

CHAPTER 10

SUPPLEMENTAL PLAN STUDIES

As awareness of flood problems increased during the development of this plan, so did the awareness of existing data gaps which prevented resolution of committee discussions and recommendations for some specific issues. These studies and information are needed to focus the selection of the most economical flood actions.

Activities included data, inventories, more detailed flood impact information, planning restrictions and design impacts. The FCZD moved forward to initiate a number of those activities, which are listed below. This chapter discusses the status and findings of those investigations. These items were added as a separate category of recommendations, referred to as In-Progress FCZD activities, and were typically considered high priority.

STORMWATER DEVELOPMENT REVIEW

Due to the unique local soil and arid climate conditions of Yakima Valley a regional storm water program was undertaken by the jurisdictions, with the Yakima County Surface Water Division as the lead. The standard practice within the “flood-prone” Ahtanum and Wide Hollow basins, within all three local governments, is to retain and infiltrate the full 25-year flood volume onsite. This is incorporated in the ordinances and the Regional Stormwater Manual. This local design approach for new development has been demonstrated to the Department of Ecology to eliminate increases to 100-year flood peak flow. The jurisdictions have adopted similar site stormwater runoff restrictions and ordinances that contain the 25-year runoff and limit 100-yr runoff to predevelopment levels. This reduces urban contribution to peak flows and channel erosion. The ordinances have formalized existing requirements for new developments to pass the upland 100-yr flows so that those developments will not be flooded.

FIS RATE MAP REVIEW

The FIS remapping study was undertaken by FEMA as part of the Map Modernization process. Inaccuracies in the existing 100-year flood maps, which had been developed in the 1970's had been noted, particularly following the 1996 flood. The old maps had been plotted from a combination of 5 foot vertical contour interval mapping and surveyed cross-sections. Current technology is to use 2 foot contour mapping interval or less.

The FCZD provided to the FIS, surveyed cross-sections, 2002 LiDAR topographic data and data from the 1996 flood. The LiDAR contract included independent data quality assessment and control to meet FEMA standards and was accepted by FEMA. Spacing and accuracy of LiDAR data points was to FEMA standard. The vertical resolution as individual LiDAR shots is with six inches while the LiDAR can be used to produce 2 foot contours. The high density, or horizontal, of the LiDAR data allows bare earth resolution that clearly identifies local features such as embankments that are typically missed by survey methods. Survey data were provided at all structures in the basins.

The FCZD also performed numerous quality checks on the hydraulics and mapping which have resulted in a number of map revisions during map development. The draft maps were circulated within the committee to refine the development of alternatives and recommendations.

The NFIP maps for the two basins will be adopted in 2011 and 2012 and will provide a more accurate tool for reducing flood hazard. The FEMA hydraulic model for the entire basins will be made available by the FCZD to the public and roads departments for projects and development.

PUBLIC OUTREACH FOR NEW FIS

The FCZD has fielded numerous queries from the public on the maps and insurance requirements and options at various locations. In some instances additional survey data provided to the FCZD was reviewed by the FEMA consultant and in many cases the FCZD provided field reconnaissance to ensure appropriate follow up.

In addition the FCZD has been attending Planning Commission, West Valley Neighborhood Plan, and Development meetings at the City of Yakima to facilitate awareness of pertinent flood hazard issues.

10 AND 25-YEAR FLOOD MAPS

The FCZD hired the FEMA mapping consultant to generate 25-year flood profiles for Ahtanum and Wide Hollow creeks to supplement those provided by FEMA for the 10, 50, 100 and 500-year intervals. County GIS has produced 10 and 25-year flood maps in order to identify frequently inundated areas. The maps are contained in Appendix J.

The 10 and 25-year flood maps, combined with the 100-year FEMA floodplain and floodway, and the bare earth LiDAR data, can be used at the planning and design level to assess the flooding impacts from proposed changes to infrastructure (roads, bridges and irrigation) and from proposed developments. The computer hydraulic models for each flood level are available from FZCD to assess changes. For example, preferred lot layouts or bridge designs that minimize future adverse flood damages could be readily identified in the planning and NEPA process by use of these and the 100-year FEMA maps.

ECONOMIC FLOOD DAMAGE DATA

The FCZD has made grant application to update the County GIS database for use of the federal Hazards U.S. Multi-Hazard (HAZUS-MH) program which calculates flood damage loss based on 2010 Census data and existing Assessor's database. The program would utilize depth hazard grids being developed by the FCZD from the FEMA models and the mapping for different flood durations including the 10 and 25-yr flood maps. This data will be available to the communities for the use in evaluating flood economic

impacts of alternate development proposals and also be used to evaluate proposed infrastructure, including bridges and transportation routes.

SEDIMENT CLEANOUT AT COUNTY BRIDGES

In 2008 the County Roads Department cleaned the sediment and gravel bed load out of ten County bridges (two were later annexed by the City of Yakima) on Wide Hollow Creek as identified and requested by citizens to provide additional channel and flood capacity:

- Wide Hollow Creek at Wide Hollow Road west of 88th Avenue (Yakima City Bridge)
- Wide Hollow Creek at Wide Hollow Road west of 91st Avenue (Yakima City Bridge)
- Wide Hollow Creek at 96th Avenue south of Wide Hollow Road (Bridge 301).
- Wide Hollow Creek at Dazet Road (Bridge 76)
- Wide Hollow Creek at Wide Hollow Road east of Stein Road (Bridge 63)
- Wide Hollow Creek at Wide Hollow Road west of Douglas Road (Bridge 64)
- Wide Hollow Creek at Wide Hollow Road east of Knox Road (Bridge 65)
- Wide Hollow Creek at Wide Hollow Road east of Fedderly Lane (Bridge 66)
- Wide Hollow Creek tributary at Stone Road (Bridge 62)
- Cottonwood Creek at Dazet Road (Bridge 77)

The process required permit streamlining between the involved agencies. The removal volumes were partly limited by land owner permission beyond the road right of way and partly by clearance limitations underneath the bridges for conventional equipment. Excavation lengths upstream and downstream of bridges were limited to 50 foot or less lengths. Mitigation has been required for this work which is being determined. It is envisioned that this will be a continuing program for those bridges identified as problematic.

BRIDGE SEDIMENT REMOVAL GUIDELINES

Sediment has been accumulating at the Wide Hollow and Ahtanum basin bridges and contributing to increased flood risk. The sediment also becomes home to invasive vegetation, further reducing bridge capacity. The FCZD performed a prototypical hydraulic analysis on 20 and 30 foot wide bridges to establish sediment and gravel removal volumes and guidelines at, upstream and downstream of the bridges.

These hydraulic guidelines were then applied to seven selected problematic bridges to identify the hydraulic effectiveness of the removal guidelines in providing flood impact benefits, and to ensure that these guidelines are feasible and could be applied in a cost effective manner to the Wide Hollow, Hatton and Bachelor Creeks bridges. The

sediment removal guidelines and removal results evaluating their applicability are contained in Appendix G. The findings were as follows:

Sediment removal to maintain and achieve 100-year conveyance capacity may be appropriate in most situations in Upper Wide Hollow Creek, and based on estimated flows, many bridges on Hatton Creek. In other areas, such as most of the bridges on Bachelor Creek and Wide Hollow below the Cottonwood/Wide Hollow confluence, removal of sediment to pass the 100-year flow could result in with a relatively high cost and little benefit to reduction of flood hazard or maintenance of access during flood events.

Also for the current bridges in these watersheds, it may be more appropriate to manage for a lower standard of conveyance than the 100-year flood for several reasons.

- First, the most benefit per amount of excavation occurs where nuisance flooding results in frequent repeated damage to the road or other major structures. To maximize benefits, the new 10 and 25-year flood maps should be used to determine where the most frequent damage occurs and concentrate on rectifying those areas and minimizing new structures in areas with high frequency flooding.
- Second, it is unlikely that there is funding available or economic justification to retrofit all existing bridges in these watersheds.
- Third, in areas such as Bachelor Creek at Lynch Lane, large improvements to the conveyance capacity of the creek, beyond what was present naturally before the bridge induced deposition have the potential to reduce upper watershed areas of flood storage during major events. Retention of areas that naturally act as flood storage or natural flood overflow paths during major events should be a consideration when deciding on bridge conveyance improvements or replacement.
- Fourth, many of these streams have been relocated, straightened, or modified for irrigation purposes and are “perched”. At these locations during the 100 year flood, adjacent areas to these perched channels will likely be flooded regardless of the conveyance capacity of a bridge. Flood frequency in areas adjacent to these perched channels is very high, and where improvement of conveyance through bridges can reduce high frequency flooding in these perched channels, it is probably of high benefit.

The case studies show that 15 foot easements at bridges are insufficient to manage the sediment depositions created by the obstructions. It would be preferable also to provide bridges that fully span the channel and channel side slopes to avoid producing acceleration and deposition.

INVENTORY OF PROBLEMATIC BRIDGES

In some cases, particularly within flat channel sections, where bridges are affected by downstream structures, or where floodplain storage naturally exists, bridge cleanout may not resolve underlying channel constraints and conditions. A Wide Hollow stream profile showing bridge locations is contained in Appendix H. Based on the sediment removal guidelines (Appendix G), the channel profiles (Appendix H), and the new 100, 25 and 10-year flood maps, an inventory will be conducted to identify problematic bridges with regard to flooding. The inventory along with the current and planned level of service for the road system will be used to establish needs, priorities, replacement preferences and interim measures.

BRIDGE DESIGN GUIDELINES FOR AHTANUM and WIDE HOLLOW

The results of the bridge sediment removal guidelines, the inventory of problematic bridges and the new 10, 25-year and 100-year maps will be used to identify future bridge design guidelines that reduce overall costs to infrastructure (capital and maintenance) and residents, through the use of replacement priorities and preferred future bridge designs.

CHANNEL SEDIMENT AND VEGETATION CONTROL PILOT PROJECTS

The FCZD has cooperated with the City of Yakima and WDFW to remove sediment and vegetation debris in the Wide Hollow reach between 72nd and 80th Avenue bridges. Although this project successfully demonstrated inter-agency cooperation, permitting and implementation, considerable new debris has been placed in the channel on two occasions in the year since, showing that landowner cooperation must be improved through Public Outreach by the City of Yakima and FCZD. Before and after photos of the 2010 Wide Hollow 72nd to 80th project are located in Appendix I.

The FCZD is working on two other channel and vegetation pilot projects with WDFW at this time: one upstream on Wide Hollow, and the other in Wiley City area. The FCZD recently completed the Wiley City channel modifications. The FCZD is willing to do pilot capital projects so that landowners can take over long term maintenance to protect themselves from floods.

The pilot projects will be combined with the bridge sediment removal guidelines to estimate annual sediment budgets for financial budgeting purposes.

SEDIMENT BUDGET FOR CREEKS

Sediment has been accumulating at the bridges and within the channel as the non-native invasive Hybrid Willow has flourished due to contributing to the inverted irrigation hydrograph. Wide Hollow Creek profiles are provided in Appendix H that show gradient, velocities and the location of bridges. The figures also show plan views with the 100 year map extent. These figures are a tool to indicate problem areas. In some cases the sediment deposits will be due to features other than bridges, such as irrigation

infrastructure, man- made modifications or natural physiological features. The results of the sediment removal guidelines, the inventory of problematic bridges, and the channel pilot projects and tools such as Appendix H will be used to estimate an approximate sediment budget.

IRRIGATION INFRASTRUCTURE INVENTORY

An inventory of existing and abandoned irrigation diversions along the creeks and their relative flood impact are required in order to provide a basis for decisions regarding preferred revisions or removals. This will be provided at a later date.

PURCHASE AND ELEVATE REPETITIVE LOSS HOMES

The FCZD has purchased and removed one frequently flooded home on Wide Hollow Creek through the use of a FCAAP grant. The property will be reconfigured to provide added protect to an adjacent seven residences. The FCZD has acquired a second FEMA grant to elevate another home on the upper Ahtanum Creek in 2012. These homes qualified as repetitive loss properties through the NFIP.

INITIATE EMMA LANE CHANNEL RELOCATION PROJECT

The FCZD acquired a grant to relocate Ahtanum Creek near 42nd Avenue where extensive overland flows through residential blocks are initiated during floods. This project is identified within the recommendations. The FCZD has been working with citizens and Yakima Nation to come up with a NEPA preferred alternative in 2012. After acceptance this project will be completed in 2013.

PROJECT AND PLANNING GRANT APPLICATIONS

The FCZD applies for FEMA and FCAAP grants for projects as the opportunity arises. One application submitted to FEMA for a Pre-Disaster Mitigation grant was made for the Shaw Creek-Wide Hollow area noted in the recommendations. Also a Flood Mitigation Grant application was made to use a FEMA supported GIS-based hazard program in order to better define Yakima flood risks, potential economic losses and priorities. These two grants were awarded in October 2011. A preferred alternative will be developed as part of the NEPA process in 2012.

INSURANCE REDUCTION THROUGH COMMUNITY RATING SYSTEM

The County has applied, and been accepted into the Community Rating System as a Level 8 Community based on existing and ongoing flood hazard mitigation. This provides all residents within the unincorporated County with a 10% saving on their flood insurance premiums.

WAPATO DAM ASSESSMENT

The FCZD commissioned sediment studies for the Yakima River mainstem including an assessment of backwater from this dam, to be completed in 2011. Further collaboration

with the Yakama Nation on this structure will be pursued to address impacts on the City of Union Gap.

FLOOD RESPONSE INFORMATION COORDINATION

The FCZD provides a flood watch on Ahtanum and Wide Hollow creeks as well as other County flood-prone creeks and rivers and keeps the Yakima Valley Office of Emergency Management informed so that appropriate flood responses are initiated.

FUTURE FINDINGS

The Recommendations contained in Chapter 11 are based on the current status of these studies, inventories, and pilot projects. As more information is gathered, the Recommendations in Chapter 11 may be modified or supplemented.

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