

6.0 HYDRAULIC ANALYSIS

6.1 DEVELOPMENT OF JUNE 2006 HYDRAULIC MODEL

A hydraulic model that simulates the June 2006 flood event was developed. This was done in order to establish baseline conditions for which comparisons can be made during the sensitivity analysis.

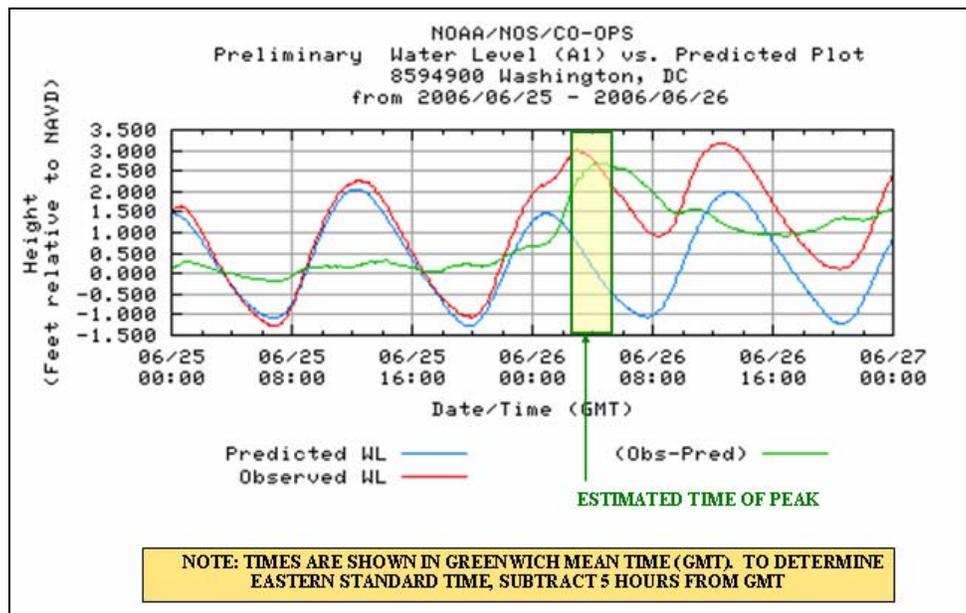
For the purposes of this investigation, the VDOT HEC-RAS steady-state models (existing and proposed conditions), dated 2002, was assumed to be the most recent and accurate reflection of the hydraulic condition of Cameron Run within the study area. Both the existing and proposed-conditions models were reviewed for accuracy, and found to be scientifically sound in most areas; however, adjustments to Manning's "n" values were made prior to using this model to develop a June 2006 flood event model. The VDOT models estimate a Manning's "n" value of 0.05 for the entire Huntington overbank area. Due to the significant amount of blockages, such as houses, large trees, etc... the "n" values were increased to 0.08 or 0.1. Therefore, the VDOT existing-conditions model was modified, and the geometric file is called "MODIFIED VDOT EXISTING".

Next, the modified VDOT existing data and VDOT proposed conditions models were merged to reflect conditions during the June 2006 flood event, as the U.S. Route 1 interchange was near completion, and the Telegraph Road interchange was not started. Manning's "n" values for near the U.S. Route 1 interchange were adjusted based upon the narrative of the construction project provided by VDOT (located in Appendix E). Values were increased from .035 (rip-rap conditions) to 0.072 to account for stockpiles, constructions materials, construction vehicles, and cofferdams. The barge blockage was input into the model to simulate the approximate 15-percent blockage that was created during the event. The geometric file for the June 2006 flood event was identified as "JUNE 2006 CONDITIONS."

6.2 JUNE 2006 MODEL RUN AND COMPARISON TO HIGH WATER MARKS

The June 2006 flood event model (JUNE 2006 CONDITIONS) was run with the peak flows estimated and discussed in Section 5 (flow file named "JUNE 2006 FLOW (TIDE)"). The plan file was named "JUNE 2006 FLOOD EVENT PLAN." A known water surface elevation of 2.0 feet (NGVD29 datum) was used as the starting water surface elevation. As noted earlier, the estimated time of peak of the flood event at the Potomac River was between 10:00 pm and 12:00 am on June 25 and June 26, 2006. At 10:00 pm on June 25, the tidal stage was roughly 3.0 feet National Adjusted Vertical Datum of 1988 (NAVD88) (which is 2.2 feet NGVD29). At 12:00 am on June 26, the tidal stage was approximately 2.2 feet NAVD88 datum (1.4 feet NGVD29) (Figure 6.1). Because the exact time of peak was unknown, the starting water surface elevation was estimated at 2.0 feet NGVD29.

Figure 6.1. NOAA Tidal Data at 8594900, Washington, D.C. for the June 2006 Flood Event



The HEC-RAS steady-state model was run in a sub-critical flow regime using the June 2006 geometric data with the June 2006 flow data. The results of the HEC-RAS run were compared to surveyed high water marks of the June 2006 flood event provided by VDOT and Fairfax County Stormwater Planning Division. This comparison is shown in Table 6.1. VDOT cross-section and high water mark locations are shown in Figure 6.2. A complete HEC-RAS output table for the June 2006 flood event is located in Appendix F.

Table 6.1. June 2006 Flood Event Model Results compared to High Water Marks

Cross-Section	June 2006 Flood Event HEC-RAS Model (feet NGVD29)	High Water Marks (feet NGVD29)
2752	23.8	22.6-25.8
2169	19.8	19.8-20.3
2071	16.3	18.4
1963	15.1	17.4
1823	14.5	15.4
1707	14.3	14.7
1389	13.9	13.2-13.9
1180	13.4	13.4-13.7
860	12.9	12.9-13.4
640	12.1	12.4
99	9.6	9.0-10.4

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For the majority of Cameron Run, the June 2006 flood event model results match quite well with the high water marks recorded by VDOT and Fairfax County. In Huntington in particular, the model results were within the range of recorded high water marks, or within 0.3 feet. The modeling results also matched well with recorded high water marks near the Capital Beltway. The results, however, varied near Telegraph Road, as the modeling results were over 2 feet lower than the recorded high water marks. Although the exact cause of this is unknown at this point in time, resolving this issue is outside the scope of this investigation. VDOT also experienced similar discrepancies when comparing information. Since the modeling results simulate the flooding in Huntington during the June 2006 flood event well, it was deemed acceptable to conduct a sensitivity analysis to meet the objectives of the investigation.