, bridges, railways, airports and pipelines
- Government and educational facilities central to governance and quality of life along with response and recovery actions taken as a result of a hazard event
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials.
- Infrastructure designed to help safely convey high water events from the event source to the perimeter of the planning area including but not limited to; dams, revetments and stormwater drainage facilities.
- Debris management and solid waste facilities

Drainage Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Economically Disadvantaged Populations: Households with household incomes of \$15,000 or less.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area.

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance rate Map. The study contains such

background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area.

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a flood hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation initiatives after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards U.S. Multi-Hazard (HAZUS-MH) Loss Estimation Program: HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUS-MH software program assesses risk in a quantitative manner to estimate damage and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards.

Hydraulics: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Initiatives: Mitigation initiatives are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of \$1000.00; or
- Two paid flood losses in excess of \$1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Return Period (or Mean Return Period): This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Stream Bank Erosion: Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are "bad" and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damage, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric

substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Watershed: A watershed is an area that drains down-gradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

APPENDIX B.
CRS AND FCAAP GUIDELINES FOR FLOOD PLANNING

APPENDIX B.

CRS AND FCAAP GUIDELINES FOR FLOOD PLANNING

COMMUNITY RATING SYSTEM PLANNING PROCESS GUIDELINES

A. FLOODPLAIN MANAGEMENT PLANNING

1. Organize to prepare the plan (Maximum credit: 10 points). The credit for this step is the total of the following points, which are based on how the community organizes to prepare its floodplain management plan:

- (a) if the planning process is under the supervision or direction of a professional planner;
- (b) if the planning process is conducted through a committee composed of staff from those community departments that will be implementing the majority of the plan's recommendations;
- (c) if the planning process and/or the committee are formally created or recognized by action of the community's governing board.

The plan document must discuss how it was prepared, who was involved in the planning process, and how the public was involved during the planning process. (REQUIRED) When a multi-jurisdictional plan is prepared, at least one representative from each community seeking CRS credit must be involved on the planning committee that is credited under item (b).

2. Involve the public (Maximum credit: 85 points). The planning process must include an opportunity for the public to comment on the plan during the drafting stage and before plan approval (REQUIRED). The term "public" includes residents, businesses, property owners, and tenants in the floodplain and other known hazard areas as well as other stakeholders in the community, such as business leaders, civic groups, academia, non-profit organizations, and major employers. The credit for this step is the total of the following points based on how the community involves the public during the planning process.

- (a) if the planning process is conducted through a planning committee that includes members of the public. If this is the same planning committee credited under step 1, items (b) and (c), at least one half of the members must be representatives of the public, including residents, businesses, or property owners from the flood-prone areas. The committee must hold a sufficient number of meetings that involve the members in planning steps 4 through 9 (e.g., at least one meeting on each step).
- (b) if one or more public information meetings are held in the affected area(s) at the beginning of the planning process to obtain public input on the natural hazards, problems, and possible solutions. At least one meeting must be held separate from the planning committee meetings in item (a).
- (c) for holding at least one public meeting to obtain input on the draft plan. The meeting must be at the end of the planning process, at least two weeks before submittal of the recommended plan to the community's governing body.
- (d) if questionnaires are distributed asking the public for information on their natural hazards, problems, and possible solutions. The questionnaires must be distributed to at least 90% of the floodplain residents.

- (e) if written comments and recommendations are solicited from neighborhood advisory groups, homeowners' associations, parent-teacher organizations, the Chamber of Commerce, or similar organizations that represent the public in the affected area(s).
- (f) if other public information activities are implemented to explain the planning process and encourage input to the planner or planning committee.

3. Coordinate (Maximum credit: 25 points). Other agencies and organizations must be contacted to see if they are doing anything that may affect the community's program and to see if they could support the community's efforts.

Examples of "other agencies and organizations" include neighboring communities; local, regional, state, and federal agencies; and businesses, academia, and other private and non-profit organizations affected by the hazards or involved in hazard mitigation or floodplain management. The credit for this step is the total of the following points. To receive credit for this step, the coordination must include items (a) and (b).

- (a) if the planning includes a review of existing studies, reports, and technical information and of the community's needs, goals, and plans for the area. (REQUIRED)
- (b) if neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests are given an opportunity to be involved in the planning process. (REQUIRED)
- (c) if neighboring communities, the state NFIP Coordinator, the state water resources agency, the county and state emergency management agency, the FEMA Regional Office, and (where appropriate) the state's coastal zone management agency are contacted at the beginning of the planning process to see if they are doing anything that may affect the community's program and to see how they can support the community's efforts.
- (d) if other governmental and nongovernmental organizations, such as the National Weather Service, Red Cross, homebuilders association, and environmental groups are contacted at the beginning of the planning process to see if they are doing anything that may affect the community's program and to see how they can support the community's efforts.
- (e) if the coordination effort includes holding meetings with representatives of the other agencies and organizations to review common problems, development policies, mitigation strategies, inconsistencies, and conflicts in policies, plans, programs, and regulations.
- (f) for sending the draft action plan to the other agencies and organizations contacted under items (b), (c), (d), and (e) and asking them to comment by a certain date.

4. Assess the hazard (Maximum credit: 20 points). The credit for this step is the total of the following points based on what the community includes in its assessment of the hazard. To receive CRS credit for this step, the assessment must include item (a). If the community wants the plan to also qualify as a FEMA multi-hazard mitigation plan, item (b) must also be completed.

- (a) for including an assessment of the flood hazard in the plan. If the community is a Category B or C repetitive loss community, this step must cover all of its repetitive loss areas (REQUIRED). The assessment must include at least one of the following items:
 - (1) a map of the known flood hazards. "Known flood hazards" means the floodplain shown on the Flood Insurance Rate Map (FIRM), repetitive loss areas, areas not mapped on the FIRM that have flooded in the past, and surface flooding identified in existing studies. No new studies need to be conducted for this assessment.

- (2) a description of the known flood hazards, including source of water, depth of flooding, velocities, and warning time.
- (3) a discussion of past floods.
- (b) if the plan includes a map, description of the magnitude or severity, history, and probability of future events for other natural hazards, such as erosion, tsunamis, earthquakes, and hurricanes. The plan should include all natural hazards that affect the community. At a minimum, it should include those hazards identified by the state's hazard mitigation plan. (REQUIRED FOR PLANS TO BE CREDITED UNDER THE DISASTER MITIGATION ACT OF 2000)

5. Assess the problem (Maximum credit: 35 points) The credit for this step is the total of the following points, based on what is included in the assessment of the vulnerability of the community to the hazards identified in the previous hazard assessment step. To receive credit for this step, the assessment must include item (a) and must evaluate the hazard data in light of their impact on the community. Simply listing data, such as the names of the critical facilities or the number of flood insurance claims, will not suffice for credit.

- (a) if the plan includes an overall summary of the jurisdiction's vulnerability to each hazard identified in the hazard assessment (step 4) and the impact on the community. (required)
- (b) if the plan includes a description of the impact that the hazards identified in the hazard assessment (step 4) have on: (1) life, safety, and health and the need and procedures for warning and evacuating residents and visitors. (5 points) (2) critical facilities and infrastructure. (5 points) (3) the community's economy and tax base. (5 points)
- (c) for including the number and types of buildings subject to the hazards identified in the hazard assessment.
- (d) if the assessment includes a review of all properties that have received flood insurance claims (in addition to the repetitive loss properties) or an estimate of the potential dollar losses to vulnerable structures.
- (e) if the plan describes areas that provide natural and beneficial functions, such as wetlands, riparian areas, sensitive areas, and habitat for rare or endangered species.
- (f) if the plan includes a description of development, redevelopment, and population trends and a discussion of what the future brings for development and redevelopment in the community, the watershed, and natural resource areas.

When a multi-jurisdictional plan is prepared, the critical facilities, building counts, and similar data must be presented for each community.

6. Set goals (Maximum credit: 2 points). The two credit points for this step are provided if the plan includes a statement of the goals of the community's floodplain management or hazard mitigation program. (REQUIRED)

7. Review possible activities (Maximum credit: 30 points) The plan must describe those activities that were considered and note why they were or were not recommended (e.g., they were not cost-effective or they did not support the community's goals). (REQUIRED)

If an activity is currently being implemented, the plan must note whether it should be modified. The discussion of each activity needs to be detailed enough to be useful to the lay reader. The credit for this step is the total of the following points based on which floodplain management or hazard mitigation activities are reviewed in the plan.

- (a) if the plan reviews preventive activities, such as zoning, stormwater management regulations, building codes, and preservation of open space and the effectiveness of current regulatory and preventive standards and programs;
- (b) if the plan reviews property protection activities, such as acquisition, retrofitting, and flood insurance;
- (c) if the plan reviews activities to protect the natural and beneficial functions of the floodplain, such as wetlands protection;
- (d) if the plan reviews emergency services activities, such as warning and sandbagging;
- (e) if the plan reviews structural projects, such as reservoirs and channel modifications; and
- (f) if the plan reviews public information activities, such as outreach projects and environmental education programs.

8. Draft an action plan (Maximum credit: 70 points). The action plan specifies those activities appropriate to the community's resources, hazards, and vulnerable properties.

For each recommendation, the action plan must identify who does what, when it will be done, and how it will be financed. The actions must be prioritized and include a review of the benefits of the proposed projects and their associated costs. (REQUIRED) A multi-hazard mitigation plan must identify actions that address both existing and new infrastructure and buildings. The credit for this step is based on what is included in the action plan. Credit is provided for a recommendation on floodplain regulations, provided it recommends a regulatory standard that exceeds the minimum requirements of the NFIP.

- (a) if the action plan includes flood-related recommendations for activities from two of the six categories credited in step 7, Review possible activities.
- (b) if the action plan includes flood-related recommendations for activities from three of the six categories credited in step 7, Review possible activities.
- (c) if the action plan includes flood-related recommendations for activities from four of the six categories credited in step 7, Review possible activities.
- (d) if the action plan includes flood-related recommendations for activities from five of the six categories credited in step 7, Review possible activities.
- (e) additional points are provided if the action plan establishes post-disaster mitigation policies and procedures.
- (f) additional points are provided if the action plan's recommended natural resource protection activities include recommendations from a Regional Habitat Conservation Plan as credited under Section 511.c.
- (g) additional points are provided if the plan includes action items (other than public information activities) to mitigate the effects of the other natural hazards identified in the hazard assessment (step 4, item (b)).

If the plan calls for acquiring properties, there must be a discussion of how the project(s) will be managed and how the land will be reused. When a multi-jurisdictional plan is prepared, it must have action items from at least two of the six categories that directly benefit each community seeking CRS credit.

9. Adopt the plan (Maximum credit: 2 points) The 2 credit points for this step are provided if the plan and later amendments are officially adopted by the community's governing body. (REQUIRED)

When a multi-jurisdictional plan is prepared, it must be adopted by the governing board of each community seeking CRS or multi-hazard mitigation plan credit.

10. Implement, evaluate, and revise (Maximum credit: 15 points) The credit for this step is the total of the following points based on how the community monitors and evaluates its plan.

- (a) if the community has procedures for monitoring implementation, reviewing progress, and recommending revisions to the plan in an annual evaluation report. The report must be submitted to the governing body, released to the media and made available to the public. (REQUIRED)
- (b) if the evaluation report is prepared by the same planning committee that prepared the plan that is credited in step 2(a) or by a successor committee with a similar membership that was created to replace the planning committee and charged with monitoring and evaluating implementation of the plan.

To maintain this credit, the community must submit a copy of its annual evaluation report with its recertification each year and update the plan at least every five years.

B. REPETITIVE LOSS AREA ANALYSIS

Up to 50 points are provided for conducting area analyses of all of the community's repetitive loss areas. An area analysis is prepared according to the following criteria:

- 1. All repetitive loss areas must be mapped as described in Section 503.b. If the community does not conduct an analysis of all the areas, it will be reflected through the impact adjustment in Section 512.
- 2. Data must be collected on each building in the area(s) using the "limited data view" of the National Flood Mitigation Data Collection Tool. The database file created by the National Flood Mitigation Data Collection Tool must be made available to FEMA and the state, upon request.
- 3. A five-step process must be followed. The steps do not have to be done in the order listed.
 - Step 1. Advise all the property owners in the repetitive loss areas that the analysis will be conducted. This must be sent directly to each property owner and cannot be done via a newspaper or newsletter notice or article.
 - Step 2. Collect data on each building and determine the cause(s) of the repetitive damage.
 - Step 3. Review alternative approaches and determine whether any property protection measures or drainage improvements are feasible. The review must look at all of the property protection measures listed in Figure 510-2 that are appropriate for the types of buildings affected.
 - Step 4. Contact agencies or organizations that may have plans that could affect the cause or impacts of the flooding.
 - Step 5. Document the findings, including a map showing all parcels in the area, recommendations, and how the recommendations will be funded.

- 4. Each area analysis document must be approved by the head of the appropriate community department. It does not have to be circulated to or adopted by the community's governing board, but it does have to be made available to any inquirer, including residents of the repetitive loss area(s).
- 5. The community must prepare an annual report on progress toward implementing the recommendations.

C. HABITAT CONSERVATION PLAN

If the community has adopted a regional Habitat Conservation Plan or other plan that explains and recommends actions to protect rare, threatened, or endangered aquatic or riparian species. The plan must have been adopted by the community's governing board and there must be documentation that the plan is being implemented. The plan must identify:

- the species in need of protection,
- the impact of new development on their habitat,
- alternative actions that could be taken to protect that habitat,
- what actions are recommended to protect that habitat and why they were selected from the alternatives, and
- how the recommendations will be funded.

If the plan has also been accepted as a Habitat Conservation Plan by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

FLOOD CONTROL ASSISTANCE ACCOUNT PROGRAM GUIDELINES

(1) Determination of the need for flood control work.

- (a) Description of the watershed;
- (b) Identification of types of watershed flood problems;
- (c) Location and identification of specific problem areas;
- (d) Description of flood damage history;
- (e) Description of potential flood damage;
- (f) Short-term and long-term goals and objectives for the planning area;
- (g) Description of rules that apply within the watershed including, but not limited to, local shoreline management master programs, and zoning, subdivision, and flood hazard ordinances;
- (h) Determination that the in-stream flood control work is consistent with applicable policies and rules.

(2) Alternative flood control work.

- (a) Description of potential measures of in-stream flood control work;
- (b) Description of alternatives to in-stream flood control work.

(3) Identification and consideration of potential impacts of in-stream flood control work on the following in-stream uses and resources.

- (a) Fish resources;
- (b) Wildlife resources;
- (c) Scenic, aesthetic, and historic resources;
- (d) Navigation;
- (e) Water quality;
- (f) Hydrology;
- (g) Existing recreation;
- (h) Other impacts.

(4) Area of coverage for the comprehensive plan shall include, as a minimum, the area of the one-hundred-year frequency flood plain within a reach of the watershed of sufficient length to ensure that a comprehensive evaluation can be made of the flood problems for a specific reach of the watershed. The plan may or may not include an entire watershed. Comprehensive plans shall also include flood hazard areas not subject to riverine flooding such as areas subject to coastal flooding, flash flooding, or flooding from inadequate drainage. Either the meander belt or floodway must be identified on aerial photographs or maps that will be included with the plan.

(5) Conclusion and proposed solution(s). The Comprehensive Flood Control Management Plan must be finalized by the following action from the appropriate local authority:

- (a) Evaluation of problems and needs;
- (b) Evaluation of alternative solutions;
- (c) Recommended corrective action with proposed impact resolution measures for resource losses; and
- (d) Corrective action priority.

(6) A certification from the state department of community, trade, and economic development that the local emergency management organization is administering an acceptable comprehensive emergency operations plan

APPENDIX C.
PUBLIC OUTREACH MATERIALS

**APPENDIX C.
PUBLIC OUTREACH MATERIALS**

APPENDIX D.
EXAMPLE PROGRESS REPORT

APPENDIX D. EXAMPLE PROGRESS REPORT

Thurston County, WA Flood Hazard Mitigation Plan Annual Progress Report

Reporting Period: *(Insert reporting period)*

Background: Thurston County developed a flood hazard mitigation plan to reduce risk from flooding by identifying resources, information, and strategies for risk reduction. To prepare the plan, Thurston County organized resources, assessed risks from flooding, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from floods. Stafford Act. The plan can be viewed on-line at:

<http://www.co.thurston.wa.us/planning/natural-res/natural-floodplan-update.htm>

Summary Overview of the Plan's Progress: The performance period for the Hazard Mitigation Plan became effective on [REDACTED], 2012, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before [REDACTED], 2017. As of this reporting period, the performance period for this plan is considered to be [REDACTED]% complete. The Flood Hazard Mitigation Plan has targeted 32 flood hazard mitigation initiatives to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- ___ out of ___ initiatives (___%) reported ongoing action toward completion.
- ___ out of ___ initiatives (___%) were reported as being complete.
- ___ out of ___ initiatives (___%) reported no action taken.

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the Thurston County Flood Hazard Mitigation Plan. The objective is to ensure that there is a continuing and responsive planning process that will keep the Hazard Mitigation Plan dynamic and responsive to the needs and capabilities of Thurston County and stakeholders. This report discusses the following:

- Flood events that have occurred within the last year
- Changes in risk exposure within the planning area (all of Thurston County)
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement.

The Flood Hazard Mitigation Plan Steering Committee: The Flood Hazard Mitigation Plan Steering Committee, made up of stakeholders within the planning area, reviewed and approved this

progress report at its annual meeting held on [REDACTED], 201[REDACTED]. It was determined through the plan's development process that a steering committee would remain in service to oversee maintenance of the plan. At a minimum, the Steering Committee will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the Steering Committee membership is as indicated in Table 1.

[illegible]

Flood Events within the Planning Area: During the reporting period, there were __ flood events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

- _____
- _____

Changes in Risk Exposure in the Planning Area: *(Insert brief overview of any flood event in the planning area that changed the probability of occurrence of flooding as presented in the flood hazard mitigation plan)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

Review of the Action Plan: Table 2 reviews the action plan, reporting the status of each initiative. Reviewers of this report should refer to the Flood Hazard Mitigation Plan for more detailed descriptions of each initiative and the prioritization process.

Address the following in the “status” column of the following table:

- Was any element of the initiative carried out during the reporting period?
- If no action was completed, why?
- Is the timeline for implementation for the initiative still appropriate?
- If the initiative was completed, does it need to be changed or removed from the action plan?

TABLE 2. ACTION PLAN MATRIX				
Action Taken? (Yes or No)	Time Line	Priority	Status	Status (X, O,✓)
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	
Initiative # __—			[description]	

TABLE 2. ACTION PLAN MATRIX				
Action Taken? (Yes or No)	Time Line	Priority	Status	Status (X, O,✓)
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Initiative #__—			[description]	
Completion status legend: ✓ = Project Completed O = Action ongoing toward completion X = No progress at this time				

Changes That May Impact Implementation of the Plan: *(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)*

Recommendations for Changes or Enhancements: Based on the review of this report by the Hazard Mitigation Plan Steering Committee, the following recommendations will be noted for future updates or revisions to the plan:

- _____
- _____
- _____
- _____
- _____
- _____

Public review notice: *The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the Thurston County governing board and to local media outlets and the report is posted on the Thurston County Flood Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

Mark J. Swartout, CFM
Natural Resources Program Mgr.
Thurston County, Planning Dept.
2000 Lakeridge Dr. SW /Bldg. 1 / Room 225
Olympia, WA 98502
Phone - 360-709-3079
FAX 360-754-2939
swartom@co.thurston.wa.us

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfip>.



 SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

 FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood height.


 OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

 **COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

 OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

0.2% Annual Chance Floodplain Boundary

_____ Floodway boundary

_____ Zone B boundary

..... CBRS and OPA boundary

 Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations

~~~~~ 513 ~~~~~ Base Flood Elevation line and value; elevation in feet\*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet\*

\*Referenced to the North American Vertical Datum of 1988

[illegible]

45° 02' 08" 93° 02' 12" Geographic coordinates referenced to the North American Datum of

3100000 FT 5000-foot ticks: Washington State Plane South Zone

<sup>49</sup>89<sup>0000m</sup> N 1000-meter Universal Transverse Mercator grid values, zone 10N

DX5510 X benchmark (see explanation in NOTES to Users section of this FIRM panel)

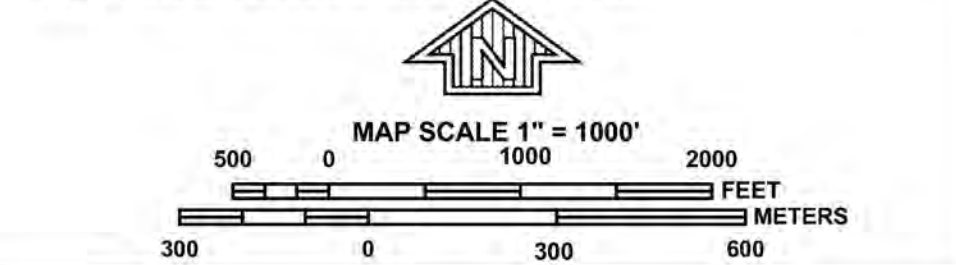
MAP REPOSITORIES  
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE  
FLOOD INSURANCE RATE MAP

October 16, 2012

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.





**FEBRUARY 14, 2020**

# Tacoma Power's efforts during Thurston County flooding



In mid-December 2019, a series of storms hit Washington state, and continued into the New Year. The most recent and largest of these storms occurred February 6, 2020, and resulted in flooding on 13 rivers throughout the state, including major flooding on the

Snoqualmie River, the Cedar River, and the upper Cowlitz River.

To accommodate the additional river volume from these storms, Tacoma Power's hydroelectric facility known as the Nisqually River Project needed to generate at maximum capacity for several weeks. By late January, the water volume in the Alder Lake reservoir behind the dam was so high that Tacoma Power needed to spill some of the excess water to preserve storage space for additional rain.

Then on February 6 as the largest storm hit, river flows into Alder Lake increased dramatically and Tacoma Power was able to use that additional storage space at Alder Lake to collect a portion of the increased flows to reduce downstream flooding substantially. Without the use of Alder Lake's additional storage, downstream flows would have been 25% higher.

That same day, Washington state's Lt. Gov. Cyrus Habib issued an emergency proclamation for 19 counties, including Pierce, Thurston and King, noting damages to roadways, injuries, widespread power outages, and rail line closures as examples of issues caused by the series of storms. Thurston County also encouraged 1,000 area residents to evacuate as the storm continued into the weekend.

Throughout the storm, Tacoma Power staff closely monitored the flooding and were in regular contact with state, federal and tribal emergency management agencies. In spite of Alder Lake's relatively small size, the team worked tirelessly to maximize the use of reservoir storage to reduce downstream flooding, and conditions in the area would have been much worse without their efforts.

The flooding caused by the storms throughout the area affected many local residents, and Thurston County Emergency Management offers resources for community members [on their website](#).

## Was this page helpful?

YES

NO



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**253-502-8600**

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