

Executive Summary

1.0 Introduction

The Stillaguamish River basin encompasses 684 square-miles in northern Snohomish and southern Skagit counties. This Stillaguamish River Comprehensive Flood Hazard Management Plan (Stilly Flood Plan) evaluates flood hazards in the Stillaguamish River basin and identifies flood hazard mitigation opportunities.

2.0 Floods and Flood Hazards

The Stillaguamish River basin is composed of three subbasins including the North Fork, South Fork, and Mainstem. Flooding in the Stillaguamish River primarily occurs between November and February each year. These events generally occur when warm wind and rains follow heavy snowfall in the mountains. These events usually occur between 1,000 and 3,000 feet above sea level in an area known as the rain-on-snow zone. These “rain-on-snow” events cause the river to rise rapidly and result in fast flows. Almost one-half of the North Fork and South Fork subbasins each is considered to be in this transition zone.

These fast flows lead to accelerated bank erosion and increased sediment transport issues in the upper basin with inundation (deep, slower flows) of farmlands on the mainstem. The fast flows increase the potential of dramatic channel changes (i.e., avulsion), rapid or accelerated loss of riverbank (hundreds of feet can be lost to the river in one flood event), and cause large amounts of debris to be swept into the river. In addition, sediment transported down the river can build up around constrictions, such as bridges, increasing maintenance requirements.

The actions developed in this comprehensive flood plan address flood hazards resulting from potential causes of flooding in the Stillaguamish River basin, address immediate threats to residents, and reduce future flood damages.

3.0 Goals

This plan establishes goals for addressing these flood hazards. The goals were developed with the guidance of the planning advisory committee, which included federal, state, and local representatives. The goals are as follows:

1. Save lives and reduce public exposure to risk;
2. Reduce or prevent damage to public and private property;
3. Reduce historic and prevent future adverse natural resource impacts of flood hazard management;
4. Reduce the costs associated with flood hazard management; and,
5. To the maximum extent possible, allow and encourage natural floodplain processes.

The success of this plan should be judged on how well the recommended actions achieve these goals. The plan also recognizes that flood hazard actions must be consistent with state and federal laws that protect natural resource and environmental values.

4.0 Priorities

The committee used the following priority criteria to determine projects to be implemented first:

Priority 1 Action - Actions that have a direct impact on saving life and property, would be initiated immediately (included in the 2003 FCAAP cycle), or must be completed before other actions can be initiated;

Priority 2 Action - Actions that follow completion of another recommended action and would most likely be pursued with funding assistance from the 2005 FCAAP cycle;

Priority 3 Action – Actions that would be initiated when time and money became available or action would benefit from the completion of Priority 1 or 2 actions.

As a result of the committee prioritization process, one of the first priority actions to be implemented is the Flood Insurance Re-Study (RFIS) and associated updated mapping of the floodplain. The results of the computer modeling that will be completed as part of the RFIS will be used as a foundation for other actions outlined in this plan.

5.0 Recommendations

The recommendations addressing basin-wide, subbasin, and site-specific issues including:

Category	Actions
<i>Capital</i>	<ul style="list-style-type: none"> ✓ Implement preferred alternatives in the Stanwood Section 205 Flood Control Study; ✓ Acquire and remove ten structures and purchase 28 acres in the floodway of the North Fork Stillaguamish River (Submitted a ~\$1.9 million dollar Hazard Mitigation Grant Program grant); ✓ Apply for federal funding to relocate critical facilities on the floodplain of the mainstem Stillaguamish River; ✓ Establish and implement a voluntary home elevation and relocation program.
<i>River Planning</i>	<ul style="list-style-type: none"> ✓ Update the floodplain maps; ✓ Identify high hazard zones throughout the entire river system (i.e., areas of accelerated erosion, high velocities, debris collection sites, deep waters); ✓ Complete detailed feasibility studies of solutions at specific hazard sites.
<i>Forest Practices</i>	<ul style="list-style-type: none"> ✓ Assess the potential impacts of forest practices on peak flows.
<i>Flood Warning and Emergency Response</i>	<ul style="list-style-type: none"> ✓ Install flood warning gages; ✓ Refine information on level of protection provided by existing County flood control structures.
<i>Maintenance and Monitoring</i>	<ul style="list-style-type: none"> ✓ Continue efforts to develop innovative methods for sediment management at County bridges.

6.0 Funding

Currently, County river management activities are primarily funded through a portion of the Real and Personal Property Tax (RPPT). This Countywide funding source is used for flood hazard planning, bank stabilization, and maintenance and repair of flood control structures. The allocation of this countywide funding source to flood projects is very limited and additional funding sources would need to be obtained to fully implement this plan. Available funding sources include federal, state, and local programs in addition to a variety of grant opportunities.

The table on the following pages details each recommended action, its priority as established by the planning advisory committee, the estimated cost to complete each action, implementing agency, and implementation timeline.

7.0 Conclusion

Full implementation of this plan will take time. However, committee-established priorities will allow those actions that directly impact lives and property to be initiated quickly following adoption.

This plan is intended to be a living document by providing recommendations to address new flood hazards that may develop after the plan adoption. Specific recommendations were developed with this adaptive management objective so new hazards can be evaluated using the committee-adopted process.

Implementation of all actions will involve the full participation of those who helped develop the plan and others. By working together, Stillaguamish flood hazards and public costs can be reduced while maintaining this river's remarkable natural resource values.

STILLY FLOOD PLAN DRAFT RECOMMENDED ACTIONS

#	Recommended Action (RA)	Lead Agency	Estimated Cost (\$)	Priority	Potential Funding Source	Implementation Time (once work initiated)	Comments
1	Conduct a Flood Insurance Re-Study (RFIS)	SC - SWM	200,000 to 300,000	1	FEMA/ FCAAP	5 years	Action includes mapping floodplain, updating hydrology and hydraulics (H&H), and submitting final product to appropriate state and federal agencies for approval. The last Flood Insurance Study conducted on the Stillaguamish River was in 1982. H&H work completed as part of this RA be used in other RA's (noted below).
2	Relocate critical facilities	Fire Districts	500,000 per facility	1	HMGP	10 years	Three fire stations are located on the floodplain and are pursuing alternatives to move to upland areas. Encourage applying for HMGP funding when becomes available.
4	Analyze all County-owned flood control structures	SC - SWM	50,000	1	RI	2 years	Engineering components (H&H) from RA1 will be used, in part, to complete this task. Unable to complete task during completion of Stilly Flood Plan due to lack of time and money.
7	Conduct a hydrologic and hydraulic analysis of forest practice impacts on peak flows	SC - SWM	20,000/SNOTEL gage	1	FCAAP/RI	5 years	Hydrology completed as part of RA-1. Includes installing new stream and snow gages. Number of gages (stream or snow) unknown.
8	Establish a study committee to address forest practices	SC-SWM	10,000/year	1	RI	3 years	Establish technical committee to review hydrology model development.
12	Map high hazard zones	SC - SWM & PDS	250,000	1	FEMA/ FCAAP	5 years	Effort to be completed as part of RA1. High hazard areas include areas susceptible to channel migration, bank erosion, high velocities, and deep floodwaters. Funding source will dictate county match requirements.
14	Apply for the National Flood Insurance Program Community Rating System	SC - SWM & PDS	50,000	1	RI	3 years	Develop Repetitive Loss Plan initially - balance of CRS follows.
19	Stabilize Swede Heaven bank and pursue voluntary acquisition of at-risk property to protect County road.	SC - ROADS	305,000	1	RF	2 years	Roads Division pursuing voluntary acquisition and bank stabilization for Swede Heaven Road protection. Work with federal agencies may delay completion.

20	Pursue voluntary acquisition of Chatham Acres	SC - SWM	1.9 Million	1	HMGP/private	2 years	Application to state in June 2002. Notified in Nov. 2002 that grant forwarded to Federal Emergency Management Agency for funding.
30	Provide improved flood warning on the mainstem	SC-SWM, SC-DEM	5,000/gage/yr	1	RI	on-going	Underway. New flood warning gages installed on Interstate 5 and on Pioneer Hwy.
32	Implement Corps Section 205 Stanwood area Flood Control Study	Corps, City of Stanwood, SC, FCD	1.5 million	1	Corps/COS/FCD/FCAAP	5 years	Estimated cost for construction of Big Ditch Levee only (north option). If project pursued under Corps authority, cost share at 65% Corps/35% local. Otherwise effort to be funded entirely from local partners, with majority of funding from Stanwood (benefits the most). Continues to be a high priority.
3	Establish a voluntary elevation/relocation program	SC - SWM	50,000/Elevation 200,000/Acquisition	2	RI	1 year	Initial mailer to identify interested parties. Establish prioritization criteria to determine acquisition or relocation priorities.
5	Investigate enhancing flood storage on public lands.	SC - SWM, Parks, Roads	20,000 (study only)	2	RI	1 year (investigate) and 5-10 years implementation	Work includes evaluating County parks (e.g., Cloverdale Park, Cicero Park) for flood storage or conveyance potential. Requires H&H results from RFIS work for full analysis.
6	Assist public with technical design and permitting requirements associated with CBSP	SC - SWM	20,000/year	2	RI	1 year/request	CBSP is an effective program in helping private property owners with bank stabilization issues that have a public benefit. This RA is aimed at setting the foundation to assist residents through permitting and technical review processes (John review).
9	Using the modeling results from the RFIS, conduct a zero-rise floodplain assessment to use as the technical basis for consideration of zero-rise provisions in the county code.	SC - PDS	50,000	2	RI	5 years	Consider action following collection and evaluation of H&H data collected in RA1.
10	Develop a landslide homeowner education program	SC - PDS	10,000	2	RI	1 year	Develop targeted outreach program that highlights the benefits of retaining vegetation on slopes, minimizing stormwater drainage problems, and other issues relevant to living near steep slopes.
11	Promote voluntary incentives to continue low density floodplain use	SC - PDS	50,000	2	RI	3 years	Continue to promote low density floodplain use to minimize the risk to life and property.

13	Use the mapped high hazard zones as the technical basis for consideration of high hazard zone provisions in the County code.	SC - SWM PDS	50,000	2	RI	5 years	As part of RA1, high hazards zones (areas susceptible to accelerated erosion, high velocities, or deep flow) will be identified for use in developing future County code provisions.
18	Implement results of the SWM bedload study to eliminate need for continued annual dredging under, near, or around bridges.	SC - Eng. Services/SWM	10,000/study	2	RF	3 - 5 years	Bridges to several major tributaries of the Stillaguamish River are maintained by annual dredging. These tributary systems are being evaluated to determine if another less costly method of bridge maintenance is possible. These studies to form the framework for future assessment of bridge maintenance. If a new bridge is recommended, project implementation timeline will depend on staff and funding.
21	Implement Steelhead Haven Landslide stabilization project to meet public safety goals.	Corps, Stillaguamish Tribe	Unknown	2	Tribes/Hab/ Corps	7 - 10 years	Proposal under development by tribal, state, and federal agencies. Estimated costs between 1 million to 10 million depending on which alternative is selected.
24	Conduct a detailed study in the Deer Creek/Oso Area and implement findings.	SC - SWM	150,000	2	RI/FCAAP	3 years once funded.	Installation of flood warning system on Deer Creek can be completed prior to completion of detailed study. Additional detailed work could be completed under FCAAP funding.
26	Remove one log per year to dismantle Black Creek splash dam	SC - SWM, USFS	50,000	2	USFS/RF/RI/ REET	7 - 10 years	15,000 for feasibility study. 5,000 each year until removed
27	Ensure Gold Basin Landslide stabilization project meets public safety goals	USFS, Corps, SC	Unknown	2	USFS/Tribes/ Hab/Corps	10 years	On-going. Multiple federal, state, and local agencies involved.
31	Conduct an avulsion risk assessment of Dike Road dike and berm; implement findings	SC - SWM, Corps	40,000	2	FCAAP/RI/ REET	3 years	\$40,000 for risk assessment and costs for implementation unknown.

15	Evaluate new flood hazards using committee-adopted process	SC - SWM	25,000/hazard (assuming RA1 complete)	3	RI	Annually	This RA enables the Stilly Flood Plan to be a living document. The project evaluation criteria approved by the Planning Advisory Committee as part of the Stilly Flood Plan process would be used to develop, evaluate, and implement solutions for new hazards.
16	Participate in habitat restoration projects that provide cumulative flood reduction benefits	SC - SWM	25,000/project (assuming RA1 complete)	3	Hab/RI	Annually	This RA enables the Stilly Flood Plan to be a living document. The project evaluation criteria approved by the Planning Advisory Committee as part of the Stilly Flood Plan process would be used to develop, evaluate, and implement solutions for new habitat restoration projects that may have a flood reduction benefit.
17	Reestablish floodplain connectivity between the river and side channels through the White Horse Trail where possible	SC - SWM, Parks	25,000/project (assuming RA1 complete)	3	RI/GF/REET	Annually	On-going evaluation of opportunities when they become available. Technical analysis of site specific areas conducted with RA-1 or after modeling complete.
22	Complete engineering assessment to stabilize Bradley Site bank, improve habitat, and reduce potential damage to public infrastructure.	SC-SWM , PW, Parks	150,000	3	RI/RF/REET/ WSDOT	3 years	Bradley site located on the North Fork Stillaguamish upstream of the trestle and SR530 bridge just east of Oso. Initial assessment drafted in the late 1990s. Reevaluate to determine if existing conditions are similar and if so, pursue funding for implementation actions.
23	Investigate feasibility of moving main flow of river at Skagland Hole through upstream abandoned channel.	SC - Parks, SWM, WSDOT	40,000 (Feasibility Study)	3	Hab/RI	5 years	Area also known as Hazel Hole. State Route 530 (state) & WhiteHorse Trail (County) currently impacted by river. Work must be completed in conjunction with state and local property owners.
25	Determine flood damage reduction benefits of acquiring Smokes Brother's Farm and removing dike.	SC - SWM, Parks	30,000 for assessment/ 1.5 million if purchase	3	Hab/RI	1 year (following completion of required components of RA1)	Determine using FIS model results. If pursued, acquisition => \$1.5 million. Benefits can be determined following H&H work for RA1.
28	When requested by Robe Valley Community through CBSP, work cooperatively to stabilize bank	SC - SWM	50,000	3	RI/REET	1 - 2 years following submittal of CBSP application.	Need cooperation of community, estimated cost of materials authorized up to \$10,000. Balance of effort primarily staff time to conduct engineering technical assistance and guidance through the permitting and construction efforts. Community organization could shift priority.

29	End formal maintenance agreement with Corps on Robe Hill Dike and determine whether to remove, modify, or leave as is	SC - SWM	5,000	3	RI/REET	1 year following completion of required components of RA1	H&H technical work completed as part of RFIS(RA1).
33	Investigate methods for flood hazard reduction as part of restoration efforts in Portage Creek	SC Parks, SC-SWM, Corps, Arlington	206,000	3	Hab/RI	on-going	Work closely with Parks, habitat specialists, Arlington and Corps to ensure that water quality improvements are not compromised for flood reduction.
34	Address upland stormwater impacts to lower Church Creek.	SC-SWM, FCD	30,000 - 60,000	3	Hab/RI	on-going	Cost for feasibility study to determine issues such as sedimentation, reduced water quality, and management of water quantity of the floodplain portion of Church Creek. Effort must also consider tide gate improvements planned at mouth of creek.

HOW PRIORITIES WERE ESTABLISHED...	ACRONYMS			
1 - Recommended Action will save lives (direct), initiate immediately, must precede other actions	<i>CTP</i>	Cooperative Technical Partner	<i>REET</i>	Real Estate Excise Tax
2 - Actions initiated using 2005 FCAAP funds or that follow completion of priority 1 actions.	<i>FCAAP</i>	Flood Control Account Assistance Program	<i>Corps</i>	U.S. Army Corps of Engineers
3 - Actions initiated when time and money are available or that may benefit from completion priority 1 or 2 actions.	<i>Hab</i>	Habitat related grants (e.g., SRFBRD)	<i>USFS</i>	US Forest Service
	<i>FCD</i>	Stillaguamish Flood Control District	<i>HMGP</i>	Hazard Mitigation Grant Program
	<i>COS</i>	City of Stanwood	<i>SC - SWM</i>	Snohomish County Surface Water Management
	<i>RF</i>	Road Fund	<i>SC - Parks</i>	Snohomish County Parks and Recreation
	<i>Tribes</i>	Stillaguamish Tribes	<i>SC - Roads</i>	Snohomish County Roads
	<i>WSDOT</i>	Wa. State Dept of Transportation	<i>SC - PDS</i>	Snohomish County Planning and Development Services
	<i>CWD</i>	Clean Water District	<i>DEM</i>	Snohomish County Department of Emergency Management
	<i>RI</i>	River Improvement	<i>CBSP</i>	Cooperative Bank Stabilization Program