

## EXECUTIVE SUMMARY

This 2007 plan is an update of the 1998 Upper Yakima River Comprehensive Flood Hazard Management Plan (CFHMP) for the Yakima River from the Yakima County northern boundary to Union Gap and along the Naches River from Twin Bridges on State Route 12 to its mouth. The CFHMP is a policy document which contains recommended actions or policy changes to reduce flood hazard in a comprehensive fashion. The CFHMP fulfills one of the main requirements for the County to be eligible for funding from the State of Washington under the Flood Control Assistance Account Program (FCAAP).

### YAKIMA FLOODING HISTORY AND IMPACTS

Since 1894, the flow in the Yakima River has exceeded flood level 47 times. Since 1970 the area was declared a federal disaster area due to flooding 8 times in 27 years. The largest flood of record occurred in December 1933, despite completion of the Yakima Project reservoir system by the US Bureau of Reclamation.

In 1938 designs for a federal levee system on the Yakima River were completed, but this project was not constructed until after World War II, completed in 1948, and repaired and extended the next year after the 1948 flood. These works were constructed to protect the urban areas of Yakima and Terrace Heights. A series of large floods during the 1970's prompted further studies by the Corps, and the levees earlier constructed under Corps authority were raised twice in the 1970's and the 1980's. The need for raising of the levees resulted from river channel rise (aggradation) since construction of the federal project. The Wastewater Treatment Plant Levee, built in 1958, has been reconstructed 8 times due to scour at the toe of the levee.

Most of the same floods occurred on the Naches River. In the 1970's, SR 12 was constructed adjacent to the river, to an elevation to withstand the 200 year flood. The area of SR 12 upstream of the 16<sup>th</sup> Avenue exit has experienced repeated flood damage since the 1980's and failure of this roadway during a major flood event would inundate a significant portion of Yakima.

There were three major flood events in the 1990's culminating in the 1996 flood. During this flood (approximately a 100 year flood), several areas along the Corps levees protecting the urban area received successful emergency reinforcement during the flood, including:

- The west bank levee at Buchanan Lake (also known as the Beech Street Gravel Pit)
- The east bank levee immediately downstream of Terrace Heights bridge

Failure at either of these locations would have resulted in widespread damages and inundation of a large number of businesses and residences.

The following occurred at non-corps levee locations:

- Raising of the east bank Drainage Improvement District #1 levee immediately downstream of SR-24 bridge to prevent overtopping and failure.
- Overtopping and damage to the west bank Waste Water Treatment Plant levee located across from the DID #1 levee.

- Major failure of a private west bank levee in Selah that protected a large floodplain gravel mining pit. Failure of that levee caused erosion of two lanes of I-82, and the closure of I-82 during the flood event.
- Overtopping of, and damage to, I-82 near Union Gap.

The ability of flood protection facilities to withstand erosion and overtopping by floodwaters is a continuing concern. Countywide damage from the 1996 flood alone was 18 million dollars.

The presence of numerous confining flood protection levees, and roads crossings that act as levees in the planning area result in increased flood hazards due to their disruption of, and increased exposure to, natural riverine processes. The active floodplain width has been reduced to as little as one eighth its former width at several locations. The physical conditions in the river channel change from year to year on a more rapid basis than before confinement, which also changes flood effects exerted against the levees and other infrastructure, such as height of flood waters, water velocity, and the location of erosive energy. Expensive maintenance and repairs are required to keep the levee system in place in order to reduce damages to businesses, homes, roads, SR 24 , I-82 and infrastructure such as irrigation, water, and wastewater systems.

At this time Yakima County has one of only two remaining Corps certified levee systems within the state. This qualification enables technical and financial aid from the federal government. The impacts of past floods, which threaten the levee system and result in millions of dollars of damage, indicate the need for effective long term flood hazard management and planning.

## **COMPREHENSIVE FLOOD HAZARD MANAGEMENT PLANNING**

Since 1986 state financial assistance for flood control works has been under the authority of the Revised Code of Washington (RCW) Chapter 86.26 and requires the development of a flood management plan. Since 1991 this funding requires adoption of a plan development process in accordance with the 1991 guidebook from Department of Ecology, entitled "Comprehensive Planning for Flood Hazard Management". A management plan, so developed, is referred to as a "Comprehensive Flood Hazard Management Plan (CFHMP)" and, upon approval by the Department of Ecology, qualifies the agency for funding under Washington Administrative Code (WAC) Chapter 173-145: Administration of the Flood Control Assistance Account Program (FCAAP). State funds from this program can be used for emergency and non-emergency activities that reduce property loss and threats to human health caused by flooding.

In addition, the CFHMP is recognized by the Federal Emergency Management Agency (FEMA) and the Washington State Emergency Management Division as a mitigation plan to be used to direct post-disaster mitigation measures.

The CFHMP requires the following steps of the planning process:

- Establish a citizen and agency participation process
- Set goals and objectives for flood hazard management
- Develop an inventory and analysis of physical conditions
- Determine the need for flood hazard management measures
- Review existing regulations that impact flood hazard management.
- Identify alternative flood hazard management measures

- Evaluate alternative measures
- Hold Advisory Committee meetings for evaluation of alternatives
- Develop a flood hazard management strategy
- Complete the draft CFHMP and submit to Ecology
- Submit the final CFHMP to Ecology
- Hold a public hearing and adopt the CFHMP
- Notify Ecology the final plan is adopted.

## **1998 UPPER YAKIMA CFHMP**

In response to the flood events of the early 1990's the Board of Commissioners in 1995 hired KCM Inc., a consulting firm with wide experience in the preparation of CFHMP's, to undertake the Upper Yakima CFHMP. Funding for the Upper Yakima CFHMP was provided under an agreement between Ecology and Yakima County, with Ecology contributing 75 percent of the project costs through the state's Flood Control Assistance Account Program (FCAAP), and Yakima County contributing the remainder from County funds. This plan was completed in 1998, adopted by the Board of Yakima County Commissioners on September 1, 1998, and approved by the Washington State Department of Ecology (Ecology) on March 3, 2003. The County adoption made it eligible for State and FEMA funding.

The CFHMP identified flooding issues along the plan reach in order to gain an understanding of flood hazard management alternatives and develop a flood hazard management program to address these issues. As part of the development of a citizen and agency participation process an Advisory Committee of 22 members was formed and 8 meetings held during plan development. The committee had members from local agencies, including the Cities and citizens. A list of members is contained in Chapter 1. The following long-term and short-term goals and objectives were developed by the committee.

### ***CFHMP GOALS AND OBJECTIVES***

Long-term goals, which were established by the Advisory Committee for the 1998 Upper Yakima River CFHMP, and are maintained in the update, include the following:

- Prevent the loss of life, creation of public health or safety problems, and damage to public and private property
- Maintain the varied uses of existing drainage pathways and floodplains within the County
- Establish and adopt a systematic and comprehensive approach to flood hazard management
- Minimize the expenditure of public funds through effective flood hazard management
- Prevent the degradation of surface and groundwater
- Establish a stable, adequate, and publicly acceptable long-term source of financing for a flood hazard management program.

Objectives established to reach CFHMP goals include the following:

- Implement flood hazard management measures as approved in the CFHMP
- Give preference to nonstructural measures such as regulations and preservation of existing drainage corridors
- Preserve floodplain uses that are compatible with periodic flooding. Discourage land uses in the floodplain that are incompatible with periodic flooding
- Adopt flood control measures that preserve or enhance existing fishery, wildlife, and other natural uses of the riparian zone
- Ensure that changes in land use within drainage corridors maintain or restore the natural character wherever possible
- Integrate water quality needs with flood control needs and minimize the impact of contaminants and sediment in stormwater entering receiving waters
- Pursue strategies for flood hazard management that balance engineering, economic, environmental, and social factors
- Maintain consistency with Yakima County and local comprehensive plans, the state Growth Management Act, and related policy plans
- Coordinate flood hazard planning with all interested and affected parties
- Improve public understanding of flood hazard management through public education
- Establish a funding mechanism to implement the CFHMP
- Develop structural and nonstructural measures to prevent or minimize existing flood problems
- Adopt regulations to prevent new development from causing or being susceptible to flood damage.

A complete listing of the 1998 recommended actions, the implementing lead agency, and the current status of those recommendations, is provided in Table 7-2 of the 2007 update. The majority of the non-structural actions have been completed or superceded. Details of these recommended actions are contained in Chapter 8 of the 1998 CFHMP.

One of the major recommendations of the 1998 CFHMP was the establishment of a Flood Control Zone District (FCZD) to oversee implementation of the Upper Yakima CFHMP, and preparation of other CFHMPs throughout the County. On January 13, 1998, the Board of Yakima County Commissioners established the Yakima Countywide Flood Control Zone District as an independent taxing districts authorized by RCW 86.15, with the Board of County Commissioners acting as the Supervisors of the District, and the Yakima County Engineer as the head of the FCZD.

The Yakima Countywide FCZD was not staffed until 2001, and revenue collected by the FCZD that began in 1999, was used to establish an emergency fund for flood fighting in the County, as the 1996 flood fight had severe impacts on the County's general fund.

## 2007 UPPER YAKIMA CFHMP UPDATE

Between the adoption of the CFHMP in 1998, and 2002, a number of significant changes occurred which impacted the 1998 CFHMP recommendations. The most significant of these changes are summarized in Table ES-1.

TABLE ES-1 SUMMARY OF MAJOR CHANGES TO AND IMPACT ON THE 1998 CFHMP		
Action	Nature of Change	Impact on CFHMP
Formation of the Yakima Countywide Flood Control Zone District	FCZD takes responsibility for implementing CFHMP actions, providing oversight, management and monitoring of flood hazards in Yakima County. Actions on CFHMP recommendations establish partnerships.	Implements many of the CFHMP recommendations for the County as a whole, and for some actions in this project area.. Many of the implemented actions are for non-structural measures.
Completion of the FEMA floodplain Maps in 1998	Regulatory environment altered. Floodplain extent and elevations generally reduced, although hydrology not updated for floods of 1990s.	CFHMP formulated when maps were in early draft stage, so that much discussion regarding draft maps in the CFHMP is no longer relevant.
Completion of <i>Plan 2015</i> , the Yakima County Comprehensive Plan	Regulatory environment altered. Especially land use designations in floodplain areas.	Many, but not all, of the concerns regarding high density zoning in floodplains were resolved in <i>Plan 2015</i> and are no longer relevant.
Listing of Middle Columbia River Steelhead and Bull Trout as Threatened under the Endangered Species Act	Regulatory and funding environment altered. Actions that alter habitat for these species, or that receive federal funding or permits, must be designed to not effect or degrade habitat conditions.	CFHMP did not specifically address the biological attributes of the reach, or the effect of the plan or individual actions on habitat conditions in the reach.
Purchase of Floodplain Properties by the US Bureau of Reclamation	Land use environment altered.  These properties will remain in conservation status.	Change in potential future values of properties in floodplain for ag or other development. Eliminates the need for some structural actions, alters the configuration of others.
The completion of the Reaches Report on stream processes in the study reach	Improved understanding of riverine processes, river mechanics and sediment transport and deposition between the levees.	Greater understanding of why federal levees were near failure in 1996, why other levees have repeatedly failed, past levee raising and potential actions to reduce danger of failure.
Proposed reconstruction of SR 24 Bridge	Change in physical environment and increased flexibility in levee reconfiguration.	Rendered the highest ranked structural action in the plan not-implementable, and provided opportunities for other actions.

Much of the need to update chapter 8 of the plan became apparent during the planning and permitting process that WSDOT undertook for the new SR 24 bridge and related facilities. This chapter deals with the analysis of flood problems, and corresponding flood hazard management alternatives and programs. In that process, several committees were formed to look at different aspects of the environment and the bridge design such as recreation, wetlands, effect on ESA-listed species. Participants in this process included Yakima County, the City of

Yakima, the Greenway Foundation, Diking Improvement District #1, WSDOT, Ecology, WDFW, the Yakama Nation, and federal agencies such as NMFS, USFWS, USBOR, the Corps of Engineers, and Federal Highways. Riverine processes and their relationship to flood hazards within the leveed area of the “gap to gap” reach of the Yakima River became a focal part of the SR 24 committee discussions and permitting process.

Given the extent of the above impacts, and the the fact that the municipalities affected by the CFHMP, namely the Cities of Selah, Union Gap, and Yakima, had not adopted the 1998 plan, it was decided in 2002 to revise and amend Chapter 8 of the CFHMP. Once revised, the FCZD would seek approval of the revised plan from the County and the above cities in the planning area.

In 2004 the FCZD submitted Chapter 8 to the Yakima County Planning Department for analysis on the consistency of the proposed amendments with the State Environmental Policy Act (SEPA) decision for the original plan. County Planning determined that the amended Chapter 8 was substantively different from the original chapter 8 and required a full SEPA process. Through the SEPA process, and after conversation with interested parties such as the City of Yakima, WSDOT, Ecology, and others, plan adoption was conditioned on the complete update of all portions of the plan prior to submission to the Board of Yakima County Commissioners for approval, or to any of the cities. Revisions were requested to update information that has become obsolete (refereces to prior versions of regulations, listings of needed actions that have since been implemented, etc.) and to ensure consistency of all chapters with the revised content of chapter 8. Also in the SEPA decision, and contained in this executive summary, is a general plan for how the actions in the plan will be implmentented by the Flood Control Zone District in cooperation with the partners listed above, and others such as the Yakama Nation, Washington Department of Fish and Wildlife, and the United States Bureau of Reclamation.

Updating the 1998 plan was a process of updating Chapters 1 through 9 in accordance with the ammended Chapter 8. The recommended actions in Chapter 8 were a process of: (a) subtraction of actions no longer deemed appropriate given new information or already completed; (b), addition of new actions that are needed; and (c) modification of several actions to be consistent with new information. The list of these changes is given in Appendix B. Actions are presented in Chapter 8 in an order based on the severity of the flooding problems (prioritized by the 1998 advisory committee) that those actions address. The most severely modified actions were those physically associated with the SR 24 bridge and the properties acquired by USBR.

Modified recommendations in the CFHMP 2004 Amendment were directly related to the enhanced understanding of the dominant processes driving flood hazards that came to light as part of the SR 24 Bridge permitting process, although much of the new science was developed by the BOR and CWU. Recommendations include policy changes and additional studies related to the processes driving flood hazards. These recommended studies are either of a general nature (i.e. study the available sediment supply in this reach) or specific, such as the recommendation for further study of the effects of levee relocation on adjacent infrastructure. For instance, such future studies and environmental analysis will include assessing potential impacts of levee relocation on the City of Yakima WWTP outfall, mixing zone, and water quality of the Yakima River. Levee relocation studies and environmental analyses will include identification and evaluation of measures to mitigate/identified adverse impacts.

## RECOMMENDED ACTIONS

In this plan area the ability of flood protection facilities to withstand erosion and overtopping by floodwaters was a primary consideration within the recommendations.

The 2007 CFHMP recommended actions detailed in Chapter 8, and Chapter 9, are summarized below in Table ES-2. Recommended flood hazard management actions include construction projects, studies to evaluate and fund new construction projects, new policy decisions, land use modifications, enhancements to regulations, and options for retrofitting existing structures. In Table ES-2, they have been grouped accordingly with the highest priority flood issues listed first in each category.

<b>Table ES-2</b>	
<b>Summary of Recommended Actions</b>	
<b>Structural, Non-Structural, Regulatory, Study</b>	<b>Issues Addressed</b>
Setback of the levees downstream of SR 24 should not occur until the WWTP's ability to continue to discharge is assured.	LR5
<b>Structural Actions</b>	
Reconfigured levees upstream of SR24 should tie into the new SR 24 bridge abutments. On the east side of the river, levee setback would begin upstream of the Old Moxee bridge and continue to the SR 24 alignment.	LR5
Remove the western Old Moxee bridge abutment, located upstream of new SR24 alignment.	LR5
Levees Downstream of SR24, on the east side of the river will be set back to allow the incorporation of the Newland Pits into the floodplain. The levee should be located west of Blue Slough for a distance of approximately 2,300 feet south of SR 24, then crossing the slough and continuing downstream.	LR5
Levees Downstream of SR24 on the west side of the river, currently protecting Yakima WWTP should be repaired to ensure protection of the WWTP itself and maintain the ability of the City of Yakima WWTP to continue to discharge in conformance with state law.	LR5
The opportunity exists at the Beech Street Pit location for widening of the channel and improving (for sediment transport) the configuration of the levee system by setting back the levee opposite from the pit and this action should be taken. Spur dikes and additional bank protection are recommended along the Beech Street levee to reduce levee erosion. Spur dikes recently installed at the East Selah Gravel Pit should be monitored during flood events to ensure that they are protecting I-82 and the East Selah Pit levee.	UR5, MR2,
To reduce the potential for avulsion or levee failure at the Buchanan Lake/Beech Street Pit over the long term (i.e., in approximately 15-20 years or sooner if possible), the existing Terrace Heights bridge should be modified to improve sediment transport and reduce the concentration of energy downstream, especially against the levee that protects the Beech Street Pit.	UR5, MR2,
<i>Existing Gravel Mining Sites:</i> Due to the location of the East Selah Gravel Pit, large flood events will continue to affect the property in this area. Following gravel extraction, long-term modifications should include a levee designed to overtop during large flows.	UR5, MR2,
The Flood Control Zone District should work with BIA, BOR, and other interested parties in replacing or modifying Wapato Dam to pass bedload and fine sediment.	LR3
The levees at Union Farms also act as a choke point in this section of the river forcing the river against I-82, and taking a fairly large amount of floodplain surface out of the active floodplain. Removal of these levees would relieve the pressure against I-82 and lower flood elevations by allowing the river to expand across a larger floodplain.	LR3
The WSDOT should construct barbs similar to the existing downstream barbs to protect I-82. The Spring Creek gate should be reinforced to prevent failure during a future flood event or avulsion caused by pit capture. A new channel for Spring Creek (approximately 550 feet in length) should be constructed outside of the I-82 clear zone, with fish habitat elements installed in this new channel.	LR7
Retirement of the Fruitvale Diversion and Consolidation with the Current Nelson Dam Diversion	NA1
Implementation of Bank Protection on US Highway 12 at the 16 <sup>th</sup> Avenue Exit.	NA1
Based on the county-wide road closure database, prioritize roads requiring flood damage mitigation.	RW12
The County should implement bank protection projects following established guidelines (e.g., King County 1993 or ISPG, 2003), modified for Yakima County.	RW3, LR1, UR1
The following are recommended to address operations and maintenance issues: Consolidate maintenance requirements into one document following the steps outlined above Adopt a policy requiring all new flood-control projects to define maintenance responsibilities and a funding source for operations,	RW16



<b>Table ES-2 Summary of Recommended Actions</b>	
maintenance, and repairs before acceptance by the County Continually update and maintain a flood control facility inventory database to document the current condition of each flood control facility.	
Rebuild the existing Greenway pathway levee to pre-flood conditions; however, install additional embankment protection by applying heavy riprap in the highly erosive areas.	MR6
Study	Issues Addressed
In addition, an inventory of the existing structural adequacy and capacity of all levees that protect existing floodplain mines and pits should be undertaken.	UR5, MR2,
Develop a high water elevation database to evaluate changes in river channels	LR3
Obtain additional high water elevations throughout the floodplain resulting from the February 9, 1996, flood	RW1
Obtain accurate topographic data throughout the floodplain specifically for the left bank levee and floodplain downstream of the SR 24 bridge, I-82, and the floodplain near East Selah	RW1
Once this data is obtained, a new hydrologic and hydraulic analysis should be performed to FEMA standards, this will allow the design of the facilities specified above in issue LR5, and shorten the time needed to amend the FEMA maps after implementation of those actions.	RW1
Request that FEMA produce a digital floodplain map that combines all jurisdictions and reflects recent data for use in the County's GIS.	RW1
Given the long-term nature of this type of flood hazard (channel migration, sediment accumulation, erosion), a study to determine these values and to monitor sediment transport and energy should be implemented.	RW20
The County, WDFW, and the Yakama Indian Nation should identify and specifically list fish habitat enhancement areas	RW2, MR8
Assemble GIS coverages documenting closed and damaged roads from historic flood events discussed in the CFHMP	RW15
Obtain flood damage GIS coverages for recent and historical floods as they become available from FEMA	RW15
The County should hire a public education officer to manage a public education and CRS program	RW18, RW7
Non-Structural Actions ( Flood Fight )	Issues Addressed
During flood events posing risk, formalize procedures for dispatching field teams and volunteers to critical locations along rivers and creeks to manually collect real-time river information Finish compiling time delays from the BOR in flood peaks between locations along the Yakima River for various flood magnitudes Continue reviewing and compiling information on past flood events to create a database that correlates road closures with river stage and discharge Develop and communicate to the public a policy on sandbag distribution during flood events (use periodic public outreach methods to reiterate this policy). Develop a flood inundation map for distribution to the public Real-time, automatic gauging stations within the upper watershed of tributary creeks Create a Community Alert Network for use at the EOC	W19
Non-Structural	Issues

<b>Table ES-2 Summary of Recommended Actions (Funding)</b>		<b>Addressed</b>
Review the adequacy of dedicated funds versus projected costs.		RW13
Actively pursue state and federal grant programs to supplement funding provided by flood control district (see Tables 9-1 and 9-3, in Chapter 9).		RW13
Adopt a funding policy similar to polices developed in <i>Plan 2015</i> .		RW13
Investigate the value and need for sub-zones within the FCZD.		RW13
Provide direction and support to secure funding for large scale actions which involve cooperation across jurisdictions and agencies		RW13
County should provide guidance in designing private bank protection projects.		RW3, LR1, UR1
Limit development in rapid channel migration areas by promoting the Open Space Taxation Program in a public awareness campaign (see issue RW10 – Acquisition/Preservation of Floodplain Open Space).		RW3, LR1, UR1
Adopt and enforce design standards, such as onsite detention, to limit or mitigate increased erosion potential resulting from new development.		RW3, LR1, UR1
The County should submit a letter of intent for participation in the COE 1135 program to obtain funding for fish habitat restoration consistent with flood protection within the plan river reaches.		RW2, MR8
The County should pursue funding through the Reigle Community Development and Regulatory Improvement Act, Robert T. Stafford Disaster Relief and Emergency Assistance Act, Flood Control Assistance Account Program (FCAAP), Pre-Disaster Mitigation (PDM) program, and Hazard Mitigation Grants Program (HMGP).		RW17
The County should continue to operate and promote the Open Space Taxation Program.		RW10
Pursue funding through state and federal programs to purchase high-hazard floodplain properties or development rights for open space use.		RW10
The County should enroll in the CRS using a “short form” (Appendix E of the CRS Coordinator’s Manual).		RW18, RW7
The County should submit the full set of required documentation to update its CRS rating following adoption of the CFHMP.		RW18, RW7
Establish a maintenance budget for Greenway facilities.		MR6
<b>Non-Structural (Regulatory)</b>		<b>Issues Addressed</b>
<i>Future Gravel Mining Sites:</i> Development of future gravel extraction sites in the floodplain of the Yakima River and Naches River will be driven by the Yakima County Comprehensive Plan		UR5, MR2,
Adopt and follow the proposed <i>Plan 2015</i> County policy for management of the riverine environments.		LR3
Add compensatory storage requirements to the County’s CAO.		LR3
Revise base floodproofing and elevation building standards based on February 9, 1996, high water data.		RW1
Require disclosure of floodplain status in the subdivision ordinance for all newly created parcels.		RW6
Sections 5.28.020(1)(a), 5.28.020(2), and 5.28.020(3) of the County’s CAO should be revised to require all new construction and substantial improvement, regardless of intended land use, to be elevated or floodproofed.		RW4, RW5
CAO Sections 5.32.010(2) and 5.36.010(2) pertaining to requirements for siting utility lines in the floodway fringe and floodway should be consolidated within Section 4.14 pertaining to siting of utilities in HRCAs.		RW4, RW5

<b>Table ES-2 Summary of Recommended Actions</b>	
CAO Section 5.36.010(1) should be deleted.	RW4, RW5
A new CAO Section 5.28.010(d) should be added as follows: Construction of new critical facilities shall be, to the extent possible, located outside the limits of the base flood plain	RW4, RW5
The County should determine if each jurisdiction’s shoreline ordinance requires mitigation similar to zero-rise methods for the area within 100 feet of the OHWM or floodway. If so, language from the shoreline ordinances should be repeated in each jurisdiction’s flood hazard ordinance. If not, Yakima County CAO Section 5.28.010(a)(3) should be replicated in each jurisdiction’s ordinance	RW4, RW5
City jurisdictions should integrate flood hazard items included in the County’s CAO.	RW4, RW5
Apply design standard of the Greenway Master Plan during Class 2 review of developments within floodplain or Greenway overlay zones.	RW10
Extend Greenway overlay zoning beyond the Yakima Urban Area within conservation, recreation, and natural areas designated in the Master Plan.	RW10
Obtain from FEMA the best available digital flood hazard map that meets the objectives listed below: <i>Accuracy:</i> Establish definitive and accurate representations of the floodway, 100-year floodplain, Special Flood Hazard Areas (SFHAs), and Base Flood Elevations (BFEs) <i>Completeness:</i> Ensure that all of the items listed above are present in the GIS database and that the database includes all jurisdictions within Yakima County <i>Accessibility:</i> Enhance the County’s ability to perform floodplain determinations, measure areas of SFHAs, determine BFEs of specific locations, and realize time savings in the permit process <i>Community Review:</i> Ensure that sufficient local review of flood hazard information has occurred prior to release of that data for public use.	RW15
The County should adopt a Comprehensive Stormwater Management Plan to reduce localized flooding in the Yakima urban areas	OSA1
<b>Non-Structural (Regulatory, Education)</b>	<b>Issues Addressed</b>
Construct a GIS permit review tool.	RW15
Continue Standard GIS data updates.	RW15
<b>Structural, Non-Structural (Funding, Flood Fight, Education)</b>	<b>Issues Addressed</b>
The following are recommended to minimize damage to Greenway and Elks Golf Course facilities: Floodproof repetitively damaged structures by moving them to a higher elevation or installing flood walls or sealant Rebuild Greenway pathways to higher design standards such as using more erosion-resistant embankment protection Establish a maintenance budget to provide funding for the repair of inevitable future flood damage to roadways, pathways, and the Elks Golf Course Establish flood response teams to remove temporary structures prior to a impending flood event Educate Greenway users about flooding by installing interpretive signs near damaged sites that describe floodplains, floodways, effective floodplain management, and how various actions can aggravate flooding and flood damage Continually monitor cumulative effects of development in the area to limit the potential of aggravating flood damage.	MR7, UR3, UR4

<b>Table ES-2 Summary of Recommended Actions</b>	
<b>Structural, Non-Structural, Study</b>	<b>Issues Addressed</b>
<p>To address flood damage within southeastern Union Gap, the following are recommended:</p> <ul style="list-style-type: none"> <li>Integrate floodproofing techniques into the City of Union Gap's pump station</li> <li>Promote floodproofing and flood insurance to Union Gap residents who experienced damaged during the February 1996 flood</li> <li>Construct the Wide Hollow Creek high-flow bypass as recommended in the 1993 draft City of Yakima Comprehensive Stormwater Management Plan for the urban area,</li> <li>Conduct a comprehensive drainage study for the Ahtanum Creek watershed as recommended in issue OSA1 – Continued Flood Damage Outside the CFHMP Study Area.</li> </ul>	LR6
<b>Study, Non-structural (Regulatory)</b>	<b>Issues Addressed</b>
Submit certification forms and supporting data to FEMA to obtain a Map Revision in Union Gap following FEMA guidelines (FEMA 1990).	RW1

## PROJECT IMPLEMENTATION STRATEGY

Several of the recommended structural actions and the studies needed to support them are large actions and will require funding at a scale that cannot be entirely be funded by any single funding source. The FCZD can provide, or contract, the expertise required to design and implement these projects and studies, as well as seek funds. Detailed analysis is required for each of the structural actions in order to maximize beneficial and minimize potential detrimental impacts. The array of levee relocation and stabilization projects require study as an overall set of coordinated actions so that the benefits and impacts can be understood and realized in a holistic manner. The following considerations are to be included: flood hazard, critical infrastructure such as water treatment, diversion, and distribution systems; the state, local, and federal transportation systems; and natural resources of very high importance to the economy of the Yakima Valley such as water quality, recreation, and fish and wildlife habitat.

Timelines for several of these activities, particularly large ones, are dependent on external agencies. Cooperation across jurisdictions and agency responsibilities will be necessary to successfully design, fund, implement, and maximize benefits from these large scale actions and studies, and to ensure that multiple objectives can be met.

Funding opportunities will be increased through the existence and adoption of this plan, plus coordination amongst affected parties and presence of a lead proponent for each project. For the largest actions, there will likely be the need to approach authorities such as the Legislature and Congress to provide or allow funds to be spent on these multi-objective and cross jurisdictional projects.

For large flood projects, the Yakima County Flood Control Zone District has the authority and can perform the role of lead or coordinator across the variety of authorities to attain multi-agency/multijurisdictional cooperation, participation, and joint decision-making.

Environmental review and permitting will be required for structural projects. Mitigation for impacts identified during additional studies and environmental review will be developed in cooperation with affected agencies or jurisdictions. Projects shall not proceed to construction unless impacts are mitigated in accordance with state and federal laws, local policies and codes, and this CFHMP.