



AWeaver@EnvalueEngineering.com

Hydrology and Hydraulics Engineering
Floodplain Delineations, Consulting
3100 Parker Drive
Lancaster, Pa. 17601-1635
Phone (717) 327-5483

Director
Office of Science Quality and Integrity
U.S. Geological Survey
MS911 National Center
Reston, VA 20192

February 10, 2016

Dear Director,

I am seeking correction of information disseminated by the U.S. Geological Survey which I believe does not meet information quality standards.

Specific information in question

My request specifically concerns the annual peak flow dated June 23, 1972 for U.S. Geological Survey gage 01576500 on the Conestoga River at Lancaster, Pennsylvania. The website is http://nwis.waterdata.usgs.gov/pa/nwis/peak?site_no=01576500&agency_cd=USGS&format=html. My request is that the peak flow be increased from 50,300 cfs to 58,600 cfs or in the alternative, 59,600 cfs, which was the first revision estimated by H.N. Flippo, Jr. in 1990 (see attached Revision Comments by H.N. Flippo Jr.).

A second related request is that the gage record be considered for revision either prior to 1990 or after 1990, when the East Walnut Street bypass was constructed just downstream of the gage. The annual peak flows (other than 1972) appear to be correct, but the stages may need to be adjusted.

Specific Reasons for believing the information is in error

Regarding the annual peak flow for 1972:

The initial estimate for the peak flow of the 1972 flood (caused by Tropical Storm Agnes) was 88,300 cfs. An appeal was filed in approximately 1989 requesting a reduction in the flow. H.N. Flippo of USGS first revised the flow to 59,600 cfs. A second estimate resulted in the present flow of 50,300 cfs. Watershed models prepared by the former Lancaster County Engineers Office indicated that the flow for 1972 was more likely closer to the 59,600 estimate. I checked this by extending the pre-1990 data points using a power curve, and by correcting modeling errors in a 1978 HEC-2 simulation, and in a preliminary 2013 HEC-RAS simulation. These three independent methods produced flows of 58,900, 58,600, and 58,700 cfs, respectively. Averaging the HEC-2 and HEC-RAS flows produced an average flow (considering significant digits) of 58,600 cfs.

Regarding the pre- versus post-1990 gage record:

USGS gage 01576500 is located 60 feet upstream of the Conestoga River Viaduct, a five span stone structure built in 1887-1888 by the Pennsylvania Railroad. In 1990 the Pennsylvania Department of Transportation (PennDOT) built the four lane East Walnut Street bypass through the rightmost arch (looking downstream), thereby eliminating approximately 20% of the flow area through the Viaduct. Construction of the bypass was supported by a 1989 HEC-2 flood study which claimed there would be no increase in flood elevations as a result of the bypass, which was built partially in the floodway. This does not appear to be the case, as the pre-1990 annual peak flows plot an average of 9% above the

present rating curve for the gage, meaning that a given stage previously corresponded to a higher flow while the post 1990 annual peak flows plot an average of 3% below the present rating curve, meaning a given stage now corresponds to a lower flow (please see Figure 4 at the end of the attached research paper. The present USGS rating curve for the gage is located at (<http://waterdata.usgs.gov/nwisweb/data/ratings/exsa/USGS.01576500.exsa.rdb>).

Documentation

I've described my findings in a paper which has been accepted for publication in the ASCE Journal of Hydrologic Engineering. This paper is supposed to be published online sometime in the next few weeks, with publication in the printed journal to follow. ASCE policy allows me to release the final draft, which I have included, and after online publication I believe I'm allowed to provide pdfs of the final version of the paper upon request, which I would be happy to do.

One of the comments from the first review of the paper was to have a USGS technical expert be included in the second review. I agreed to this but don't know who made the comment or if it was actually done. Another comment from the first review was, "*In parallel to publication in HEENG [the Journal of Hydrologic Engineering], the USGS has an open, transparent QA procedure for submitting revisions and corrections that the author could use to have the Lancaster stream gage record corrected.*"

I have also included a copy of the 1990 Revision Comments by H.N. Flippo Jr. This is probably in the USGS files but by providing it I can hopefully save your staff the effort of finding it.

Effect of USGS information believed to be in error

To the best of my knowledge there is no direct effect on anyone due to what appears to be an error in the 1972 annual peak flow, which is also the flood of record for the gage. An indirect effect is that the Log-Pearson III flood series for the gage is influenced by the flood of record, and a flood of record that is too low could also result in a flood series that is too low. The preliminary Flood Insurance Rate Maps to be released by FEMA in April 2016 will not be affected, however, because the new FEMA flood studies were based on a flood series from a different source (watershed modeling provided by the former Lancaster County Engineer's Office, where I was employed as an Assistant County Engineer).

As stated above, I wrote a paper describing my findings, and one of the anonymous reviewers suggested I follow through by requesting the flood record be changed, which I am now doing. I am also interested in using the Lancaster County watershed modeling on actual storms, one of which is the 1972 flood. This requires a flow for the 1972 flood as accurate as reasonably possible.

Recommendation

My recommendation is an upward revision to the June 23, 1972 annual peak flow from 50,300 cfs to 58,600 cfs, or in the alternative to the flow of 59,600 cfs estimated by H.N. Flippo in 1990. In addition, at the discretion of USGS, the possible revision of the flood stages either prior to or after 1990 when the East Walnut Street bypass was constructed.

Thank you for your consideration of this request,

Andrew C. Weaver, P.E.
President, Envalue Engineering