

CHAPTER 11

RECOMMENDATIONS

Many of the alternatives selected in Chapter 9 are inter-related and it was necessary to combine them to form the recommendations in this chapter. The wording of the recommendations was compressed in this chapter to encompass the various aspects and common elements within the selected alternatives. The omitted detail is retained in Table 9-9 and can be tracked by the original numbering scheme and a crosswalk contained in Table 9-9.

The recommendations, so compressed, were presented to, and discussed with, the Committee for any changes. The result was 61 high priority recommendations, shown in table 11-1, containing the most important issues identified in the CFHMP area, 38 medium recommendations listed in Table 11-2 and 38 low priority recommendations listed in table 11-3.

The recommendations emphasize public hazard reduction benefits, relative urgency, costs and consider the significant implementation aspects related to cost effective flood hazard reduction and cooperation.

RECOMMENDATION CATEGORIES

Recommendations have been categorized as: Inventory and Study, Planning and Regulatory, Maintenance and Management, Structural, Public Outreach, and Flood Response. Categories are based on the work nature and main participants required for implementation. For example, the FCZD cannot take the lead for Planning and Regulatory because that is the responsibility of the jurisdictions. The FCZD can facilitate Maintenance and Management for structures and properties that belong to landowners and jurisdictions, but cannot take responsibility for the ongoing requirements on land owned by others. The FCZD has taken a major role in Public Outreach, Flood Warning and planning for Flood Response. Flood Response is a role for first responders within the +Communities in addition to state and federal agencies. Implementation of these recommendations will require an ongoing, coordinated approach to planning, regulatory, structural, and maintenance actions and programs over the long term.

PARTNERS

Partnerships are required to mitigate existing flooding problems that affect large areas. An awareness of overlapping mandates is required to allow joint funding of projects for joint benefits. Projects and programs or initiatives require leads that have been identified by the first entry in the "Partners" column of Tables 11-1 through 11-3. The first entry is considered the lead, although partners may wish to alter the order to facilitate

implementation. As funding is a concern for the parties, conceptual level costs are also presented in the Recommendations tables.

IMPLEMENTATION TIMELINES

Implementation depends on many factors including priority, funding and permitting. In Tables 11-1 through 11-3 a column called “Onset” provides an initial target timeframe and strategy for community implementation of the plan.

Actions already completed by the FCZD are denoted “C” (see Chapter 10 and Appendices). Actions underway, are denoted “IP” for “in progress” (see Chapter 10). Actions recommended to be initiated shortly after Plan adoption are denoted “S” for “short term”, while “L” is for “long term”, again referring to start date. Actions recommended within the next cycle of regulatory update, such as Comprehensive Plan or Ordinance updates are denoted as “AU” for “awaiting update”. Actions recommended to be initiated as part of upcoming projects or opportunities are denoted “O” for “opportunity”. These actions recognize the need to coordinate with other activities and the ability to provide funding, which is many cases requires cooperation of agencies, plus the need to work in cooperation with long term planning of new and replacement infrastructure. Funding mechanisms are discussed in Chapter 12.

The recommendations below emphasize public hazard reduction benefits, relative urgency, costs and consider the significant implementation aspects related to cost effective flood hazard reduction and cooperation.

Table Notation Notes

The original alternative numbering (in parenthesis) was retained during the merging of like alternatives and can be used to obtain more detail and to track an alternative within Chapter 9 and the Appendices.

Table 11-1

High Priority Recommendations

Note: () represents the recommendation location on Table 9-8, and [] represents the original alternative number(s) for that recommendation

INVENTORY AND STUDY			
Description	Onset	Estimated Costs in \$	Partners
IS-1 Establish technical work groups and pilot programs on a reach by reach basis for channel, vegetation and sediment maintenance (including Wide Hollow coarse sediment budget) to provide criteria and enable appropriate larger scale maintenance programs which meets flood and habitat needs. (1.8.A [15A-2] (See Appendix J)	IP	100,000	FCZD/WDFW Irrigation Districts, Landowners, Jurisdictions
IS-2 Establish cleanout guidelines and a pilot program bridge sediment removal and maintenance. (1.8.A) (See Appendix G & H)	C	50,000	FCZD/ Roads, Plan Depts.

INVENTORY AND STUDY (cont)			
Description	Onset	Estimated Costs in \$	Partners
IS-3 Inventory problematic bridges, roads and infrastructure impacts and sediment buildup to generate action plan for removals, etc. This includes areas of ponding (1.8.A,33.A [12A/B-3], 3.1.C [12D-5 & new], 3.2.8,3.3 B [12A/B-10], [12D-5], Monitoring-Inventory [12D-3])	IP	15,000	FCZD/Roads Depts.
IS-4 Inventory flooding impacts for existing and abandoned irrigation structures (4.2 .B, [2C-1, 5A-1, 5E-1])	IP	20,000	FCZD/ Irrigation
IS-5 Modify bridge crossing design to reduce flooding and maintenance on case to case basis – wider spans, wider easements upstream and downstream for channel design and cleanout, deeper footings, to enable for scour, etc (3.1.A [1A-1, 12A/B-7, 12A/B-6, 12A/B-1, new]) (See Appendix G)	IP	40,000 per Bridge	Roads/ Plan Depts.
IS-6 Wapato dam impact assessment for Union Gap (7.A [4-11, 6C-7])	IP	20,000	FCZD
IS-7 Provide 10 and 25 year flood extent maps to show chronic flooding areas where actions such as infrastructure sizing and siting, proposed development and redevelopment can be designed to guide flood hazard reduction. (5.7.C [new]) (See Appendix J)	C	50,000	FCZD
IS-8 Provide 10 and 25 year flood damage estimates using established federal methods to guide economic and environmental decisions.	IP	20,000	FCZD
IS-9 Study to identify Ahtanum avulsion scenarios and existing flood issues at Mission (11.1.A through E [2A-1, 2C-6, 2-3, 2-1, 2B-4])	S	40,000	FCZD
IS-10 Establish historical flooding areas –e.g. Wiley City & Ahtanum-as special study areas to include all infrastructure (5.6.B [new])	S	10,000	FCZD/Plan Depts.
IS-11 Establish historical map and identity flood risks in Hollows (8.1.D [1D-8 & 15F-2] [15F-3 & 15F-4])	S	10,000	FCZD
IS-12 Identify & prioritize emergency response access routes during 10, 25 and 100 year floods to incorporate into emergency transportation and planning (3.1.E [12F-6, 12H-8], 3.2A [12F-3, 12H-7], 9.2B [12F-4])	S	10,000	City & County Roads/YVOEM
PLANNING & REGULATORY			
Policy Development			
<i>To be implemented in the policy processes associated with the broad scale Growth Management Act processes such as County-Wide Planning Policies, Comprehensive Plans, Capital Facilities Plan Elements, and UGA expansion.</i>			
PR-1 Ensure drainage infrastructure is properly sited, sized and designed to minimize flood effects from stormwater run-off. This includes establishing the relationship between flooding and stormwater and determining detention/retention and other stormwater standards. (2.2.D, 2.2.C, 2.2.B [4.4, 13C-4, 1D-6, 14C-7, 15G-1, 13C-1, 13C-3, 15E-2, 15F-1, 15G-2])	IP	Complete	RSPG/ Stormwater Utilities
PR-2 Petition State Noxious Weed Control Board to list hybrid willows as invasive species as designated in other states. (1.6.B [new])	IP	10,000	FCZD

PLANNING & REGULATORY (cont)			
Description	Onset	Estimated Costs in \$	Partners
PR-3 Incorporate floodplain and economic impacts into SEPA for subdivision layouts floodplain development (losses, damages, safety, insurance, response and recovery) from the planning to the project level, especially in urban and urbanizing areas (5.4.F [new])	S	5,000/ yr	Plan Depts./ FCZD
PR-4 Establish policies , such as a flood hazard audit and hazard element using the flood problem inventory in this plan, within County-wide planning policies and comprehensive plans in flood hazard areas to direct preferred locations for new infrastructure such as arterials, water and wastewater distribution mainlines, regional stormwater facilities, parks and greenbelts. (5.6.C [13A-11] and Monitoring-Inventory [12D-3]) <ul style="list-style-type: none"> o New major arterials should be located outside of floodplains where possible. If in floodplain, design to minimize flood impacts. (5.4.C [12H-4b], 5.4.E [12H-4c]) 	AU	20,000	Plan Depts./ FCZD
PR-5 Retain and provide Open Space land use in all jurisdictions using zoning easements, acquisitions and incentives within floodplains to provide multiple public benefits such as preserving space for flooding, greenbelts and trails (5.3.A [13B-6, 12H4-d, 14E-3, 13C-5, 13A-5, 14E-4], 5.4.A [14C-3, 14C-4, 14C-5], 5.5.A [15C-3, 15C-9, 15C-10], 5.5.C [9C-10]).	AU	20,000	Plan Depts./ FCZD
PR-6 Provide open space incentives that target general floodplain function, riparian and storage recommendations. (1.2.A [9C-1, 7B-2, 7B-3], 5.2.A [13B-4, 9C-3, 14C-2, 13A-7, 15C-4], 5.3.A [13A-3], 5.5B [15B-5, 15B-8]).	AU	5,000/yr	Juris/Interest Groups,FCZD
PR-7 Decide upon, designate (in flood response, transportation and capital facilities plans) and maintain critical access routes at 10, 25 and 100 year events (3.1E [12F-6, 12H-8], 3.2.A [12F-3, 12H-7], and 9.2.B [1-B-3, 12F-4]) keeping non-critical routes at grade (3.1E [12D-4])	S	10,000	Roads/YVOEM
Standards and Ordinance Development - <i>To be implemented in association with the development and approval processes for ordinances that implement the Comprehensive Plan, and in some cases modifications to the building codes. Some of these recommendations (work group) would need to begin well before modifications to existing ordinances are proposed.</i>			
PR-8 Ensure all new development and redevelopment within identified FEMA floodplains are adequately reviewed for NFIP compliance and overall environmental (SEPA) impacts through the use of additional review procedures which may include; at minimum a public notice (type 2 for the County); a signed checklist for all floodplain items; a floodplain development permit independent of other required permits; or establishing a floodplain overlay zone covering the above concerns. (modified 5.6.A [13B-3])	AU	10,000/yr	Plan Depts./ FCZD
PR-9 Establish work groups to formalize regulatory applicability of man-made and natural courses. (1.1.B [7B-7, 15E-5, 15E-6, 5D-2, 5D-3, 5D-4, 5D-5, 5D-8, 5F-4, 15E-1, 2-2, 8A-3])	S	20,000	Plan Depts./ FCZD

PLANNING & REGULATORY (cont)			
Description	Onset	Estimated Costs in \$	Partners
PR-10 Ordinance increase for residential to at least one foot above BFE for future development to reduce community costs and damage (6.1.A [14A-2])	AU	10,000	Bldg Officials/ Plan Depts.
Project and Permit Level – <i>These recommendations should be incorporated as standards of review for development in floodplains, mostly in relation to new subdivisions, commercial/industrial and public and private infrastructure projects.</i>			
PR-11 Improve compliance with NFIP on all new and replacement bridges and culverts (6.3.A [18], 8.1B [8D-1, 4-3, 15B-6])	IP	5,000/yr	Bldg Officials
PR-12 Based on the 10 and 25-year flood mapping, consider them, for design requirement of land use designation decisions in future floodplain development to minimize frequent damages and economic impact. (5.7.C [new])	S	25,000	Plan Depts./ WDFW
PR-13 Use SEPA and Comprehensive Plan Policies and Goals to address flood issues/impacts associated with larger scale proposed developments where current zoning, subdivision or building standards are not sufficient to mitigate flood risk. (5.1.B [13B-2])	S	5,000/yr	Plan Depts.
PR-14 Implement NPDES Regional stormwater to limit run-off up to 100-yr flood (2.2.A [1D-5], 2.2F [4-15]).	IP	Complete	Local Jurisdictions
PR-15 Fully utilize new FEMA models and maps, and locally developed 10 and 25-yr map products, including loss data, for alternative analysis and infrastructure and land use decision making, by providing models and mapping free of charge. (3.1A [recommendation overview], 6.1C [new], 8.1.A [12G-1, 12A/B-2, 12C-2, 12G-3], 8.1.B [8D-1, 4-3, 15B-6, 4-9, 4-19, 15D-1, 15C-13, 15D-2], 8.1.D [1D-8, 15F-2])	S	2,000/ yr	Plan Depts./ Roads
PR-16 Consolidate access for floodplain crossing to minimize flood impacts (3.3.D [12G-9], 5.6.D [12H-9, 12A/B-9, 12H-5, 12C-4])	AU	2,000/ yr	Plan Depts./ Roads
PR-17 Ensure floodplains and floodways are identified on final plat maps – included would be text identifying effective map date and disclosure regarding fact that the maps will change over time. Also consider including identification of riverine Critical Areas buffer on plats (6.3.C [new])	AU	2,000/ yr	Plan Depts.
PR-18 Increase flood code enforcement through adequate funding mechanisms 6.3.A [1C-4, 1C-3,18])	S	50,000/yr	Code Enforcement
STRUCTURAL			
Projects in Urban Growth Areas			
ST-1 Property acquisitions and home elevations for repetitive loss properties (5.5.A [new])	IP	150,000	FCZD/ Jurisdictions
ST-2 Emma Lane channel improvements, (12.2.A [3-1])	IP	800,000	FCZD/ Jurisdictions
ST-3 Bachelor Bridge at Ahtanum Rd. (12.4.A [3-6]) & Ahtanum Creek & 16 th Avenue bridge replacements (3.1.B [3-13])	O	600,000	County Roads/ Plan Depts.

STRUCTURAL (cont)			
Projects in Urban Growth Areas			
Description	Onset	Estimated Costs in \$	Partners
ST-4 Wide Hollow flooding between 64 th and 101 st – channel improvements and acquisitions – recommendations include those for Shaw Creek, plus regional retention ((10.1.E [8C-6, 8E-3])	IP	400,000	FCZD/ Jurisdictions
ST-5 Resolve Shaw Creek relocation/overflow to remove community damages and insurance (10.1.A & B [8B-1, 8E-1 a-e, 8E-4, 8E-6 b-d new])	S	1,500,000	FCZD/ Jurisdictions, Plan Depts.
Projects in City of Union Gap			
ST-6 Wide Hollow relocation or overflow channel incorporated in future development and proposed infrastructure design in Union Gap (7.C [6C-6, 11A-4, 6C-6], and 7.J [new])	O	500,000	DOT/ Jurisdictions
ST-7 Improve grade for Spring Creek East to reduce flooding in Union Gap (7.H [6D-2])	O	100,000	DOT/ Jurisdictions
ST-8 Mill structure – Develop shelf ready open channel bypass design for grant application on, lower channel (7.E [11A-5])	O	20,000	FCZD/ Jurisdictions
Projects in areas which route floodwaters overland			
ST-9 Reduce catastrophic flow captures at Mission (infrastructure and town impacts – Rutherford Road) and preventing avulsions into Hatton and capacity issues (11.2.A,B & C [2A-5, 2B-2, 2A-7, 2A-6], and 11.3A, 11.4A [2A-8, 2C-2, 2C-4, 2C-5])	S	300,000	FCD/Irrigators, Landowners, Plan Depts.
ST-10 Flood design for John Cox diversion (new)	L	40,000	FCZD/Irrigators
MAINTENANCE & MANAGEMENT			
Continuous and stable Channel and Riparian Management			
MM-1 Program for sediment and debris removal, invasive species control, replacement species in plantings, sediment & bank stabilization (1.6.A & B [15C-2, 7A-5, 7B-8, 7A-1])	IP	30,000/yr	WDFW/FCZD Plan Depts., NYCD
MM-2 Beaver management (1.9.A & B [9A-1, 9A-3, 9A-6, 9A-2, 9C-5 & 9A-5, 9A-7])	IP	1,000/yr	WDFW/ Landowners
MM-3 Riverine Infrastructure Management – debris and sediment maintenance (1.8.A [15A-2])	IP	10,000/yr	Jurisdictions/ Irrigators
MM-4 Riparian restoration, mitigation and protection to reduce flood impacts (1.2A, B & C [9C-1,, 7B-2, 7B-3, 9C-2, 9C-4])	S	5,000/ yr	FCZD/WDFW Jurisdictions
MM-5 Land acquisition in problem areas prior to development (Emma Lane/Cottonwood/Shaw Creek/Union Gap, etc.) (5.5.A [4-13, 15B-4, 15D-4, 13B-5, 9C-12])	IP	200,000	FCZD/ Juris Landowners, Interest groups
MM-6 Apply appropriate range management standards to elk in confined feeding operations near riverine environment (1.3.A [9B-3], 1.3.B [9B-2, 9B-4])	S	6,000	WDFW
MM-7 Obtain landowner access permission for problem bridge channel maintenance. (3.3D)	IP	3,000/ yr	FCZD/ Jurisdictions
MM-8 Coordinate opening irrigation diversion gates for flood relief, based on forecasts, channel maintenance needs, and impact to diversion facility (9.5.B [5F-6])	IP	1,000	FCZD/Irrigators YVOEM

MAINTENANCE & MANAGEMENT (cont)			
Continuous and stable Channel and Riparian Management			
Description	Onset	Estimated Costs in \$	Partners
MM-9 Separate irrigation conveyances from streams as practical and based on priority (1.1.A [7A-4, 7A-2, 15B-3, 5D-7])	L	1,000,000	Irrigators/ Jurisdictions
MM-10 Consolidate irrigation diversions and remove as become obsolete (4.1.A [5C-1, 5C-2, 5D-1])	L	200,000	BOR/BPA/ Irrigators, Juris
MM-11 Community adoption of Community Rating System to reduce insurance rates through CRS activities (5.2.B [new])	L	20,000	Jurisdictions
PUBLIC OUTREACH			
PO-1 Information to public and local governments on New FEMA Maps	IP	20,000	FCZD/ Jurisdictions
PO-2 Outreach to public regarding flood hazard related to regulatory changes	IP	5,000/yr	FCZD/ Plan Depts.
PO-3 Provide flood risk & regulatory constraints at beginning of development process (8.2.E [13A-10, 14B-1])	S	2,000/ yr	Plan Depts.
PO-4 Outreach to Realtors, lenders, etc. about flood risks (8.5.A & B [15C-14, 15C-15, 15C-16])	S	2,000	FCZD
PO-5 Provide information to the general public and property owners to enhance their understanding of: specific flood risks, beneficial functions of floodplain, and aesthetic values of streams and floodplains for development (8.2.A,C,D, 8.3.C,D,E, 8.5A & B [10C-1, 15C-14, 15C-16, 7B-5, 9C-11, 10A-3, 10B-2, 1D-3, 1D-7, 1B-9, 9C-7])	L	10,000	FCZD/Plan Depts.
FLOOD RESPONSE			
FR-1 Designation of evacuation routes and notification of the public and first responders (9.2.B [10B-3])	S	5,000	YVOEM/Roads
FR-2 Implement and participate in activities for the Flood Response Plan (9.1.A & B [10A-1, 10A-2, 12F-5, 10C-1])	S	5,000/yr	YVOEM/ Jurisdictions
FR-3 EOC environmental coordination (9.8.A [10D-3, 10D-3a,10D-3b, 10D-3c])	L	2,000/yr	EOC/WDFW
FR-4 Determine where large numbers of animals may be kept during a flood event and distribute information to the public. Work with Emergency Management and Red Cross to establish animal food and shelter contingencies – discussions may include Central Washington State Fairgrounds, farm feed stores,	L	5,000/yr	Conservation Authorities
FR-5 Coordination between Emergency Management and the Irrigation Districts such as AID and Yakima Valley Canal, for management during floods. Include Irrigation Districts in communications with the EOC (9.3.B [5F-1, 5F-3, 2B-3])	O	2,000/yr	YVOEM/AID YVCCo

Table 11-2

Medium Priority Recommendations

Note: () represents the recommendation location on Table 9-8, and [] represents the original alternative number that recommendation

INVENTORY & STUDY			
Description	Onset	Estimated Costs in \$	Partners
IS-13 Resolve run-off issues presented by DIDs (2.2.E [13C-2, 15E-3])	S	50,000	Jurisdictions
IS-14 Document floods including aerial photos, high water marks, etc. (9.6B [15D-5])	S	20,000/event	FCZD
IS-15 Identify high flood risk stream reaches where man-made changes or proposed projects effect channel processes or flooding including roads, perched channels and other alterations (and disclosure that area is at risk of flooding) (Monitoring-Inventory [12C-1, 15A-3, 15B-7, 15B-10])	S	10,000	FCZD/ WDFW
IS-16 Design bridges and irrigation infrastructure to reduce potential for accumulation of debris and sediment and creation of un-natural overflow channels/paths (2.1.C [5B-1, 7D-3, 7D-5])	L	5,000/Structure	Roads/FCZD Plan Depts., WDFW
PLANNING & REGULATORY			
Policy Development			
PR-19 Develop flood abatement policies for high risk floodplain areas of existing dense development within the floodplain (such as Ahtanum and Wiley City) (5.6.B [13A-13])	O	30,000	Plan Depts./FCZD
o Design drainage to meet multiple objectives including flood alleviation, in flood-prone areas, esp. in Wiley City and Ahtanum (5.6.B [14A-4])	L	10,000	FCZD/Plan Depts.
PR-20 Identify areas that are “islands” surrounded by floodplain and develop standards to limit density, provide emergency access and consider transportation networks within the context of surrounding area (6.2.A [12H-6])	L	10,000	FCZD/Plan Depts.
PR-21 Seek land use examples for flood-prone areas from other similar communities (5.6.E [13B-8])	L	5,000	FCZD/Plan Depts.
PR-22 Ensure existing flood policies in the Yakima Urban Area Comprehensive Plan are implemented through ordinances and local jurisdiction land use decisions. Planning for flooding is supported in Objective E7 (5.7.A [13A-4])	O	10,000	Plan Depts.
PR-23 Incorporated principle of floodplain planning into infrastructure & similar facilities plans (5.4.D [8C-2, 12H-2])	L	5,000	Plan Depts./Public Works
PR-24 Preserve natural drainage including draws and mitigate identified hollows that provide natural flood flow paths but are not identified as FEMA floodplains. Implementation is through drainage requirements within stormwater, county/city drainage, grading, and long and short subdivision ordinances (2.1.B [new])	S	5,000/ yr	Plan Depts.

PLANNING & REGULATORY (cont)			
Description	Onset	Estimated Costs in \$	Partners
PR-25 Consider development moratoriums or high standards of proof in place where development is outpacing flood knowledge or tools available to keep the public safe (i.e. the area has not been mapped, or conditions have changed since the last mapping) (5.4.A [13A-15])	O	0	Plan Depts.
PR-26 Maintain open areas near the mouth of Ahtanum Creek for flooding such as Fulbright Park (5.3.A [11A-2])	O	20,000	Plan Depts.
Standards and Ordinances Development			
PR-27 Work for consistency in zoning and development standards across jurisdictions for developments and buildings within floodplains. Determine gaps in the regulatory scheme. (5.1.A & 5.1.B [13A-9 & new])	AU	10,000	Plan Depts.
PR-28 Reduce risks through subdivision development standards to minimize new structures in harm’s way (5.1.A [15C-11])	O	5,000/yr	Plan Depts.
	O	5,000/ yr	Plan Depts.
PR-29 This includes special land use standards for industrial uses relating to hazardous materials, storage, use, disposal (5.7.B [11B-1]) and flood-proofing for non-residential structures, including elevating to make existing structures less flood damage prone (6.1.B [4-8]). Jurisdictions should adopt Appendix G of IBC.	SU	10,000	Plan Depts./ Bldg Officials
STRUCTURAL			
ST-11 Make infrastructure improvements in Emma Lane area:	O	10,000	FCZD/ Landowners
	O	400,000	Roads
ST-12 Evaluate not filling in the existing Ahtanum channel so it can be used for habitat if the creek is relocated near Emma Lane (12.2.A [3-15])	IP	5,000	FCZD/ Landowners
ST-13 Perform a cost-benefit analysis for stream relocation near Emma Lane (12.1.B [3-19])	IP	5,000	FCZD
ST-14 Improve flood conveyance and predictability by reconfiguring modified or “perched” streams and establishing overflow channels if relocation is not feasible (1.7.A & B [15A-1, 15B-1, &B-6, 15B-9] such as Shaw, 10.1.C [8A-2], and Emma Lane, 12.2.A [3-14])	L	100,000	FCZD

STRUCTURAL (cont)			
Description	Onset	Estimated Costs in \$	Partners
ST-15 Maintain Wide Hollow flood mitigation methods in Union Gap by retaining an overflow path along railroad right of way and encouraging development of an O & M agreement among appropriate parties for flood and fish structures at the Mill (7.I & 7.D [11A-1 & new for Mill recommendation])	O	20,000	City of Union Gap
MAINTENANCE & MANAGEMENT			
MM-12 Investigate irrigation infrastructure changes such as flood gates or siphons to reduce flood routing through irrigation systems (4.2.D [5A-2, 5A-5, 5A-4])	L	5,000	Irrigators
MM-13 Modify drainage standards for existing roads in overflow areas to minimize flood impacts (i.e. Emma Lane area) (2.2.G [3-12])	AU	10,000	Roads/FCZD
MM-14 Ensure replacement of damaged infrastructure reduces future flood damage risks (3.3.E [12G-5])	O	5,000/ Structure	Roads
MM-15 Explore additional funding methods for mitigation or reduce environmental effects (including flooding) from existing roads or other infrastructure (3.3.C [12G-6])	O	2,000	Roads
PUBLIC OUTREACH			
PO-6 Work with landowner assistance programs to improve appropriate streamside vegetation and provide information about flood resistant fencing (1.5.B [7B-4, 1B-7, 1B-8])	S	10,000	FCZD
PO-7 Utilize meetings and other methods of notification to inform developers and current and prospective residents about flood risks for Shaw Creek (10.2.A & B [8E-6.a, 8D-4, 8D-5])	IP	5,000	FCZD
PO-8 Encourage residents and property owners who are at high risk for flooding to purchase flood insurance even if they are not in a mapped floodplain (8.2.B [8D-3])	IP	2,000/yr	Jurisdictions
PO-9 Provide public notice/disclosure/consultation about planned flood projects (8.4.B [19])	O	2,000	Jurisdictions/ FCZD
PO-10 Provide information for the public about culvert maintenance and sizing (8.2.F [12E-5])	S	2,000	FCZD/Roads
PO-11 Yakima County Flood Control Zone District to provide technical assistance and comments regarding flood hazards and infrastructure design (8.4.A [12G-2])	IP	2,000/ Structure	FCZD
PO-12 Encourage volunteer flood-watchers program to provide information (9.4.C [10C-8])	S	0	FCZD
FLOOD RESPONSE			
FR-6 Public and agencies coordinate flood fight and post flood actions with recommendations identified in the Ahtanum-Wide Hollow CFHMP to provide a good basis for decision whether to take emergency action (9.3.E [10D-2])	S	5,000	YVOEM
FR-7 Install gages on North Fork Ahtanum and Wide Hollow Creeks, including telemetry (9.6.A [5F-2])	O	40,000	FCZD
FR-8 Develop warning systems including mass media (9.4B [10-B-1])	L	10,000	YVOEM

FLOOD RESPONSE (cont)			
Description	Onset	Estimated Costs in \$	Partners
FR-9 Identify known problem locations so information is available for first responders and include in the Flood Response Plan (if appropriate) (9.2.A, 9.2.C, 9.3.D, 9.7.A [5Ff-5, 10C-5, 12F-1, 1A-7])	S	5,000	YVOEM/FCZD
FR-10 Provide special flood phone line for public to call in and provide information about current flooding – EOC & FCZD cooperate/coordinate (9.4.D [10C-7])	L	0	YVOEM/FCZD
FR-11 Improve access to Bachelor diversion during floods without diverting flood waters or making flood problems worse (9.5.A [2C-3])	L	30,000	Irrigators/BOR
FR-12 Improve communication, coordination and information dissemination between various agencies and emergency management office during flood emergencies (9.3.A, 9.4.A, 9.3.C [10C-2, 10C-3, 10C-4, 10C-9])	IP	0	YVOEM

Table 11-3
Low Priority Recommendations

Note: () represents the recommendation location on Table 9-8, and [] represents the original alternative number for that recommendation

INVENTORY & STUDY			
Description	Onset	Estimated Costs in \$	Partners
IS-17 Study use of ring dikes to protect St. Joseph’s Mission property (2A-3).	IP	500,000	Landowners
IS-18 Consider major levee construction on Mission property to alleviate headcuts, this may not be needed if Recommendations A & B in Hatton section are successfully implemented. (2A-2).	IP	200,000	FCZD
IS-19 Perform an Emma Lane flood study, and develop design guidance on acceptable flood protection levels. (3-2). Address Ahtanum Creek flood conveyance downstream of 42 nd and Ahtanum Rd. (3-18).	IP	80,000	FCZD
IS-20 Develop a Coordinated Resource Management Group to develop joint priorities for resource management (e.g. Wenas working group). (9B-1)	L	50,000	NYCD/WDFW
IS-21 Investigate and recommend increased maintenance and debris cleanout of culverts and ditches on public roads (coordinate with road maintenance crews to optimize ditch cleaning for flood purposes) (1D-1, 12D-2, 12E-1).	L	20,000/yr	Roads
IS-22 Monitor effects of urbanization and land use intensifications to the characteristics (runoff, time of concentration, water quality) of the watershed over time. Take action to mitigate for negative watershed scale effects. (Monitoring-Inventories [12H-3])	L	100,000	FCZD

INVENTORY & STUDY (cont)			
Description	Onset	Estimated Costs in \$	Partners
IS-23 Map non-mapped Channel Migration Zones (and other hazards) (15G-4, 15D-3). Identify areas that are at risk for channel migration in addition to identified CMZ, i.e. N.F. Ahtanum, below the Narrows, at the Mission, Shaw Creek, etc (15C-12).	O	20,000	FCZD/ FCZD
IS-24 Alter drainage systems and easements, based on Emma Lane floodplain remap study (3-10).	O	5,000	FCZD
IS-25 Inventory of private roads acting as levees. (Monitoring-Inventories [12D-6])	O	10,000	FCZD
IS-26 Private road culvert inventory. (Monitoring-Inventories [12E-7b]).	O	5,000	FCZD
IS-27 Investigate funding sources or incentives for private drainage infrastructure (Monitoring-Inventories [12G-8])	O	5,000	FCZD
PLANNING & REGULATORY			
Policy Development			
PR-30 Take larger scale effects to the watershed into account when designing new transportation systems: Minimize number of roads – maximize efficiency and design roads in a manner to minimize flooding. (12H-4a)	AU	5,000/yr	County Rds/ Plan Dept
PR-31 Assess the cumulative effect of road policies and standards for new roads within the transportation element of the comprehensive plan that act as dams or conveyances. (12C-3).	AU	2,000	County Rds/ Plan Dept
PR-32 Limit future development in the Emma Lane floodplain area if structural alternatives not implemented (3-3).	AU	2,000/yr	County Plan Dept
PR-33 Place controls on building in the flood-prone areas in and around Emma Lane (3-17) (e.g. using zoning, utility hook-ups, etc.).	AU	2,000/yr	County Plan Dept
PR-34 Investigate geologic hazard area standards for applicability to high flood risk hazard categories such as channel migration zones and alluvial fans to address potential regulatory gaps. (Monitoring-Inventories [14E-1])	L	4,000	FCZD/ Plan Dept Building Officials
Standards and Ordinance Development			
PR-35 Adopt and implement stricter building standards in Emma Lane area-flood-proofed homes, buildings (3-11, 3-3).	AU	10,000	County Plan & Build
PR-36 New traffic generating developments should be located outside of floodplains (see also Bridges & Roads) (12H-4b).	O	150,000	Juris Plan & FCZD
Project and Permit Level			
PR-37 Improve drainage throughout the entire Emma Lane area – culverts, roads, etc. (3-8).	IP	20,000	Roads

STRUCTURAL			
Description	Onset	Estimated Costs in \$	Partners
<p>ST-16 Consider the following structural alternatives where changes in the channel threaten homes, businesses, agricultural land, or infrastructure.</p> <ul style="list-style-type: none"> ○ Levees, armor, buffers, CMZ (channel migration zones) (15C-1) ○ Structural flood control measures either by individuals or government (4-7) ○ Utilize “softer” solutions for bank stabilization, bio-engineering. (15C-2) ○ Levees constructed along perched channels (i.e. Cottonwood Grove) (15B-2) 	L	0	Plan Depts./ FCZD
<p>ST-17 Expand diking along Shaw Creek to protect new and existing development (8B-2, 8E-2, 15B-2)</p>	L	60,000	Add Insurance Costs
<p>ST-18 In some locations, add wood to stream to “catch” wood debris – this accomplishes multiple objectives – would benefit habitat as well as reduce the volume of woody debris that accumulates on bridges, diversions, and other structures. (7D-4)</p>	O	40,000	FCZD
<p>ST-19 Armoring:</p> <ul style="list-style-type: none"> - Provide armoring of roads with act as levees (Ahtanum/Cottonwood Canyon Rd., etc.) (12D-1). - Armor road ditches where road fill is going to contribute to excess bedload and to protect road prism. (12E-3). 	O	10,000	FCZD
<p>ST-20 Culverts:</p> <ul style="list-style-type: none"> - Recognize the limitations of culverts as flood conveyance structures (12E-2) - Replace old culverts with higher capacity culverts based on flood risk (12E-7a) 	O	0	FCZD & Juris Roads
<p>ST-21 Identify sources of funding for removal of abandoned irrigation structures (5E-2)</p>	O	2,000	FCZD & Agencies
<p>ST-22 Preserve and restore natural floodplain in places that retain some of the floodplain function. Prioritization - allow for flexibility while identifying critical locations, based on CFHMP and mapping (4-12).</p>	O	5,000/yr	FCZD
<p>ST-23 Install a remote control floodgate that could be opened some times of year, closed at others (on Spring Creek floodgate) (6B-2)</p>	O	20,000	City of UG
<p>ST-24 Protect natural floodplain functions in Shaw Creek’s watershed, especially before it is mapped (8C-1).</p>	O	500,000	FCZD
MAINTENANCE & MANAGEMENT			
<p>MM-16 The Spring Creek floodgate should generally be closed except for habitat or flow enhancement for a limited time period (see alternative F below also (6B-1)</p>	IP	0	FCZD/ Union Gap
<p>MM-17 Review DID management in relation to flood hazard over the long term as land use changes (15E-4)</p>	L	20,000	DIDs (County)
<p>MM-18 Investigate funding for enforcement and cleanup of illegal dumps on private ground. (1C-9, 1C-10)</p>	O	5,000	SW, DOE & Health Dist

MAINTENANCE & MANAGEMENT (cont)			
Description	Onset	Estimated Costs in \$	Partners
MM-19 Improve stormwater system on Ahtanum Road to limit Emma Lane overflows into the airport area, and downstream to 16 th (which floods the intersection at Ahtanum Road) (3-9).	O	0	City of Yakima
MM-20 Investigate methods for the following: <ul style="list-style-type: none"> - Research how other communities deal with dumping in floodplains, particularly concrete, fill, etc. - Research measures to deal with illegal/contaminated dumps (meth labs, etc.) - Examine statewide laws relating to dumping and streams to establish authorities. (Monitoring-Inventories [1C-7, 1C-8, 1C-11])	O	8,000	SW, FCZD, Juris
MM-21 Utilize fence designs that prevent floodwaters from backing up on fences, such as: <ul style="list-style-type: none"> o Breakaway fence panels in locations that flood frequently. o Suspension fences, which consist of steel pipe or cable hung high above the creek, and hanging lighter materials down from the cable. This works as a fence, but is not lost during floods. Fence setbacks – hold fences back some distance from the creek (loss of traditional land usage) (1B-1, 1B-2, 1B-3, 1B-4, 1B-5).	O	10,000/yr	NYCD/FCZD Bldg Officials, Plan Depts.
PUBLIC OUTREACH			
PO-13 Cooperate with other agencies to support or develop public education programs, such as stream cleanup programs and volunteer monitoring (9C-13).	IP	10,000/yr	FCZD
PO-14 Encourage citizens to report dumping in streams (public outreach) (1C-5).	L	2,000	FCZD
FLOOD RESPONSE			
FR-13 Coordinate between jurisdiction procedures in place for expedited permit issuance during and period after a flood event under State and County regulations (10D-1).	O	10,000	OEM, Juris, Agencies, FCZD
FR-14 Outline emergency response to ice jams in the Flood Response Plan (1A-3). <ul style="list-style-type: none"> - Alert residences at risk. (new) - Blast ice jams – (normally only done on very stable ice jams) (1A-6) Facilitate regulatory approval by Ecology and Fish & Wildlife and local jurisdictions due to short time frame. (new)	O	2,000	FCZD/Agencies

MAPPING TOOLS

The recently released (2011) Preliminary FIS maps for the 100 year flood increase awareness of flood hazard, and provide a critical and more accurate regulatory tool to minimize damage from large flood events, particularly for new development and

redevelopment. The maps, along with the 10 and 25 year flood maps provided in appendix J as part of this plan, also show how the existing topography and made-made structures interact with large floods to redirect flows. The maps reflect the unique absence of floodplains in these basins that could readily convey water back into the channels or long distances overland. Overland flows often affect large areas, causing substantial damage and economic disruption.

From the extent and nature of the flooding portrayed on the FEMA maps it is evident that, despite the implementation of this plan, infrequent flood events such as the 100 year event will continue to affect large areas, causing substantial damage and economic disruption. The plan recommendations above therefore concentrate on remedial actions to reduce community costs through minimizing additional community exposure and attending to more frequent flooding issues creating the most damage.

Frequent floods, from a five year interval up to the 25 year flood, produce the majority of property damage and economic disruption to the community over time. In these two basins actions to reduce damage over this range of floods is a more cost effective and realistic goal than trying to provide full relief from the 100-yr flood. The 10 and 25 year flood maps can serve as guidelines for future infrastructure location, design and planning. Many of the recommended actions in the categories should be implemented and/or managed with this product in mind.

IMPLEMENTATION STRATEGY

The purpose of a CFHMP is to propose a suite of actions that will reduce flood hazards over both the short and long term. In order to develop a long term strategy it was necessary to understand the underlying causes and obstacles to overcome. The most relevant new understanding attained during development of this plan, apart from the large extent of flooding, was the pervasive and historic nature of floodplain and channel modifications to suit agricultural practices, such as channel relocations, resizing and removal, and the legacy that alteration presents for future urbanization of the floodplains. The irrigation diversions and basin bridges act to increase overflows and flood redirection.

As flood problems result from a lack of flood hazard awareness coupled with development, or unforeseen changes in the physical or biological characteristics of the watershed, the greatest return on investment is to increase flood hazard awareness to allow effective decisions that minimize risk for both existing and future development. The In-progress activities and recommendations, combined with the Public Outreach recommendations, including distribution of this Plan, are intended to extend the awareness of these and future changes.

As the development of the Plan increased awareness of the flood problems, there was an increased awareness of data gaps that, if filled, would serve to increase the cost-

effectiveness of all the recommendations. To facilitate the plan effectiveness, the Inventory recommendations received the highest implementation priority and several were provided by the FCZD in Appendices G, H and I.

Answers to the questions “What types of actions will be effective?” and “Why will these actions be effective?” are the critical components of an implementation strategy for the plan. The answers to these questions differ for new and existing development.

New Development

Due to the widespread nature (generally shallow) of major floods, the disproportionate effect of minor changes to the landscape (fences, roads, hay bales) on flood routing and potential flood damage, and the future need to develop or redevelop large tracts of land, a higher priority is placed on Planning and Regulatory recommendations.

The Planning and Regulatory recommendations focus on standards for the location and analysis of development and related infrastructure, and construction standards for development including flood elevations, bridge design, and safe evacuation routes. Although these recommendations serve to reduce additional flooding from future development, they will also reduce existing flooding as the opportunity for replacement of existing infrastructure arises, such as bridges, with higher capacity spans and lower approaches. The FEMA FIS study has provided the mapping (noted above), the hydraulic model and means for the communities to assess infrastructure updates and removals at reduced cost.

Existing Development

In sediment rich basins characteristic of the Pacific Northwest, a significant specific issue is channel sediment and invasive vegetation, and the need for a maintenance program to manage their effects. Some of the impacts can be avoided through infrastructure design and normal replacement.

The need to implement Maintenance and Management recommendations for stream and irrigation channels is especially important in currently urbanized areas. The need to prevent intensive and expensive maintenance in future urbanized area should be an implementation priority of the Planning and Regulatory recommendations, as well as the Structural recommendations and actions. Sediment is an important contributor to basin flooding problems. Studies to quantify the impacts of sediment at bridges and in the channels have been initiated as a result of this Plan (Appendix G) so that Maintenance recommendations can be more effective.

The structural alternatives primarily act to route more water into the main channels and transfer flow capacity issues from a location of lesser channel capacity to one that is higher and provide reduced flood impacts. Many of the recommended structural projects addressing existing flooding are located in the Urban Growth Areas and should

be implemented sooner rather than later – before development precludes the opportunity for these structural alternatives and the conditions causing increased flood hazard and damages from development are fixed in place. Some of the structural recommendations in the plan address critical locations in these watersheds where flood overflow paths for large floods, such as the 100-yr flood, originate. These overflow points are usually activated during frequent floods. Once identified, the projects focus on these locations to reduce the frequent chronic, wide spread flooding.

Other structural recommendations are located in already urbanized areas, and will be implemented in conjunction with planned infrastructure or redevelopment activities as the opportunity arises.

ECONOMIC CONSIDERATIONS

The most economic action after the provision of selected Inventory recommendations is to translate the new awareness into design and planning guidelines and building restrictions that mitigate flood effects. Jurisdiction planning measures should acknowledge the legacy of agricultural conversion of floodplains to more flood-prone development, such as at lower Shaw Creek, so that effective flood reduction measures are incorporated. The use of the provided 10, 25 and 100-yr flood maps to guide development and infrastructure will greatly further this goal (see Appendix J). The maps can be used to facilitate development and design the costly infrastructure location and replacements, such as bridges, required due to obsolescence or damage. Building code revisions that reduce future economic burden to the citizens through flood insurance reduction should be pursued to avoid subsidizing other more flood prone communities.

The next most economical action is to address existing flood issues specific to a cause through wider actions such as channel maintenance.

The most expensive category is to address existing flood issues specific to a location. Structural projects are typically very expensive for jurisdictions, particularly where significant land is required. However, due to land pricing in development areas, projects should be addressed as soon as practical before the land is overdeveloped or under urbanization development pressures.

Structural projects, such as levees, also require maintenance that is a continual commitment of resources, making them the least financially attractive. The number of potential structural projects is limited in these basins by the wide extent of flooding during infrequent floods, such as the 100-year flood. Typical protection methods for existing development such as diking, channel relocation or home relocation cannot fully contain the problem. In most cases the structural measures are more suited to 10 and 25-yr floods as they encompass the majority of the community losses, as determined through economic analysis.

A Funding Strategy is presented in Chapter 12.

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