APPENDIX D.
ACTION PLAN IMPLEMENTATION STATUS AND ACCOMPLISHMENTS: 2006 -2012

This appendix provides a summary of accomplishments or progress between January 1, 2006 and December 31, 2011; the 2006 Flood Hazard Management Plan provided a summary of accomplishments between 1993 and the end of 2005. These accomplishments, which are listed by river basin in the following tables (D-1 through D-13), include projects related to the maintenance, repair and retrofit of King County's flood protection infrastructure; property acquisitions to remove homes at risk from flood hazards, provide for future flood hazard reduction projects, or secure open space for the purpose of flood conveyance; other non-structural accomplishments such as studies conducted that inform on-the-ground projects; and technical assistance. Information on the location, nature, and driver associated with each project is provided.

A brief narrative description and type of action are provided for each flood mitigation action proposed in the 2006 King County Flood Hazard Management Plan. Individual actions are further characterized using standard flood mitigation action categories; Table D-14 provides definitions for these action type categories. The final columns reflect implementation accomplishments of these actions and next steps.

TABLE D-1.
COUNTYWIDE PROGRAMMATIC ACTIVITIES (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Public Outreach, Flood Preparedness, Warning and Emergency Response	Provide regional flood preparedness, warning and flood emergency response services. Coordinate and implement public outreach on flood preparedness and floodplain management programs and projects, and respond to inquiries and complaints from citizen and other public and private agencies.	Preventive/ Public Information	Implemented an automated Flood Alert System; conduct annual direct mail campaign to all King County floodplain parcel addresses; and provide real-time flood data online and via mobile device web pages.	Implement social media flood platform and develop flood warning application for smart phones.
Flood Protection Infrastructure Inventory and Assessment	Develop and implement a flood protection infrastructure inventory database and a routine program of inspection, condition assessment, and monitoring for all flood protection infrastructure and appurtenances, including levees, revetments, raised banks, pump stations, stormwater discharge structures, cross-culverts and closure structures.	Preventive	Inventory in the process of being developed, once fully implemented, will likely want a recommendation to continue with these activities	Continue developing and implementing inventory database, assessment, and monitoring
Flood Protection Infrastructure Maintenance	Carry out annual routine maintenance, including flood protection infrastructure mowing, noxious weed control, installation and repair of access control, and minor repair and maintenance of flood protection infrastructure and related properties and appurtenances.	Preventive	This action is implemented on an as needed basis.	Carry forward this action

TABLE D-1.
COUNTYWIDE PROGRAMMATIC ACTIVITIES (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Sediment Management Program	Establish a sediment management program that includes expanded channel monitoring, establishment of thresholds to trigger actions, and analysis of sediment management action alternatives.	Structural	Action has been implemented, with an expanded channel monitoring component being conducted on eight river segments. Sediment management action alternatives have been analyzed on three of the eight segments (South Fork Snoqualmie, Lower Cedar, Lower White), where implementation of a selected sediment management action would occur as a capital project. On the five other river segments (Lower Raging, Lower Tolt, Snoqualmie at Fall City and Carnation, and Middle Fork Snoqualmie), consideration of sediment management alternatives is yet to be completed, although channel monitoring data collected to date have been used in basin-scale flood reduction strategies underway.	Carry forward this action to continue the implementation of the sediment management program, with ongoing channel monitoring of sediment levels, and analysis, evaluation and selection of appropriate sediment management actions, which may include levee setback, acquisition and removal of at-risk structures, elevation of at-risk structures or gravel removal.
Floodplain Information and Permit Review Technical Support	Provide technical support to King County's Department of Development and Environmental Services for floodplain permits and inquiries, floodplain mapping, elevation certificates, and Critical Areas Ordinance updates.	Technical Assistance	Technical support to King County Programs for floodplain permits and responding to inquiries on mapping, elevation certificates as requested.	Carry forward this action; continue to provide assistance to help public and private entities make wise land use decisions that reduce or eliminate flood-related risks.
Salmon Habitat Recovery Technical Support	Provide floodplain management technical support to Snohomish, Cedar, Green and White River watershed coordination and salmon habitat recovery activities.	Natural Resource Protection	Action has been implemented; coordination with WRIA teams is on-going. Participation in salmon habitat recovery and other fish and wildlife habitat enhancement projects to ensure that flood-related risks associated with these projects are avoided or minimized.	Carry forward this action; continue participation in salmon habitat recovery and provide technical support associated with flood-related risks associated with projects.

TABLE D-1.
COUNTYWIDE PROGRAMMATIC ACTIVITIES (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Technical Support to Other Agencies	Provide floodplain management technical support to all King County departments proposing activities or projects that affect floodplain functions.	Technical Assistance	Action has been implemented. Technical support to all King County Departments and Programs as needed. King county continues to work with those involved in the use and management of agricultural, recreational, and open space lands, etc. in flood hazard management areas to ensure that land uses remain compatible with the natural conveyance of flood waters.	Carry forward this action; continue to provide assistance to help public and private entities make wise land use decisions that reduce or eliminate flood-related risks.
Grant Applications	Maximize federal, state and local funding opportunities through grant application submittals in support of completing capital improvement projects, technical studies and other flood hazard management activities.	Plan Performance	Action has been implemented. Grant applications have been submitted and awarded for various projects throughout King County	Carry forward this action; submit grant applications as applicable.
Community Rating System Certification	Provide supporting documentation, technical support and staff training required to maintain favorable status in the FEMA's Community Rating System. This work supplements work, carried out in the Department of Natural Resources and Parks and compliment-related work carried out by the Department of Development and Environmental Services	Plan Performance	King County remains in favorable status in FEMA's CRS as a Class 2 community. This rating allows flood insurance premium rates at a 40% discount.	Carry forward this action; continue participation in CRS.
River and Floodplain Section Administration	Provide for program administration, staff supervision and training, Flood Hazard Management Plan updates, Comprehensive Plan Consistency, and the River and Floodplain Management Unit Annual Report.	Plan Performance	Action has been implemented. 2006 Flood Hazard Management Plan was adopted in 2007. Plan update process began in 2012. Annual Reports have been completed and published.	Carry forward this action.

TABLE D-2.
COUNTYWIDE PROJECTS (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Flood Hazard Corridor Mapping	Update flood hazard management corridor maps with flood hazard, land use and evaluate the feasibility of assessing the cumulative effects of flood risk reduction projects. Integrate flood hazard and ecological data in a readily accessible information management system.	Preventive	Partial Implementation. King County has updated flood rate insurance maps for its major river systems and continues to make mapping changes as land use dictates. King County's "iMap" application integrates ecological and flood hazard data in a format accessible to the general public.	Action is ongoing
Countywide Risk Assessment	Carry out flood damage risk assessments to evaluate the potential consequences of flood protection infrastructure failure along major river systems. Risk assessments will focus on areas of potential levee failure and known repetitive loss areas.	Preventive	Action has been Implemented - King County has conducted robust risk assessments in known problem areas to identify potential consequences of flood protection infrastructure failure.	Action is ongoing
Flood Protection Infrastructure Revegetation	Implement flood protection infrastructure revegetation projects to promote the growth of native vegetation to decrease long-term maintenance needs and enhance fish and wildlife habitat Funding adequate to support one or two small projects per year	Natural Resource Protection	Partial Implementation– Many flood protection infrastructure repair projects involve planting native vegetation.	In order to maintain eligibility with the Corps' PL 84-99 rehabilitation and inspection program, King County has been required to remove vegetation from levees in certain areas.
Flood Emergency Response	Provide funding to repair flood protection infrastructure damaged by floods. To the maximum extent possible, funds would be used to match state and federal emergency and disaster mitigation funds.	Emergency Services	Damaged flood protection infrastructure have been aggressively repaired, where possible partnering with the Corps of Engineers and FEMA.	Action is ongoing
Adaptive Management Analyses and Implementation	Monitor projects using performance measures and adaptive management to track the effectiveness of completed projects and inform the design and implementation of future projects.	Plan Performance	Post-project monitoring does occur, and the lessons learned inform future project designs.	Carry forward this action

TABLE D-2.
COUNTYWIDE PROJECTS (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Large Wood and Landslide Hazard Assessment and Management Alternatives Analyses	Complete an assessment of flood hazards associated with increasing accumulations of large wood in river channels and the potential impacts future landslides may have on flooding and erosion. Develop alternative analysis and protocols for the management of flood hazards related to these natural river and floodplain elements.	Plan Performance	Partial Implementation– large wood assessments have been conducted, and protocols for large wood placement have been developed. Natural wood protocols are in development.	Carry forward this action; specifically carry forward landslide assessment and protocols
Small Stream and Marine Shoreline Area Flood Studies	Complete flood studies and flood boundary delineations to update the corresponding FEMA Flood Insurance Studies and Flood Insurance Rate Maps for small streams and marine shoreline areas in unincorporated King County.	Plan Performance	Partial Implementation – King County has completed mapping of marine shoreline areas and the studies have been submitted to FEMA allowing for the development of coastal FIRMs. Some small streams have been studied, but others remain and will be completed as availability of staffing and financial resources allow	Carry forward
Flood Mitigation Opportunity Fund	Identify and provide funding for home elevations and floodplain property acquisitions recommended through the analyses of repetitive loss areas, basin-specific alternative analyses, and countywide risk assessment	Property Protection	Partial Implementation - King County has identified priority mitigation areas and actively pursued grant funding to support elevations and acquisitions. A fund of the type described here was established for the Cedar River basin. Funding for mitigation activities in other basins is drawn from basins' capital funds, and the mitigation typically must be associated with a specific project.	King County is currently implementing elevations and acquisitions at the maximum level that staffing will allow.

TABLE D-3.
ACCOMPLISHMENTS FOR THE SOUTH FORK SKYKOMISH RIVER IN KING COUNTY (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Miller River Alluvial Fan - Road Protection *formerly known as Miller River Road Protection*	Develop and implement strategy for maintenance or removal of flood protection infrastructure and other infrastructure on the Miller River Alluvial Fan.	Structural Solutions	Analysis of log structure completed. Provide technical input to KC Roads Services on flood and erosion risks related to appropriate responses to Old Cascades Highway breach.	Continue to provide expertise to KC Roads Services.
Timber Lane Village Home Acquisitions (Erosion & Flooding) *formerly known as Timber Lane Village Home Buyouts (Erosion) and Timber Lane Village Home Buyouts (Flooding)*	Purchase homes and property in this residential neighborhood, which is subject to extreme erosion and flooding.	Property Protection	Three houses and 5 parcels purchased.	Conduct technical analysis to determine highest priorities for flood and erosion buyouts.
South Fork Skykomish River Channel Migration Zone Study	Conduct channel migration hazard mapping of the South Fork Skykomish River	Preventive	None.	Begin mapping and analysis for the study area.
Priority Acquisitions Throughout South Fork Skykomish Basin *formerly known as South Fork Skykomish River Early Action Residential Flood Hazard Mitigation*	Purchase or otherwise mitigate flood risks to repetitive loss properties.	Property Protection	King County recently purchased a repetitive loss property near Baring.	Assess high risk areas and identify and acquire high priority properties.
Miller River Home Demolition *formerly known as Miller River Home Buyout*	Demolish purchased monastery compound which was threatened by flooding and erosion.	Property Protection	One property purchased.	Project Complete.
Town of Skykomish Residential Flood Mitigation *formerly known as Town of Skykomish Home Buyouts*	Purchase homes and property subject to flooding risk in the Town of Skykomish.	Property Protection	None.	None planned.
Other Actions Implemented but not Addressed in 2006 FHMP				
McKnight Revetment Repair	Repair damage from 2009 flood event.	Structural Solutions	Completed 70 lineal feet of revetment repair project. Planted site with variety of native plants.	Project complete.

TABLE D-4.
ACCOMPLISHMENTS FOR THE SOUTH FORK SNOQUALMIE RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
South Fork Levee System Improvements	Determine and implement an effective suite of actions to repair, relocate and/ or strengthen selected portions of the levee system. Implement early actions as appropriate and in response to flood events.	Structural Solutions	Initial analyses and evaluations are underway to implement this project.	Compare suite of alternatives and begin preliminary design of selected alternative(s).
Upper Snoqualmie Valley Residential Flood Mitigation *formerly known as North Bend Area Residential Flood Mitigation*	Prioritize and implement residential home elevations, relocation and acquisitions. In the South Fork Basin the focus is elevations in Shamrock Park and Clough Creek neighborhoods and acquisitions in the Circle River Ranch neighborhood.	Property Protection	Ten homes elevated and 3 underway.	Pursue home elevations and acquisitions to mitigate or eliminate flood risks to residential structures.
Other Actions Implemented but not Addressed in 2006 FHMP				
Geomorphic Hazards and Risks Assessment Alternatives Analysis – South Fork Snoqualmie River Circle River Ranch Neighborhood	Conduct investigation to identify geomorphic hazards and alternatives to reduce their risks on South Fork Snoqualmie River.	Preventive	Identified hazards and risks in Circle River Ranch neighborhood.	Project complete.
South Fork Snoqualmie River Gravel Removal Study	Characterize sediment accumulation and evaluate effects of gravel removal along portion of leveed South Fork Snoqualmie River.	Preventive	Finished analysis of gravel removal scenarios for flood reduction effectiveness.	Project complete.
Circle River Ranch Alternatives Analysis and Implementation	Determine and implement an effective suite of actions to address geomorphic risks to the Circle River Ranch neighborhood. An analysis of the potential alternatives will inform potential implementation of projects.	Preventive	Completed analysis of flood and erosion risks in the Circle River Ranch neighborhood.	In progress.
Allen Revetment Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed 150 lineal feet of revetment repair project.	Project complete.
Riverbend Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed 60 lineal feet of levee repair project.	Project complete.
Si View Park Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed levee repair project.	Project complete.
Reif Road River Mile 4.1 Levee Repair	Repair damage from 2009 flood event.	Structural Solutions	Completed levee repair project.	Project complete.

TABLE D-4.
ACCOMPLISHMENTS FOR THE SOUTH FORK SNOQUALMIE RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Allen Revetment Repair	Repair damage from 2009 flood event.	Structural Solutions	Completed revetment repair project.	Project complete.
Reif Road Levee Emergency Repair	Repair damage from 2011 flood event.	Structural Solutions	Completed 40 lineal feet of levee repair project.	Project complete.
Si View Levee Repair	Repair damage from 2012 flood event.	Structural Solutions	Repairing 40 lineal feet of levee erosion.	Project in Design Phase.

TABLE D-5.
ACCOMPLISHMENTS FOR THE MIDDLE AND NORTH FORKS SNOQUALMIE RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Middle Fork Corridor Management Project *formerly known as Middle Fork Levee System Capacity Improvements*	Develop management strategies that reduce flood, erosion, and channel migration risks in a sustainable way. Products will include technical information detailing pros and cons of alternatives, a decision-making process and record, and an implementation plan for a suite of actions (preferred alternative).	Structural Solutions	Bathymetric survey completed in 2010.Report completed: "Middle Fork Snoqualmie River Channel Migration Update, 1996-2010". Emergency Action Plan created at Mason Thorson Extension prior to 2011 levee repair. Hydraulics, geomorphology and ecological resources work initiated.	Complete hydraulic, geomorphologic, and ecological resources characterization reports. Complete alternatives analysis. Implement high ranking actions from alternatives analysis.
Other Actions Implemented but not Addressed in 2006 FHMP				
Mason Thorson Ells Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed 400 lineal feet of revetment repair project.	Project complete.
Mason Thorson Extension Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed 450 lineal feet of levee repair project.	Project complete.
Mason Thorson Extension Levee Repair	Repair damage from 2009 flood event.	Emergency Services	Completed emergency repair.	Project complete.
Mason Thorson Extension Levee Repair	Repair damage from 2010 flood event.	Structural Solutions	Completed 20 lineal feet of levee repair project.	Project complete.
Mason Thorson Extension Levee Repair	Repair damage from 2011 flood event.	Structural Solutions	Completed 70 lineal feet of levee repair project.	Project complete.
Middle Fork Snoqualmie Large Wood Mitigation	Relocate logs in high flow channel from January 2009 flood event.	Structural Solutions	14 logs relocated around Mason Thorson Extension Levee.	Project complete.

TABLE D-6.
ACCOMPLISHMENTS FOR THE UPPER MAINSTEM SNOQUALMIE RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Actions Implemented but Not Addressed in 2006 FHMP (No actions from 2006 Flood Plan)				
Upper Snoqualmie Valley Residential Flood Mitigation *formerly known as Upper Snoqualmie Valley River Flood Mitigation Program*	Prioritize and implement residential home elevations, relocation and acquisitions. 331 Homes have been identified as elevation targets an additional 12 homes are acquisition targets. This project implements non-structural flood mitigation for the entire Snoqualmie Valley floodplain above Snoqualmie Falls.	Property Protection	Fourteen homes elevated and 1 underway.	Pursue home elevations and acquisitions to mitigate or eliminate flood risks to residential structures.
Meadowbrook Revetment Repair	Repair damage from 2011 flood event.	Structural Solutions	Completed 80 lineal feet of revetment repair project.	Project complete.
Record Office Revetment Repair	Repair damage from 2012 flood event.	Structural Solutions	Repairing 125 lineal feet of revetment erosion.	Project in Design Phase.

TABLE D-7.
ACCOMPLISHMENTS FOR THE LOWER SNOQUALMIE RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Aldair/ Fall City Acquisitions, *formerly known as Aldair Buyout*	Pursue voluntary acquisitions of at risk structures in Snoqualmie at Fall City segment; includes potential support to levee setback projects in Snoqualmie at Fall City segment.	Property Protection	Five properties purchased so far including 15 residences and 36 acres. Participated in SAFC reach feasibility study, including technical analysis and outreach.	In progress.
Lower Snoqualmie Residential and Agricultural Flood Mitigation *formerly known as Lower Snoqualmie Residential Flood Mitigation Program*	Pursue house and agricultural structure elevations and acquisitions consistent with mitigation strategy criteria; provide other support for flood risk reduction for agricultural, commercial, residential uses in valley.	Property Protection	Seven homes elevated and 2 barn elevations underway.	In progress.
Winkelman Revetment Repair *formerly known as Tolt Pipeline Protection*	Analyze, design, and implement a capital project to repair 800 lineal feet of Winkelman revetment to maintain protection of Seattle Public Utilities Tolt water supply pipeline that runs adjacent to Snoqualmie River at this location.	Structural Solutions	In progress.	Project is proposed for 2015 construction.
SE 19th Way Buyout	Purchase farm which is at risk of being isolated by bank erosion.	Property Protection	Not pursuing buyout. See Appendix G for potential project action.	None.
Neal Road Relocation	Realign road currently closed due to bank failure.	Emergency Services/ Structural	None.	Project not completed. Project removed from CIP list due to low priority.
Other Actions Implemented but not Addressed in the 2006 FHMP				
Flood – Farm Task Force Implementation	Continue to support farm pads, barn elevations, and ongoing dialog with farmers regarding flood concerns and possible solutions. Participate in agency Fish/ Farm/ Flood process.	Technical Assistance	Twenty four farm pads have been constructed. Participating in WLR Fish/ Farm/ Flood work program.	In progress.
McElhoe Pearson Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed 50 lineal feet of levee repair project.	Project complete.

TABLE D-7.
ACCOMPLISHMENTS FOR THE LOWER SNOQUALMIE RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Aldair Levee Repair	Repair damage from 2008 flood event.	Structural Solutions	Completed 300 lineal feet of levee repair project.	Project complete.
McElhoe Pearson Levee Emergency Repair	Repair damage from 2009 flood event.	Emergency Services	Completed emergency repair.	Project complete.
Sinnema Quaale Upper Revetment Repair	Analyze, design, and implement a capital project to repair 1000 lineal feet of Sinnema Quaale Upper revetment that provides protection to an embankment supporting the Snoqualmie Valley Trail, a regional fiber optic line, and SR 203.	Structural Solutions	In progress.	Construction proposed for 2014.

TABLE D-8.
ACCOMPLISHMENTS FOR THE TOLT RIVER (2006– 2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Tolt River Mouth to State Route 203 Floodplain Reconnection Technical Support	Continue providing technical support for flood and channel dynamics aspects of the Tolt River Levee Setback project.	Technical Assistance	Provided technical assistance for Setback project.	Project complete.
Tolt River Road Shoulder Protection	Protect road from channel migration.	Emergency Services	Buried setback revetment installed to protect road.	Project complete.
San Souci Neighborhood Acquisitions *formerly known as San Souci Neighborhood Buyout*	Purchase homes in high flood and erosion hazard area.	Property Protection	Twelve properties purchased including 12 residences and 40 acres.	Continuing to purchase at risk properties for 3-5 more years.
Tolt River Flood Early Action Residential Flood Hazard Mitigation	Elevate structures on two repetitive loss properties.	Property Protection	None.	No RL properties in Tolt; 2 RL properties in Snoqualmie mainstem near Tolt will be part of LS residential mitigation program.
Tolt River State Route 203 to Trail Bridge Floodplain Reconnection	Setback Frew levee (right bank) to improve conveyance and allow habitat enhancement.	Structural/ Natural Resource Protection	None.	Priority for funding and implementation to be determined by Tolt Corridor Action Plan.
Tolt River Mile 1.1 Levee Setback	Setback Highway to RR Bridge levee (left bank) to improve conveyance and allow habitat enhancement. Includes purchase and removal of homes.	Structural/ Property Protection/ Natural Resource Protection	Ten properties purchased including 8 residences and 7 acres.	Purchase remaining at-risk properties; begin design of levee setback project.
Other Actions Implemented but not Addressed in 2006 FHMP				
Frew Emergency Repair	Perform emergency repairs to flood protection infrastructure during and immediately following January 2009 flood event.	Emergency Services	Completed emergency repair.	Project complete.
Tolt River Levee Right Emergency Repair	Perform emergency repairs to flood protection infrastructure during and immediately following January 2009 flood event.	Emergency Services	Completed emergency repair.	Project complete.

TABLE D-8.
ACCOMPLISHMENTS FOR THE TOLT RIVER (2006– 2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Highway to RR Bridge Emergency Repair	Perform emergency repairs to flood protection infrastructure during and immediately following January 2009 flood event.	Emergency Services	Completed emergency repair.	Project complete.
Tolt River Natural Area Floodplain Reconnection Acquisitions	Purchase homes in high flood and erosion hazard areas associated with Tolt Natural Area (some of which will allow for future setback of Edenholm levee).	Property Protection	One property purchased with one residence on one acre.	One more appraisal underway; additional acquisitions will be pursued pending landowner willingness.
Tolt River Corridor Action Plan *formerly known as Tolt River Supplemental Study*	Study and planning effort underway to update technical information on flood and erosion risks and habitat restoration; and to recommend priority actions.	Preventive	The Tolt River Corridor Action Plan is currently underway. This effort includes the scope of work as originally envisioned in this action.	Completion of technical data collection, alternatives analysis, and outreach.
Lower Tolt River Acquisition	Purchase Swiftwater property to allow for future setback of Upper Frew levee (right bank).	Property Protection	Appraisal underway to determine fair market value of property.	Close on purchase in 2013 if price can be agreed to.

TABLE D-9.
ACCOMPLISHMENTS FOR THE RAGING RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Fall City Levee Setback Feasibility Study	Determine best alternative for homes in areas subject to flood hazards areas.	Preventive	None.	Develop study scope, schedule and budget for implementing levee setback feasibility study.
Alpine Mobile Manor Neighborhood Buyout	Purchase and remove homes from high flood and erosion hazard area and allow habitat enhancement. In long term, remove county and private flood protection infrastructure.	Property Protection/ Natural Resource Protection	Six properties purchased, comprising 5 residences and 8 acres.	Purchase 4 more single family homes and the mobile home park if landowners are willing and funding is available.
Other Actions Implemented but not addressed in 2006 FHMP				
Arruda Revetment Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed revetment repair project.	Project complete.
Bryce Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed levee repair project.	Project complete.
Bridge to Bridge Left Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed levee repair project.	Project complete.
Bridge to Mouth Right Levee Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed levee repair project.	Project complete.
Preston Fall City Lower Revetment Repair	Repair damage from 2006 flood event.	Structural Solutions	Completed revetment repair project.	Project complete.
Bridge to Bridge Left Levee Repair	Repair damage from 2009 flood event.	Structural Solutions	Completed levee repair project.	Project complete.
Bridge to Bridge Right Levee Repair	Repair damage from 2009 flood event.	Structural Solutions	Completed levee repair project.	Project complete.

TABLE D-10.
ACCOMPLISHMENTS FOR THE SAMMAMISH RIVER AND ISSAQUAH CREEK (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Willowmoor Floodplain Restoration	Reconfigure outflow from Lake Sammamish to maintain or reduced current level of flood risk along the lake in a manner that reduces impacts on fish and wildlife in the transition zone between the lake and the Sammamish River. Project is required mitigation for current maintenance practices required by the U.S. Army Corps of Engineers.	Structural Solution/ Natural Resource Protection	King County and the City of Redmond are jointly conducting a feasibility study to inform project constraints, opportunities, and alternatives.	King County is evaluating how to move forward with this project given its relatively low flood risk reduction potential. The City of Redmond committed their 2011 Sub-Regional Opportunity Fund to this project to advance it.
Sammamish River Flood Study	Survey data for the Sammamish River dates from 1965. Extensive urban development in the basin has altered flows and sediment loads entering from tributaries. The contour interval used for these existing flood maps is five feet rather than the more detailed interval of two feet. A two-foot interval greatly improves the mapping accuracy of flood hazard boundaries, used in planning future development in the valley. The insurance analysis performed in the Risk Assessment for this Plan in Appendix C supports the need for mapping by identifying that 71 percent of the flood insurance policies in force within the Sammamish River basin are outside the mapped 100-year floodplain. Prepare flood study and corresponding FEMA Flood Insurance Studies and Flood Insurance Rate Maps for the Sammamish River. (Sammamish River, Unincorporated, Cities of Redmond, Woodinville, Bothell, and Kenmore)	Preventive	Completed flood study and Flood Insurance Rate Maps for the Sammamish River.	N/ A
Issaquah Creek Early Residential Flood Hazard Mitigation	Twenty three existing homes and commercial buildings have repeatedly experienced damage from flooding on Issaquah Creek. Repetitive damage to structures was determined by FEMA based on existence of flood insurance policies and claims paid by those policies. Based on the amount and number of claims that have been paid, these properties are identified as being at high risk for future flood damage. Mitigate two repetitive loss properties on Issaquah Creek. Investigate other potential at-risk homes in repetitive loss areas. (Issaquah Creek, City of Issaquah and Unincorporated King County)	Property Protection	Of the 23 repetitive loss properties along Issaquah Creek, 2 have been mitigated through acquisition, with 6 additional acquisitions underway; 5 structures have been mitigated through elevation, with one more planned for 2013.	Carry forward this action
Issaquah Creek Bank Stabilization	Severe bank erosion threatened a city road and the Medical Center of Issaquah.	Structural Solution	Completed a bank repair to protect the infrastructure at risk.	N/ A

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Cedar River Channel Migration Zone Study and Mapping.	Prepare channel migration zone study and maps for the Cedar River.	Preventive	A study of channel migration mapping techniques was completed. The results of this study will help guide next steps.	Preliminary analyses have been conducted, but the formal study and mapping process has not been completed.
Cedar Rapids Levee Setback	Set back levee to improve flood conveyance and restore habitat. Complete project design, permits, and construction.	Structural Solution/ Natural Resource Protection	Project was largely funded by habitat restoration-focused partners through the Salmon Recovery Funding Board. Project was completed.	Natural restoration processes are being adaptively managed to foster beneficial habitat without sacrificing flood protection.
Jan Road-Rutledge Johnson Levee Setbacks	Remove portions of both levees that protect only open space. Segments of existing levees constrict conveyance and direct erosive flood flows into the Cedar River Trail and State Route 169.	Structural Solution/ Natural Resource Protection	Acquisition of a key property necessary for the project has been completed with grant funding secured by a habitat restoration partner.	Feasibility study will be initiated in 2012 to evaluate levee inter-related levee setback projects within the reach. Study will guide project design and timing. Coordinate with habitat partners in ongoing acquisition and future project design efforts.
Cedar River Early Action Residential Flood Hazard Mitigation	As of 2011, there were 17 existing homes identified by FEMA, based on flood insurance claims that have repeatedly experienced damage from flooding. Based on the amount and number of claims that have been paid, these properties are identified as being at high risk for future flood damage. These typically represent only a small percentage of the total number of properties experiencing similar flood damages, but which don't have the insurance claims records. Investigate other potential at-risk homes in repetitive loss areas. (Cedar River, Unincorporated King County	Property Protection	Eleven of the FEMA identified repetitive loss homes have been mitigated through acquisition and home elevation. Acquisition of 84 additional homes subject to repeated damage includes 65 parcels that will contribute to large flood risk reduction capital projects and 15 acquisitions by our habitat partners.	Flood Hazard Mitigation Study will better define the flood problem and possible solutions. Continue to work with flood-prone property owners to identify and implement flood solutions. .

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Herzman Levee Setback & Floodplain Reconnection	Set back levee to reduce erosive forces on the Cedar River Trail and State Route 169.	Structural Solution/ Natural Resource Protection	Completed acquisition through donation on one of the parcels necessary for the levee setback.	Feasibility study will be initiated in 2012 to evaluate levee inter-related levee setback projects within the reach. Study will guide project design and timing. Coordinate with habitat partners in ongoing acquisition and future project design efforts.
Cedar Grove Mobile Home Park Acquisition Project	Purchase mobile home park and provide relocation assistance to the residents in this area of major flood hazards.	Property Protection/ Natural Resource Protection	Completed project.	N/ A
Rainbow Bend Levee Setback and Floodplain Reconnection	Set back or remove levee to improve flood conveyance and storage through this reach and to restore floodplain functions.	Property Protection/ Structural Solution/ Natural Resource Protection	Acquired last remaining parcel in project area, completing flood mitigation objectives for the residents. Developed partnership with City of Seattle and Lake Washington/ Cedar/ Sammamish Watershed Salmon Recovery Council to design and construct the levee setback and floodplain restoration project. Some of the site restoration and revegetation has been completed.	Design is currently underway and project is scheduled for construction in 2013.

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Getchman Levee Setback and Floodplain Reconnection	Set back the levee to improve river's flood conveyance, flood storage, and its interaction with lower Taylor Creek, while maintaining protection for Maxwell Road. Acquisitions are completed or underway.	Property Protection/ Structural Solution/ Natural Resource Protection	Acquisition of two key properties necessary for the project have been completed with grant funding assistance secured by a habitat restoration partner. All necessary acquisitions are complete.	Feasibility study will be initiated in 2012 to evaluate levee inter-related levee setback projects within the reach. Study will guide project design and timing. Coordinate with habitat partners in ongoing acquisition and future project design efforts. .
Rhode Levee Setback and Home Buyouts	Purchase homes along path of fastest, deepest flood flow, and set back the levee to lower localized velocities and depths.	Structural Solution/ Property Protection/ Natural Resource Protection	Acquisitions have been completed on six homes spanning seven parcels, eliminating flood risk to those residents. Negotiations are underway on several additional parcels. Grant funding from habitat partners has contributed to these acquisitions.	Feasibility study will be initiated in 2012 to evaluate levee inter-related levee setback projects within the reach. Study will guide project design and timing. Coordinate with habitat partners in ongoing acquisition and future project design efforts. .
Other Actions Implemented Not in 2006 FHMP				
Elliot Bridge Reach Floodplain Reconnection	Residential neighborhood, partially protected by low elevation levees, experienced damages from fast and deep flood flows in 2006 and 2009.	Property Protection/ Structural Solution/ Natural Resource Protection	Acquisitions have been completed on 14 properties. Negotiations are currently underway on one additional property.	Continue to work with flood-prone property owners to complete acquisitions necessary for setback of two opposing bank levees. Work with WSDOT to implement an early action restoration project on a portion of the project area.

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Royal Arch Neighborhood Flood Mitigation	Fast and deep overbank flows during January 2009 flood damaged homes and cutoff access for 10 residential properties.	Property Protection/ Natural Resource Protection	Through coordination with the City of Seattle on implementation of their habitat conservation plan grant, acquisitions have been completed on 7 properties containing 5 homes.	Continue to coordinate with City of Seattle to complete purchase the one remaining home at greatest risk.
Belmondo Reach Acquisition	This reach contains one of the only unconfined areas within which the river regularly shifts channel location across a wide band of active floodplain. A home located on a terrace above the channel is at risk from channel migration and erosion that could undercut the terrace. (Cedar River, Unincorporated)	Property Protection/ Natural Resource Protection	Project to acquire flood-prone home completed through coordination with City of Seattle.	N/ A
WPA	The WPA levee provides a minimal level of flood protection to five homes which are located in the floodway and what appears to be an area of severe channel migration based on preliminary findings of the channel migration zone study currently underway. The levee also constricts flow conveyance through this segment, where a mobile home park on the opposite bank is regularly inundated by flood flows. (Cedar River, Unincorporated)	Property Protection/ Natural Resource Protection	Habitat partners secured grant funding and have completed acquisition on 2 homes.	Carry forward this action
Cedar River Trail Site #2B Revetment Repair	Repair damage to the flood protection infrastructure caused bank scour from November 2006 flood.	Structural Solution	Completed 100 lineal feet of bank stabilization revetment repair project.	N/ A
Lower Dorre Don Levee Repair	Concrete debris (likely from old bridge abutment) in river causing flows to be deflected towards neighborhood	Structural Solution	Completed 440 lineal feet of bank stabilization levee repair project.	N/ A
Banchero-Barnes Revetment Repair	Repair damage to the flood protection infrastructure caused bank scour from November 2006 flood.	Structural Solution	Completed 310 lineal feet of bank stabilization revetment repair project.	N/ A

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Cedar Rapids Emergency Repair 2009	Flooding in 2008 and 2009 mobilized chained logs from project. Decision to retrieve all chained logs and stockpile for re-designed installation.	Emergency Services/ Structural Solution	Completed emergency repairs.	Design and construct permanent repair was completed in 2010.
Cedar River Trail Site #1 Revetment Repair	Severe erosion and scour damage to revetment as a result of 2009 flood.	Structural Solution	Completed 150 lineal feet of bank stabilization revetment repair project.	N/ A
Cedar River Trail Site #3 Revetment Repair	Flood damage from 2009 event caused scour hole within one foot of trail, and damage to toe and bank rock.	Structural Solution	Completed 65 lineal feet of bank stabilization revetment repair project.	N/ A
Jan Road Levee Repair	Scour along top-of-bank and backslope as result of January 2009 flood.	Structural Solution	Completed 22 lineal feet of minor levee repair.	N/ A
Petorak-Wadhams Revetment Repair	Severe erosion and scour at upstream end of flood protection infrastructure as a result of January 2009 flood. Home immediately behind revetment at risk.	Structural Solution	Completed 130 lineal feet of bank stabilization revetment repair project.	N/ A
Rainbow Bend Levee Repair	Damage to top-of-bank and backslope of levee as result of January 2009 flood.	Structural Solution	Completed 15 lineal feet of minor levee repair.	N/ A
Rhode Levee Repair	Damage to top-of-bank and backslope of levee as result of January 2009 flood.	Structural Solution	Completed 100 lineal feet of levee repair.	N/ A
Belmondo Emergency Repair	Emergency repair done during January 2009 flood covers a portion of the bank damages from both the November 2006 and January 2009 floods.	Emergency Services/ Structural Solution	Complete 300 lineal feet of emergency repair.	Repair remainder of damaged bank. Bring into compliance with permit requirements.
Cedar Trail Bridge - 2266-10 South Abutment Repair	Access roadway under bridge was damaged by January 2009 flood.	Structural Solution	Completed 90 lineal feet of bank stabilization revetment repair project.	N/ A
Cedar Rapids Wood Replacement Repair	Install engineered logjams to replace the function of the faulty chained logs that were removed as an emergency measure following the January 2009 flood.	Structural Solution	Completed project.	N/ A

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Byers Curve Revetment Repair	Damage from the January 2009 flood include overtopping scour on levee top and backslope, face scour in several places, missing toe rock, and natural wood debris deposited on levee top and backslope.	Structural Solution	Completed 66 lineal feet of minor revetment repair.	N/ A
Cedar River Trail Site #2B Revetment Repair	Severe erosion and scour damage to revetment as a result of 2009 flood.	Structural Solution	Completed 150 lineal feet of bank stabilization revetment repair project.	N/ A
Herzman Levee Repair	January 2009 flood damaged the levee toe and bank.	Structural Solution	Completed 300 lineal feet of bank stabilization revetment repair project.	N/ A
Belmondo Repair Phase 1	Permanent repair needs to complete bank repair on remainder of damaged bank and mitigate for emergency work in order to meet permit requirements.	Structural Solution	Completed 200 lineal feet of bank stabilization revetment repair project along Belmondo Revetment.	Complete bank stabilization along remainder of damaged revetment and meet permit requirements.
Orchard Grove Levee Repair	Repair damage to levee backslope	Structural Solution		N/ A
Cedar Rapids Emergency Repair 2011	Perform emergency bank stabilization along setback levee alignment during January 2011 flood event.	Emergency Services/ Structural Solution	Completed emergency repair along 85 lineal feet of bank and replaced 100 lineal feet of setback levee.	Complete fortification of the setback levee.
Young Revetment Repair	Reposition logs that jammed up against the revetment during the January 2011 flood event, threatening the integrity of the flood protection structure.	Structural Solution	Completed log repositioning and minor bank repair.	N/ A
Cedar Rapids setback levee repair	Rebuild portion of setback levee based on vulnerability revealed during the 2011 flood.	Structural Solution	Completed replacement of 163 lineal feet of setback levee.	Rebuild and realign downstream portion of levee.
Cedar Rapids Right Bank Levee Repair	Realign downstream end of setback levee	Structural Solution		Rebuild left bank levee, if feasibility study indicates need.

TABLE D-11.
ACCOMPLISHMENTS FOR THE CEDAR RIVER (2006–2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Cedar River Public Outreach	Share information about King County's flood hazard management projects and programs affecting residents and users of the Cedar River watershed.	Public Information/ Plan Performance	Hosted a public meeting in the basin to share information and receive feedback from the community. Residents expressed interest and favored more regular communication of this type.	Plans are underway to host another community meeting(s) and perhaps repeat annually.
Cedar River Recreation Study	Increase our understanding of types, locations, and seasonality of recreational uses in the Cedar River.	Preventive	This study tested methods for describing and estimating the number of river floaters, where they float in relationship to river projects, the risks they take while floating, and their perceptions of large wood in the river.	This was a pilot study, and the techniques may be used to gain similar information on other King County river basins.
Cedar River Large Wood Study	A multi-phase project to better understand the large wood budget on the Cedar River. The study will identify source or recruitment areas, transport reaches, deposition or accumulation areas; and associated potential ecological benefits and risks of wood accumulations.	Preventive	Between 2009 and 2011 field data were collected on in-stream wood to help develop the wood budget.	In 2012 a canopy analysis and bank erosion evaluation will be conducted to better understand wood loading rates to the river.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Pump Station Operation	Maintain and operate Black River, P-17 and Segale/ Southcenter pump stations in the Green River Flood Control Zone District.	Structural	Maintenance needs were identified and repairs completed. Overflow from a diesel fuel tank at the Black River/ P-1 Pump Station in Renton was addressed with emergency containment, recovery and removal of oil and contaminated soils, construction of an impoundment and runoff detention measures, and identification of long-term upgrades needed. Sediment accumulations in the storage forebay have been mapped and removal plans are underway. Operation of the pump stations has been transferred to pump operations staff at Metro Wastewater Treatment Division. System upgrades and needed repairs have been identified and implemented under their supervision.	Sediment removal plans will be finalized and implemented at the P-1 flood protection infrastructure. Monitoring and maintenance of all pumps will continue, with needed repairs and equipment replacements identified and accomplished in a timely manner. Fuel storage facilities at the P-1 flood protection infrastructure will be brought up to modern standards and code requirements.
Green River Flood Study	Complete flood study and corresponding FEMA Flood Insurance Studies and Flood Insurance Rate Maps for the Green River between River Mile 5.0 and River Mile 45.0.	Preventive	The Green River Flood Study was completed and submitted to FEMA in support of an appeal to their Draft Preliminary Digital Flood Insurance Rate Maps (DFIRMs) for the Green River. The appeal was supported by all Green River jurisdictions, and has resulted in the issuance of Preliminary DFIRMs by FEMA which utilize the Green River Flood Study mapping results.	Pending decisions made by FEMA, new mapping standards may be applied to the Green River Levees to define DFIRM floodplain extents based on new risk determination categories. These will require modifications to the Green River Flood Study. Absent any new mapping standards, Kent will ask FEMA to modify the Preliminary DFIRMs to reflect its own levee certifications through approval of its various CLOMRs, now in preparation.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Desimone Levee Project 1, 2, 3, &4	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The individual Desimone Levee Projects 1-4 have been included in a reach-long feasibility analysis of alternatives for levee rehabilitation along both banks of the Green River between the S. 200th Street Bridge in Kent and the So. 180th Street in Tukwila. The study alternatives will be published with recommendations in late 2012. In the interim, the City of Kent has pursued geotechnical studies in preparation of a Conditional Letter of Map Revision (CLOMR) request to FEMA. These studies have confirmed that levees in this reach fail to meet recommended standards for slope stability under rapid drawdown conditions, and will require some type of setback modification to this end. Kent itself proposes that discontinuous sheetpile floodwalls be built to secure a minimal factor of safety (FS), while the 2006 Flood Plan recommends a consistent, overall reconstruction of setback earthen levees with flatter slopes. Discussion of these varying recommendations is ongoing between Kent and the District.	Once discussions with Kent are resolved and a recommendation from the alternatives analysis is selected, necessary easement acquisitions will be initiated and projects built.
Segale Levee Project 1	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	In 2009 portions of the Segale Levee project 1 were reconstructed in a modified setback configuration, including a landward concrete floodwall segment, by the Corps of Engineers. Remaining portions of this project remain to be completed. The individual Segale Levee Project 1 has been included in a reach-long feasibility analysis of alternatives for levee rehabilitation along both banks of the Green River between the S. 200th Street Bridge in Kent and the So. 180th Street in Tukwila. The study alternatives will be published with recommendations in late 2012.	Once the study is published and a recommendation from the alternatives analysis is selected, necessary easement acquisitions will be initiated and projects built.
Segale Levee Project 2	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The individual Segale Levee Project 2 has been included in a reach-long feasibility analysis of alternatives for levee rehabilitation along both banks of the Green River between the S. 200th Street Bridge in Kent and the So. 180th Street in Tukwila. The study alternatives will be published with recommendations in late 2012. Once the study is published and a recommendation from the alternatives analysis is selected, necessary easement acquisitions will be initiated and projects built.	Once the study is published and a recommendation from the alternatives analysis is selected, necessary easement acquisitions will be initiated and projects built.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Briscoe Levee Project 4	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The Briscoe Levee Project 4, at the 2006 levee failure location, was evaluated for several slope repair configurations by the King County Soils Materials Laboratory, with design alternatives developed by King County Rivers Section engineers and constructed by the Corps of Engineers under their PL-99 Rehabilitation Inspection program. Design studies concluded that Factors of Safety for rapid drawdown conditions should meet or exceed FS= 1.2 to 1.4, with the lower thresholds addressing localized stability with respect to shallow sloughing failures above and below a midslope bench, and with the higher values addressing global stability with respect to deeper-seated rotational slope failure potentials. This resulted in the design of slopes at or near 3H:1V inclination, requiring the acquisition of additional easement areas from adjoining commercial landowners to site the reconstructed, setback levee repair over a 600-foot reach. The design also included a series of log deflectors anchored into a rock toe buttress, and bioengineering slope stabilization with native plantings, built by the Corps of Engineers and repaired by King County.	Monitor and maintain as needed.
Nursing Home Levee Project	Rehabilitate levees to reduce the risk of flooding in the lower Green River	Structural	The Nursing Home Levee is one portion of the overall Horseshoe Bend Levee, selected for initial implementation in the 2006 Flood Plan due to its substantially oversteepened condition and incremental structural deterioration. Acquisition of additional easement area needed for the reconstruction of a portion of this levee was initiated by the District in 2008, which then sponsored a setback reconstruction of this portion by the Corps of Engineers in 2009, together with emergency shoring of an adjoining, less stable embankment and completion of additional Horseshoe Bend setback reconstruction previously initiated by the District. Structural analyses of the levee by the City of Kent's geotechnical engineers confirmed the need for additional setback of this and adjoining portions of the Nursing Home and Nursing Home Extension segments of the overall Horseshoe Bend levee. Kent was awarded $10,000,000 to acquire added easement areas and set additional portions of the levee back with construction of discontinuous segments of earthen berms.	Project discussions with Kent and the Corps of Engineers will determine the scope and character of further repairs and reconstruction needs in this levee reach, and throughout the Horseshoe Bend. Once project alternatives are reviewed, programmatic needs resolved, and a recommended alternative selected, acquisitions, design and construction of remaining levee upgrades will commence as needed.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Salmon Habitat Recovery Cost Share	Provide financial support to, and participate in, Salmon Recovery Funding Board and U. S. Army Corps of Engineers Ecosystem Recovery Project habitat projects.	Natural Resource Protection	The District cooperated with the City of Auburn to provide the local cost share match and complete the construction of the Salmon Recovery Fund financed Fenster Phase 2A Levee Setback and Floodplain Reconnection Project within Auburn's Fenster Park at River Mile 32.0 on the Left Bank of the Green River. This project was part of the overall Fenster/ Pautzke Ecosystem Restoration Project (ERP) identified at this location, but the Corps did not participate in this work. Removal and setback of the Pautzke Levee was subsequently accomplished by King County's Ecological Restoration Engineering Section using additional SRFB funds and supplemental grants from additional sources.	The Fenster site will be used for construction of mitigation measures required to offset levee tree clearing actions within the City of Auburn, completed by the District since 2006 in response to determinations by the Corps that they would be necessary to maintain eligibility for Corps PL-99 levee flood damage repairs in the future. Instream log placement will be incorporated as a modification of existing SRFB-funded log structures previously built. A second phase of the Fenster Project is also planned and funding is being sought to supplement available SRFB awards.
Green River Flood Control Zone District Program Management	Provide program management and administration to Green River Flood Control Zone District projects, program and activities.	Plan Performance	Additional staffing resources were added to the Green river Basin Team to accomplish the Flood plan's long-term project and planning goals. This included two engineers and one program analyst positions. A significant effort was devoted to concerns with Corps operations of Howard A. Hanson Dam, flood scenario mapping in response to this crisis, coordination and placement of supplemental flood containment structures along the Lower Green river levees, and coordination with the City of Kent's continuing efforts to analyze, design, construct, and certify the levees and their proposed modifications.	One additional engineer will be added to the Green River Basin Team to assist with implementing the District's work program.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Briscoe Levee Projects 1-3, 5-8	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The individual Briscoe Levee Projects 1-3, 5-8 have been included in a reach-long feasibility analysis of alternatives for levee rehabilitation along both banks of the Green River between the S. 200th Street Bridge in Kent and the So. 180th Street in Tukwila. The study alternatives will be published with recommendations in late 2012. In the interim, the City of Kent has pursued geotechnical studies for a Conditional Letter of Map Revision (CLOMR) request to FEMA. These studies confirm that levees in this reach fail to meet standards for slope stability under rapid drawdown conditions, and will require some type of setback modification to this end. Kent itself proposes that discontinuous sheetpile floodwalls be built to secure a minimal factor of safety (FS), while the 2006 Flood Plan recommends a consistent, overall reconstruction of setback earthen levees at a higher FS value. Discussion of these varying recommendations is ongoing between Kent and the District.	Once discussions with Kent are resolved and a recommendation from the alternatives analysis is selected, necessary easement acquisitions will be initiated and projects built.
Russell Upper Levee Project	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	Basic geotechnical evaluation of the Russell Upper Levee has been completed by the City of Kent in connection with its request to FEMA for a Conditional Letter of Map Revision (CLOMR). This structural evaluation has shown that three major segments of the levee would need to be reconstructed in a setback configuration to meet even the absolute minimum Factors of Safety (FS) for rapid drawdown failures. As if to confirm this finding, the slopes in question developed several localized slumping failures following the 2011 and 2012 flood seasons. Using higher slope stability standards set in accordance with the 2006 Flood Plan, and also recognizing constraints posed by existing residential land uses, the District has outlined a more comprehensive overall setback proposal for the entire levee reach, and remains in discussions with Kent over decisions on consistent design standards, project phasing, and funding allocations for this work, expected to start in late summer of 2012.	Once discussions with Kent are resolved the necessary easement acquisitions will be initiated and projects built. Full completion of the project will be implemented with a phased funding and construction approach over time.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Kent Shops Levee Project	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The Kent Shops Levee Project was combined with the Narita Levee Project and the Myers' Golf Levee Project, all of which were jointly designed and constructed by the Corps of Engineers under their PL-99 Rehabilitation Inspection Program, with the Flood District providing the local sponsor's cost share. The City of Kent provided the additional setback levee easement areas needed to meet slope stability requirements, within their municipal golf course adjoining the levees. The Flood District reimbursed Kent under the terms of an Interlocal agreement negotiated to offset the costs of rebuilding the golf course to accommodate the modified layout created by the levee setbacks. While the bioengineered levee reconstruction template previously used by the Corps at the Briscoe Levee 4 location was initially endorsed, changes in the Corps' administration of its national and regional standards for allowance of vegetation on levees, and an engineering emphasis on bed scour led to construction of a launchable rock toe with a modified design in this location.	Monitor and maintain as needed.
Narita Levee Project	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The Narita Levee Project was combined with the Kent Shops Levee Project and the Myers' Golf Levee Project, all of which were jointly designed and constructed by the Corps of Engineers under their PL-99 Rehabilitation Inspection Program, with the Flood District providing the local sponsor's cost share. The City of Kent provided the additional setback levee easement areas needed to meet slope stability requirements, within their municipal golf course adjoining the levees. The Flood District reimbursed Kent under the terms of an Interlocal agreement negotiated to offset the costs of rebuilding the golf course to accommodate the modified layout created by the levee setbacks. While the bioengineered levee reconstruction template previously used by the Corps at the Briscoe Levee 4 location was initially endorsed, changes in the Corps' administration of its national and regional standards for allowance of vegetation on levees, and an engineering emphasis on bed scour led to construction of a launchable rock toe with a modified design in this location.	Monitor and maintain as needed.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Myer's Golf Levee Project	Rehabilitate levees to reduce the risk of flooding in the lower Green River.	Structural	The Myers' Golf Levee Project was combined with the Narita Levee Project and the Kent Shops Levee Project, all of which were jointly designed and constructed by the Corps of Engineers under their PL-99 Rehabilitation Inspection Program, with the Flood District providing the local sponsor's cost share. The City of Kent provided the additional setback levee easement areas needed to meet slope stability requirements, within their municipal golf course adjoining the levees. The Flood District reimbursed Kent under the terms of an Interlocal agreement negotiated to offset the costs of rebuilding the golf course to accommodate the modified layout created by the levee setbacks. While the bioengineered levee reconstruction template previously used by the Corps at the Briscoe Levee 4 location was initially endorsed, changes in the Corps' administration of its national and regional standards for allowance of vegetation on levees, and an engineering emphasis on bed scour led to construction of a launchable rock toe with a modified design in this location.	Monitor and maintain as needed.
Middle Green Floodplain Acquisition	Purchase one home and associated property subject to severe flood related hazards.	Property Protection	The Wallace property was purchased by the King County Environmental Restoration and Engineering Section with funding from a number of grant agencies. The home and associated structures were removed from a high channel migration hazard zone in the floodplain, and the site restored with extensive native riparian plantings. This effort complements earlier purchase and removal of the adjoining home and ongoing restoration of that site as well. In addition, a third site, the Freemouw property, was also purchased and removed from a chronic at-risk location situated on the floodplain channel of Burns Creek in the same Middle Green River reach as the Wallace site, which also adjoins Burns Creek.	Monitor and maintain as needed. Integrate additional floodplain acquisitions as needed to accomplish a series of levee setback and floodplain reconnection project actions within the Middle Green River, potentially including the Flaming Geyser Levees, the Crisp Creek neighborhood, Lone's Levee, Turley Levee, Horath/ Kaech Levee, Neely Bridge Levee, and Porter levee.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Dykstra Revetment Repair	Repair damage from 2006 flood event.	Structural	The Corps of Engineers repaired flood damages to portions of the Dykstra Levee in Auburn by constructing a rock toe buttress and rock facing with some inclusion of willow cuttings and log flow deflectors. The Flood District funded the local sponsor's cost share for this work.	Monitor and maintain as needed. Evaluate overall levee and perform site investigations as needed to determine appropriate structural modifications to achieve currently recognized levee engineering standards. Explore a long-term program of property acquisitions to achieve stable levee geometries as thus determined.
Foster Golf Revetment	Repair damage from 2006 flood event.	Structural	The Flood district funded minor repairs to the Foster Golf Revetment in Tukwila. The work was performed by King County.	Monitor and maintain as needed.
Galli's Section Repair	Repair damage from 2006 flood event.	Structural	The Corps of Engineers repaired flood damages to the full length of the Galli's Section Levee in Auburn by constructing a rock toe buttress and rock facing with some inclusion of willow cuttings and log flow deflectors. The Flood District funded the local sponsor's cost share for this work.	Monitor and maintain as needed. Evaluate overall levee and perform site investigations as needed to determine appropriate structural modifications to achieve currently recognized levee engineering standards. Explore a long-term program of property acquisitions to achieve stable levee geometries as thus determined.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Horseshoe Bend 205 Repair	Repair damage from 2006 flood event.	Structural	The Flood District negotiated with an affected property owner and acquired additional easement areas needed to reconstruct a damaged portion of the Nursing Home segment of the Horseshoe Bend 205 Levee (see also Nursing Home Levee Project, above, and Horseshoe Bend 2009 repairs, below). The Corps of Engineers then reconstructed the levee here to a setback design based on placing a sizeable launching toe structure and rock facing along the lower riverward slopes, with inclusion of some native plantings. Downstream at the Breda segment of the Horseshoe Bend levee, the initial portion of a phased levee setback constructed by the Flood District in 2004 was completed by the Corps with this same launchable toe structure. Additional rip-rap scour protection was also placed by the Corps just downstream from the Central Avenue Bridge abutment at this time, and was tied-in to earlier bioengineered repairs originally constructed downstream in 1997.	Monitor and repair as needed. Project discussions with Kent and the Corps of Engineers will determine the scope and character of further repairs and reconstruction needs in this levee reach, and throughout the Horseshoe Bend. Once project alternatives are reviewed, programmatic needs resolved and a recommended alternative selected, acquisitions, design and construction of remaining levee upgrades will commence as needed.
Tukwila 205 Repair	Repair damage from 2006 flood event.	Structural	The Corps of Engineers reconstructed of a flood damaged portion of the Tukwila 205 Levee at the Lily Pointe and Wells Fargo properties along the left bank just upstream from the S. 180th Street Bridge in Tukwila, and also at the Segale property just upstream from the levee along S. 180th. All design and construction costs were borne by the Corps for this work on the federally authorized Tukwila 205 Levee here, except for the cost and construction of a concrete floodwall eliminating the landward portion of the levee embankment on the Segale property. This was paid for by the landowner to minimize setback dimensions affecting the site. The work included reconstruction of the levee in a setback location to achieve more stable river embankment slope geometry, along with anchored deflector logs and a launchable rock toe buttress incorporating some native plantings. Costs for acquiring the additional easement areas on the Lily Pointe and Wells Fargo sites were funded by the Flood District in support of Tukwila's role as the local sponsor for the work.	Monitor and maintain as needed. Complete S. 180th Street to S. 200th Street Levee alternatives feasibility study. Once a project alternative is identified and recommended as a result of this study, pursue additional acquisitions as needed and proceed with project implementation.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Foster Golf Course Mitigation	Mitigation associated with 2006 flood repair projects.	Mitigation	Newly emphasized federal compliance requirements for removing levee vegetation in order to remain eligible for federal levee repair funding under the Corps of Engineers' PL-99 Rehabilitation Inspection Program led to the decision to cut a significant number of trees and larger woody shrubs from Lower Green River Levees in 2009 and 2010. This action was permitted by the Washington Department of Fish and Wildlife (WDFW), with a requirement that mitigation be provided with placement of an equivalent number of trees into the water column and replacement plantings at a nearby mitigation site location. The Foster Golf Course was provided as a site for this purpose by the City of Tukwila for mitigation of levee clearing within Tukwila. Logs were anchored within the water column to wooden pilings driven into the riverbed. All work was designed and constructed by King County with Flood District funding.	Monitor and maintain as needed. Additional instream log placement and native plantings will be completed nearby in 2013 to satisfy similar obligations incurred in response to subsequent levee tree clearing actions.
42nd Ave South Repair	Perform repair to flood protection infrastructure due to damage from January 2009 flood.	Structural	Chronic slumping of the 42nd Avenue S. roadway embankment in Tukwila occurred again during the 2009 flood season. Tukwila maintains a high-pressure 18-inch diameter water main within the roadway shoulder, which was partially exposed and at risk due to the slump. An emergency repair was initiated with piling-driven support of the road shoulder to allow excavation of a construction bench just above the tide line here. Additional pilings were driven into the embankment toe within the water column to reinforce and consolidate the loose sediments present, and a matrix of logs was anchored to the pilings to deflect erosive, undercutting flows away from the base of the slope. Rock toe support was not included, as federal permits required for these measures would have delayed critical project implementation scheduling needs, to address potential rupture of the regionally significant water main serving all of Southcenter and supplying fire mains throughout much of Tukwila. Live geogrids were then constructed to rebuild the failed slopes, incorporating densely planted layers of native vegetation to reinforce the embankment.	Monitor and maintain as needed.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Stoneway Lower Repair	Perform repair to flood protection infrastructure due to damage from January 2009 flood.	Structural	A slumping failure caused by the January 2009 flood caused nearly 200 feet of Frager Road adjoining the Stoneway Lower Revetment along the left bank of the Green River upstream from the S. 231st Street Bridge in Kent to fail. Failed slopes were excavated, log pilings driven to consolidate and reinforce the toe, and log deflectors placed to reduce toe erosion. The slope was rebuilt with geotextiles and live geogrid lifts, with dense native plantings.	Monitor and maintain as needed.
Horseshoe Bend Repair	Perform repair to flood protection infrastructure due to damage from January 2009 flood.	Structural	The Corps of Engineers repaired flood damages to a portion of the Nursing Home portion of the Horseshoe Bend Levee in Kent by constructing a rock toe buttress and rock facing with some inclusion of willow cuttings. This work was immediately upstream from and integrated with the Nursing Home Levee Project described above (see also 2006 Horseshoe Bend 205 Repair, above). The Corps also constructed similar embankment reconstruction at two other flood damage locations downstream, using the same design and construction approach. These downstream locations adjoin both the upstream and downstream margins of earlier repairs constructed in 1997. The Flood District was the local sponsor for this work, with all design and construction costs borne by the Corps on the federally authorized Horseshoe Bend 205 Levee system.	Monitor and maintain as needed. Project discussions with Kent and the Corps of Engineers will determine the scope and character of further repairs and reconstruction needs throughout the Horseshoe Bend. Once project alternatives are reviewed, programmatic needs resolved, and a recommended alternative selected, acquisitions, design and construction of remaining levee upgrades will commence as needed.
Dykstra Sinkhole Repair	Repair to a sinkhole developing within the landward foundation of the Dykstra levee.	Structural	A 4-foot diameter sinkhole in a residential yard just landward of the Dykstra Levee and intersecting with the levee foundation materials was investigated with soils borings and laboratory analysis indicating it will require repair to ensure the integrity of the levee foundations at this location. Seepage conditions and soils types present require excavation and replacement of foundation materials to a depth of approximately ten feet. This work is immediately adjacent to the existing residence, and a shoring plan to secure both the trench and the residential foundations is needed. To date, a King County work order contractor has been unable to resolve design requirements for securing the foundations with respect to lateral loading requirements determined by the King County Soils Materials Laboratory's site exploration and testing results.	Complete an engineered shoring plan and complete project construction. Monitor and maintain as needed. An engineering design contract will be scoped and executed to provide for this project element, after which construction will proceed during the summer of 2012.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Renton and Tukwila Pump Station Modifications	Upgrade the Renton and Tukwila Pump Station.	Structural	The Flood District has secured the services of professional pump operations staff located at the Renton Metro Wastewater Treatment Facility immediately adjoining the Black River/ P-1 Pump Station to thoroughly evaluate that flood protection infrastructure and the nearby P-17 flood protection infrastructure in Tukwila for needed upgrades. Equipment in these facilities dated from the 1970's, and several pumps and control mechanisms at Black River were in need of major overhaul, functional upgrades, or replacement. Access and emergency back-up electrical upgrades were completed at P-17, and all pumps and related accessory mechanisms at Black River were serviced, replaced and repaired to fully operational conditions.	Intake fish screens at Black River are being incrementally replaced, sediments removed from the pump intake locations, site evaluations are being completed and a dredging plan is being drawn up to remove accumulated sediments and restore the storage forebay at the flood protection infrastructure to its design capacity. These upgrades and dredging actions are ongoing. A wholesale evaluation of the old equipment present and options for its timely replacement will be completed as well.
Kent Containment	Install containment barriers along the Green River.	Structural (Temporary)	High flood storage reservoir pool elevations at Howard A. Hanson Dam in January 2009 resulted in seepage-related concerns at the right abutment to the dam. This led the Corps of Engineers to temporarily modify its operations at the dam, with a result that curtailed levels of flood protection were anticipated until the suspected problems were better identified and solutions implemented. As a result, the Flood District cooperated with the Corps, Kent and the other Valley cities to place temporary levee raising structures consisting of large sand-filled bags or barricade structures along miles of Lower Green River levees, wherever developed land uses might be at risk. Many of the bags and structures were supplied by the Corps, with sand fill materials and bag placement provided by the City. Significant funding was provided to the City by the Flood District to help with this effort. No unusual flood events actually occurred, and the Corps constructed several major repairs to the dam abutment, announcing that fully operational status had been restored in the early spring of 2012.	Remove containment structures and restore levees to original conditions.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Auburn Containment	Install containment barriers along the Green River.	Structural (Temporary)	High flood storage reservoir pool elevations at Howard A. Hanson Dam in January 2009 resulted in seepage-related concerns at the right abutment to the dam. This led the Corps of Engineers to temporarily modify its operations at the dam, with a result that curtailed levels of flood protection were anticipated until the suspected problems were better identified and solutions implemented. As a result, the Flood District cooperated with the Corps, Auburn, and the other Valley cities to place temporary levee raising structures consisting of large sand-filled bags or barricade structures along miles of Lower Green River levees, wherever developed land uses might be at risk. Many of the bags and structures were supplied by the Corps, with sand fill materials and bag placement provided by the City. Significant funding was provided to the City by the Flood District to help with this effort. No unusual flood events actually occurred, and the Corps constructed several major repairs to the dam abutment, announcing that fully operational status had been restored in the early spring of 2012.	Remove containment structures and restore levees to original conditions.
Tukwila Containment	Install containment barriers along the Green River.	Structural (Temporary)	High flood storage reservoir pool elevations at Howard A. Hanson Dam in January 2009 resulted in seepage-related concerns at the right abutment to the dam. This led the Corps of Engineers to temporarily modify its operations at the dam, with a result that curtailed levels of flood protection were anticipated until the suspected problems were better identified and solutions implemented. As a result, the Flood District cooperated with the Corps, Tukwila, and the other Valley cities to place temporary levee raising structures consisting of large sand-filled bags or barricade structures along miles of Lower Green River levees, wherever developed land uses might be at risk. Many of the bags and structures were supplied by the Corps, with sand fill materials and bag placement provided by the City. Significant funding was provided to the City by the Flood District to help fund this effort. No unusual flood events actually occurred, and the Corps constructed several major repairs to the dam abutment, announcing that fully operational status had been restored in the early spring of 2012	Remove containment structures and restore levees to original conditions.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Renton Containment	Install containment barriers along the Black River outlet at its confluence with the Green River.	Structural (Temporary)	High flood storage reservoir pool elevations at Howard A. Hanson Dam in January 2009 resulted in seepage-related concerns at the right abutment to the dam. This led the Corps of Engineers to temporarily modify its operations at the dam. Curtailed levels of flood protection were anticipated until the suspected problems were better identified and solutions implemented. As a result, the Flood District placed temporary levee raising structures consisting of large sand-filled bags and eco-block barricade structures along the Black River outlet channel at its confluence with the Green River. This was done to ensure a separation of interior floodwaters from potential Green River surcharge at the pump station forebay. King County furnished eco-block concrete barriers and fill materials for large sandbag obtained from the Corps. Funding for this effort was provided to the by the Flood District. No unusual flood events actually occurred, and the Corps constructed several major repairs to the dam abutment, announcing that fully operational status had been restored in the early spring of 2012.	Remove containment structures and restore site to original conditions.
Porter Bridge Levee Flood Prep	Implement emergency flood prep measures.	Flood Contingency	2009 impairment of Howard A. Hanson Dam led to concerns by Auburn regarding debris impacts on the 8th Street (Porter) Bridge Questions were raised about potential behavior of logjam accumulations upstream at the Auburn Narrows. King County coordinated with the Corps of Engineers to evaluate this substantial logjam, with the Corps recommending it not be disturbed. Further evaluation of the jam's mobilization potential was also requested as part of an independent peer-review panel by King County to evaluate its overall Green River program. This panel also found a low potential for re-mobilization of the logjam, and a high potential for this feature to actually protect downstream structures like the Porter Bridge by continuing to capture and sequester logs entering the lower river from upstream. Following these investigations, contingency plans were set to stage large trackhoe excavators at the bridge to remove any log accumulations during very extreme floods. These floods have not occurred, and the dam has been restored to normal operating conditions.	Maintain contingency plans for responding to potential debris accumulations at the Porter Bridge.

TABLE D-12.
ACCOMPLISHMENTS FOR THE GREEN RIVER (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Green River Levee Tree Removal	Remove trees and other vegetation from Green River levees to meet U.S. Army Corps of Engineers flood repair funding eligibility requirements.	Policy	Hundreds of native riparian trees and woody shrubs were cut from Green River Levees to satisfy Corps of Engineers funding eligibility requirements. Based on permitting requirements for this work, substantial mitigation in the form of replanting and instream log placement at other sites has been required. Some initial mitigation has already been accomplished (see Foster Golf Mitigation, above), but much work remains to be completed in 2013. To this end, a large parcel (the Teufel site in Kent) has been acquired to provide a site not also constrained by levees for such mitigation to proceed. The Foster Golf site in Tukwila and the Fenster Park site in Auburn will also provide for reach-specific mitigation needs to this end. A significant volume of additional vegetation has subsequently been identified for removal by the Corps of Engineers in 2012, and will require even further mitigation if policy choices are made to proceed with additional levee clearing. Regional and national discussions with the Corps of Engineers are ongoing with respect to modifying this national policy directive.	Set all levees back from the existing OHWM of the Green River to a distance of from 1.0 to 2.5 Site Potential Tree Heights. Provide for a perpetual, undisturbed shaded riparian zone with a vegetated corridor in this setback area. Plant and maintain a varied, robust mix of native riparian tree species and maintain to maturity. Site, reconstruct and maintain all river levees landward from the margins of this vegetated corridor.
Tukwila 205 – Lily Point Reimbursement	Reimburse Tukwila for local sponsor land acquisition costs at the Lily Pointe and Wells Fargo locations of the Tukwila 205 Levee Repairs.	Structural (Acquisition)	Lands necessary for reconstructing a flood-damaged federal levee to modern structural standards were acquired by the City of Tukwila, which is the local sponsor of record for this flood protection infrastructure(see also Tukwila 205 Repair, above). The levee was reconstructed in a setback location, requiring the lands in question. The Flood District agreed to provide Tukwila with reimbursement for these acquisition costs, allowing the Corps to fund the full cost of design and construction for the levee repairs.	Continue to cooperate with local jurisdictions to acquire lands and easements as needed to reconstruct levees to currently accepted levels of engineering excellence.
Green River Flood Emergency – Advance Measures	Fund coordination of Emergency Advance Measures	Program Coordination	Federal, County, and City actions were coordinated through planning and implementation, to establish emergency containment structures in response to impaired operations at Howard A Hanson Dam (see also Auburn, Kent, Tukwila and Renton Containment, above). Dam operations were returned to normal with repairs concluded in early 2012, allowing completion of this coordinating function with arrangements for removal of the Emergency Advance Measures containment structures involved.	Continue to participate in emergency flood response planning and contingency actions as appropriate.

TABLE D-13.
ACCOMPLISHMENTS FOR THE WHITE AND GREENWATER RIVERS (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
White River Channel Migration Zone Study and Mapping	Prepare channel migration zone study and maps for the White River.	Preventive	Some technical information on historical channel conditions has been compiled (Collins Report)	Apply technical methodology to prepare study and mapping for a study areas including Segments 1, 2, 3 and 4
White River Flood Studies	Prepare flood studies and corresponding FEMA Flood Insurance Studies and Flood Insurance Rate Maps for the White River.	Preventive	Two flood studies were completed in 2009: Within Segment 1, from the countyline to RM 10; and within segment 3from from SR410 to Mud Mountain Dam.	Flood studies for White River segments 2 (RM 10- SR 410) and 4 (MMD-Greenwater) should be pursued.
Greenwater River Flood Study	Prepare flood study and corresponding FEMA Flood Insurance Studies and Flood Insurance Rate Maps for the Segment 5: the Greenwater River.	Preventive	No progress.	Verify if the available Pierce County flood study is representative of current conditions. If not, collect new channel data and update the flood study. (Segment 5)
Countyline Levee Setback Project *Formerly known as County Line to A-Street Flood Conveyance Improvement*	Improve flood conveyance throughout this reach of Segment 1 reach and reduce flood-related risk to residential and commercial properties by setting back the existing levee and reconnecting the river channel to a portion of its floodplain.	Property Protection/ Structural	Acquisition of 3 properties, preliminary design and supporting technical analysis. Monitoring Plan and Pre-project monitoring data collection.	Complete necessary acquisitions, finalize design, SEPA and other permit review. Two year construction scheduled for 2014 and 2015.
Pacific City Park Revetment Repair	Repair damaged concrete revetment.	Structural	Frequent site monitoring has occurred. No repair work was completed. Project is now included within the Pacific Right Bank Levee Setback Project.	See description for Pacific Right Bank Levee Setback Project in Chapter 5 and Appendix F.
3rd Place and Pacific City Park Revetment Retrofit	Rehabilitate failing concrete slab revetment by replacing with bioengineered flood protection infrastructure.	Structural	Two fee-simple acquisitions have been completed to support the future levee setback project. No progress on feasibility studies or design. Project has been in the Right Bank Levee Setback Project.	See description for Pacific Right Bank Levee Setback Project in Chapter 5 and Appendix F.

TABLE D-13.
ACCOMPLISHMENTS FOR THE WHITE AND GREENWATER RIVERS (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
41st Street Setback Feasibility Analysis	Conduct levee set back feasibility study to protect homes and school.	Preventive	No progress to date. Project has been replaced by the A Street – R Street Feasibility Study.	See description for A Street – R Street Feasibility Study in Chapter 5 and Appendix F.
Red Creek Residential Flood Mitigation *formerly known as Red Creek Acquisitions*	Remove homes subject to flooding and erosion hazards through fee simple acquisition.	Property Protection	No progress to date on acquisitions. Annual outreach to keep the community informed of flood risks occurred through public meetings from 2006-2009, and personal letters in 2010-2011.	Maintain contact with private property owners for opportunities from willing sellers.
TransCanada Flood Conveyance Improvement	Implement levee modification project.	Preventive	Completion of Feasibility Study and preliminary engineering (2010)	Initiate other technical analyses (i.e. geotechnical bluff analysis) to continue with design development
River Mile 44 to Greenwater Residential Flood Mitigation *formerly known asWhite-Greenwater Acquisition*	Purchase and remove residential structures subject to flood and erosion hazards.	Property Protection	Landowners were engaged in acquisition negotiations in 2010. No agreement was reached.	Maintain contact with private property owners for opportunities for willing sellers.
Other Actions Implemented Not addressed in 2006 FHMP				
White River Flood Damage Repair at Stuck River Drive	Replace eroded revetment with stable log and rock toe and 300 feet of biostabilized riverbank.	Structural	Repair of flood damage incurred from 2006 flood event	Continue with site monitoring requirements and vegetation maintenance
Temporary Flood Protection Barrier	Provide temporary enhanced flood protection landward of existing revetments to reduce flood risks to private residential and commercial areas of Pacific.	Preventive / Property Protection / Structural	Installed in October 2009 and maintained (to present) a temporary floodwall with HESCO barriers and Supersaks along a setback alignment extending from County property at Pacific City Park and along private property to the southern riverward extent of White River Estates.	Maintain barrier in place until final Pacific Right Bank Levee Setback project can be implemented.

TABLE D-13.
ACCOMPLISHMENTS FOR THE WHITE AND GREENWATER RIVERS (2006-2011)

Action	Project Description	Type of Action	Accomplishments	Next Steps
Pacific Right Bank Levee Setback	Improve flow conveyance by removing artificial fill, reconnecting the river to a broader portion of its floodplain and building a setback levee to limit the bounds of channel migration in this reach.	Preventive / Property Protection / Structural	Acquired 1 agricultural property and 11 residential properties. 5 of these homes were auctioned and relocated, 6 were demolished.	Feasibility work, continued acquisitions, design, permitting and implementation.

TABLE D-14.
FLOOD MITIGATION CATEGORIES AND DEFINITIONS

Category	Definition	Impact	Examples
Preventive	Activities that keep problems from getting worse and helps the County identify risk and vulnerability.	Increases capability and decreases vulnerability and exposure.	• Planning • Land Use • Regulations • Mapping
Property Protection	Actions that can singularly protect property on a building –by-building or parcel basis. Actions can be implemented at a private and/ or public level	Decreases vulnerability and exposure.	• Acquisition • Relocation • Retrofitting
Natural Resource Protection	Activities that preserve or restore natural areas or enhance the environments ability to attenuate the impacts of natural hazards.	Reduces exposure	• Wetlands protection • Erosion and sedimentation control/ management • BMP's • Normative Flow practices
Emergency Services	Measures taken during an emergency to minimize the impact of the event. Also included preparedness and recovery actions.	Increases capability	• Hazard Warning • Hazard Response • Critical Facilities protection • Health and Safety Maintenance
Structural Solutions	Actions taken to prevent the hazard for impacting a populace. Involves controlling the hazard.	Manipulates the hazard	• Levees • Floodwalls • Diversions • Channel Modifications
Public Information	Activities implemented to inform the public about the preparedness for and the mitigation of the impacts of natural hazards.	Increases capability	• Websites • Publications • Media release • Public Awareness Time frame • Public meetings
Technical Assistance	Actions that support objectives of the plan by providing assistance to other stakeholders that can implement actions that will enhance the objectives of the plan	Increases capability by leveraging resources	• Promotes consistency • Enhances Coordination
Plan Performance	Actions that enhance the implementation of the actions identified in the plan	Increased capability	• Funding alternatives • Coordination • Oversight • Performance