



Mapping On Demand
3601 Eisenhower Avenue
Alexandria, VA 22304
(703) 960-8800 tel
(703) 960-9125 fax

January 7, 2005

William D. Hicks, P.E.
Northern Virginia Regional Commission
7535 Little River Turnpike, Suite 100
Annandale, VA 22003-2937

Dear Mr. Hicks:

Thank you for your efforts to update the hydrologic analysis for Four Mile Run in Arlington County, Virginia. We have reviewed the hydrologic frequency analysis for U.S. Geological Survey (USGS) gaging station 01652500 at Shirlington Road Bridge, and concluded that the results of the hydrologic frequency analysis are reasonable.

Your study applied the methodology recommended in Bulletin 17B, "Guidelines for Determining Flood Flow Frequency" by the Interagency Advisory Committee on Water Data. You estimated the peak flow of the 1-percent-annual-chance (base flood) discharge as 15,970 cubic feet per second (cfs) at gaging station 01652500, with a drainage area of 13.8 square miles. This estimate is lower than the currently effective base flood discharge. You explained that this analysis used more than 30 years of annual peak flow data; therefore, the frequency curve is more reliable than the effective Flood Insurance Study (FIS). To further verify the discharges, you ran sensitivity analyses for three scenarios using different data sets: all recorded annual peaks since 1952; adjusted annual peaks prior to 1961 when the watershed was not fully urbanized, and recorded annual peaks since 1961 reflecting fully developed conditions; and recorded annual peaks from 1961 through 2003. Differences among these three analyses are less than 1,000 cfs. You adopted the highest value as the most reasonable, estimated base flood discharge.

We compared this study with several frequency analyses of Four Mile Run conducted since 1970, as shown in the table below. The 1972 study typically estimated the base flood discharge in a range of 20,000 cfs to 23,000 cfs; with the current longer record, as used in the 1994 study, the typical estimate of the base flood discharge is less than 17,000 cfs.

Comparison of Base Flood Discharge for Selected Locations along Four Mile Run

Drainage Area (sq. mi).	Base Flood Discharge (cfs)			
	Effective	This study	USGS 1994	USACE 1972
17.3	26,000	N/A	N/A	N/A
13.8	N/A	15,970	16,700	20,000
12.3	22,100	N/A	N/A	N/A

The base flood estimate from this study is consistent with the 1994 USGS study. The peak flow decrease, although nearly 20 percent, mainly results from the use of longer gage record. In addition, the record period used in previous studies, such as the 1972 U.S. Army Corps of Engineers analysis and the effective FIS, includes three significant flood events with peaks greater than 10,000 cfs in 1963, 1969, and 1972. A flood of such magnitude has not occurred in this watershed since 1972. Based on these analyses, we concur with your estimates for the frequency curve at USGS gaging station 01652500.

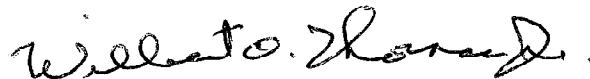
Your study did not address in detail how the results of the frequency analysis would be applied to revise the Flood Insurance Rate Maps (FIRMs) for the City of Alexandria and Arlington County, Virginia. There

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are several issues that have to be considered during further hydrologic and hydraulic analyses. In the effective FIS, the peak flow rates were changed at several locations downstream of Shirlington Bridge to the mouth of Four Mile Run. The map revision should reflect flow rate changes along the reach in a similar manner. The effective Base Flood Elevation (BFE) is based on a higher base flood rate; this might cause difficulties in tie-in of the estimated BFE with the effective BFE at the upstream end.

We appreciate the City of Alexandria and Arlington County for taking the initiative to improve the FIRM, and your timely coordination with us. Please contact me at (703) 316-6268 if we can provide further assistance.

Sincerely

A handwritten signature in black ink that reads "Wilbert O. Thomas, Jr." with a stylized flourish at the end.

Wilbert O. Thomas, Jr.
Senior Technical Consultant
Michael Baker, Jr.
A member of the MOD Team

CC: Michael Craghan, FEMA Region III
Michael Conaboy, Regional Management Center