

9.0 CONCLUSIONS

The purpose of this investigation was to determine specific causes of the higher than expected flood levels experienced during the June 2006 flood event in Huntington. During this study, it was determined that the June 2006 flood event has a recurrence interval of approximately 60 to 70 years, meaning it was between the 60 and 70-year flood event. As a result of the analysis presented in this report, it has been determined that cumulative impacts to the Cameron Run channel and floodplains have increased the flood levels in Huntington over time. At the time of the June 2006 flood event, Fairfax County and FEMA were using the 1976 USGS study for floodplain management purposes. Although the study was accurate when it was completed, it is not accurate for the Huntington area today due to significant changes in the channel and watershed. As a result, the flood levels during the June 2006 flood event were higher than the county expected.

During this study, various potential causes of the increase in flood levels were evaluated and the following was determined:

Activities that contributed to higher flood levels over time

- Channel sedimentation had a considerable impact to flood elevations in Huntington during the June 2006 flood event. Had the channel been at its 1965 condition (same channel depth and width as in 1965), flood elevations would have been approximately 1.2 to 2 feet lower in Huntington.
- The U.S. Route 1 interchange construction activity (part of the Woodrow Wilson Bridge construction project) had a lesser impact to flood elevations in Huntington during the June 2006 flood event. The temporary construction activity caused between a 0.5 and 0.9-foot increase in flood elevations along the Huntington area. The increase as a result of the construction activity was within the permitted limits established by FEMA. As a result of the overall finished construction of the U.S. Route 1 interchange, the projected maximum increase in the 100-year flood elevation is estimated to be 0.8 feet approximately 300 feet west of the confluence of Hoofs Run. Therefore, the temporary increase in flood levels during the construction of the interchange is similar to the expected future increase in flood levels after the project construction is complete.
- The floodplain development, including Jones Point and the Metro Rail and Station (as well as other commercial developments) had minimal impact to flood elevations in Huntington during the June 2006 flood event. The floodplain development caused between a 0.2 and 0.4-foot increase in flood elevations along the Huntington area. The increase as a result of the floodplain encroachments were within the permitted limits established by FEMA.

Activities that did not contribute to higher flood levels

- The barge blockage at the George Washington Memorial Parkway had no impact to flood elevations in Huntington during the June 2006 flood event.
- Lake Barcroft release rates had no impact on the flood elevations in Huntington during the June 2006 flood event. For this storm event, the peak at the USGS gage occurred nearly simultaneously with the peak exiting Lake Barcroft.
- The Potomac River tide stages had no impact to the flood elevations in Huntington during the June 2006 flood event.

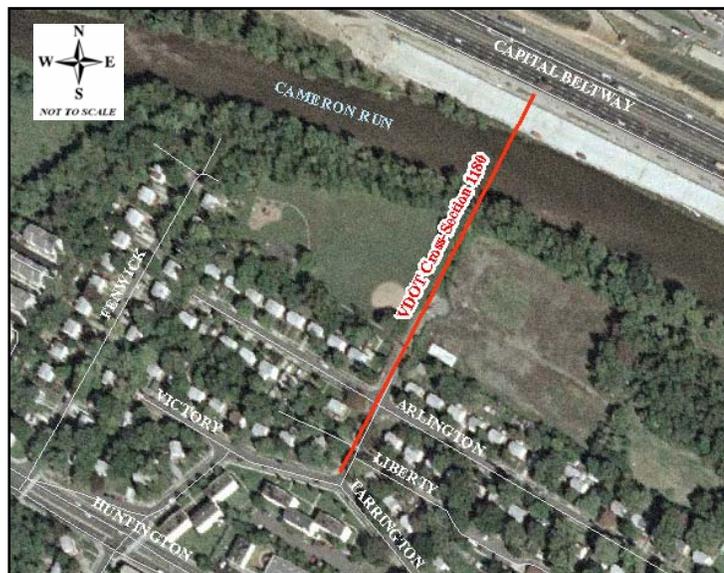
Although each factor in the first list above increases flood levels to varying degrees, the cumulative increase created by adding the increases together creates a significant increase over time. This is explained below for one area within Huntington, VDOT Cross-Section 1180 (Figure 9.1). During the June 2006 flood event, the flood elevation was 13.4 feet at VDOT Cross-Section 1180.

If the peak flows from the June 2006 flood event would have occurred in 1965 at VDOT Cross-Section 1180, the flood elevation would have reached 10.7 feet (NGVD29). At this same location (USGS Cross-Section 60.19) the 100-year flood elevation per the 1976 USGS study was 11.2 feet with a flow of 21,800 cfs. The flow for the June 2006 flood event at this location was estimated to be 19,700 cfs. A flood at this stage would have caused minimal damages to residences, as floodwater would remain mostly in yards and in streets.

The floodplain development that occurred, in particular Jones Point, caused a 0.3 feet increase in flood elevations at VDOT Cross-Section 1180. Thus, if the June 2006 flood event would have occurred in 1972, the flood elevation would have reached 11.0 feet. Again, a flood at this stage would have caused minimal damages to residences, as floodwater would remain mostly in yards and in streets. Tropical Storm Agnes, which recorded higher flows than the June 2006 flood event, caused some damages to homes; however, most of the damages were associated with sewer back-ups.

Sedimentation throughout time decreased the channel capacity in Cameron Run, especially between 1972 and 1999. If the June 2006 flood event would have occurred in 1999, flood elevations at VDOT Cross-Section 1180 would have reached 12.7 feet, nearly 1.7 feet higher than the same flood in 1972. A flood of this magnitude would have caused significant damages

Figure 9.1. Location of VDOT Cross-Section 1180

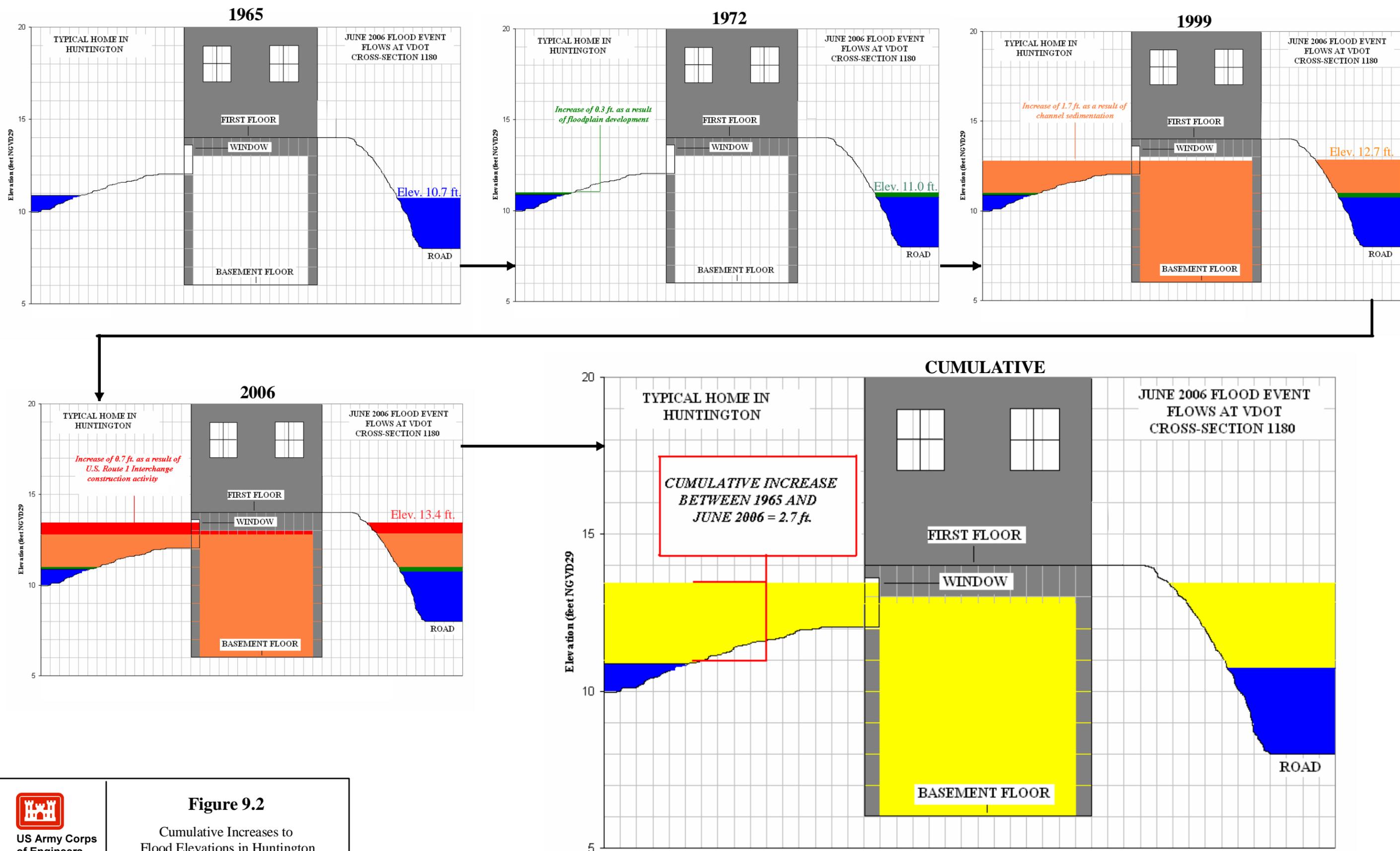


to many of the structures in Huntington. Channel sedimentation had the greatest impact to the increases in flood levels in Huntington over time.

The changes that occurred to Cameron Run between 1999 and the June 2006 flood event were related to the construction activity associated with the U.S. Route 1 interchange and the barge blockage at the George Washington Memorial Parkway during the June 2006 flood event. This activity increased flood elevations by 0.7 feet at VDOT Cross-Section 1180, which results in the June 2006 flood event elevation at this location of 13.4 feet. Approximately 160 homes suffered damages, with one-third of the homes having first-floor flooding and the rest having major basement damages. Thus, the cumulative impacts to the floodplain between 1965 and June 2006 increased flood elevations by 2.7 feet at VDOT Cross-Section 1180 (Figure 9.2). Similar cumulative increases occur at other cross-sections within Huntington as well.

It should be noted, however, that some of the houses in Huntington still would have been flooded during the June 2006 flood event even if these activities had not increased the flood levels.

Since the completion of the 1976 USGS study, several other studies, including the 1982 CDM study and the 2002 VDOT study were completed and showed a greater risk of flooding in Huntington. The 1982 CDM study may have been disputed. The 2002 VDOT study, which is the most current and accurate model, was not provided to Fairfax County staff for use in floodplain management applications; however, according to VDOT, they did provide the final study to FEMA, who produces the county Flood Insurance Rate Maps (FIRMs) that show the 100-year floodplain. The flood levels during the June 2006 flood event were consistent with the peak flows recorded and the current condition of Cameron Run. The dramatic changes to the watershed and Cameron Run channel, along with the continued use of the 1976 USGS study for floodplain management purposes, were the reasons that flood levels during the June 2006 flood event were higher than expected.



US Army Corps of Engineers
Baltimore District

Figure 9.2

Cumulative Increases to Flood Elevations in Huntington