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Memorandum

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CC	Chris Phaneuf		
Subject	Regression Estimate Hydrology Issues – Piscataqua/Salmon Falls FIRM Study		
From	Jason Currie, Ed Dickson, Jeffrey Burm (signed below)		
Date	October 6, 2017		

The initial hydrologic analysis for the Piscataqua/Salmon Falls watershed consisted of regression discharges that deviated significantly from discharges calculated via gage analysis at a number of locations. The regression estimates underpredict discharges across the entire range of recurrence intervals relative to calculated gage discharges. As a result, the preliminary water surface elevations do not escape the channel banks on a significant number of reaches in the study area. This is particularly apparent in the approximate reaches of ungaged watersheds, yielding an alarming number of locations where the 1% floodplain would be designated as just the channel. While it is possible for this scenario to occur in nature, the widespread nature of this occurrence in the study area warranted further examination.

This examination has focused primarily on the terrain data, as well as the hydrologic parameters and assumptions of the regression equations. The source of the regression equations for this study is the 2008 USGS regression report, “Estimation of Flood Discharges at Selected Recurrence Intervals for Streams in New Hampshire”. The hydrologic parameter that arose as a concern is the “% wetlands” parameter. The USGS report indicates that the “% wetlands” values used in the calculations were derived from the 2001 Multi-Resolution Land Characteristics Consortium National Land Cover dataset. AECOM initially used the latest land use dataset from 2011 to calculate % wetland as indicated in the USGS report. This approach yielded “% wetland” parameter values that were consistently higher than those listed in the USGS report. The AECOM team then tried to duplicate the USGS report % wetland values using the currently available version of the 2001 land use dataset, but were unsuccessful. These efforts produced similar % wetland calculations to the 2011 land use dataset. The author of the USGS regression report, Scott Olson, was contacted to verify the exact land use features used for the % wetland calculation. However, the study team has still not been able to duplicate the % wetland calculations used in the original USGS regression analysis. In subsequent communication with Mr. Olson, he agreed that both the 2011 NLCD % wetland and the currently available 2001 NLCD data set yield % wetland values far greater (average 157%) than the original 2001 NLCD data set that was used to derive the 2008 regression equations.

The team has investigated possible solutions based on additional discussion with the USGS, including the following:

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- Using the ‘original’ 2001 land-use dataset. This dataset would have to be included in the deliverable because it is no longer publicly available at USGS.
- Using the most recent Maine regression equations because they do not use the %wetlands as a parameter.
- Using the % wetland calculations from the USGS report and applying applicable reduction factor to ungaged reaches;
- Using the Log-Pearson III analyses at the gages and applying a discharge adjustment both upstream and downstream. This does not address ungaged reaches but could be used in conjunction with the above reduction factor;
- Moving forward with regression calculations as-is.

The investigative process associated with evaluating the various alternatives for resolving the anomalies in the regression analysis has added a number of layers of calculation, coordination, and correspondence that were not originally reflected in the project schedule. While cost overruns have been avoided to this point, this process has unfortunately caused delays in finalizing the results of the hydrologic analyses as steps are taken in order to ensure that the final deliverable meets the quality and accuracy standards of AECOM, and as expected by UNH. In an effort to resolve these unforeseen circumstances and achieve the most accurate results, AECOM has enlisted one of its senior hydrologists and former USGS employee, Ben Pope, to guide the process of finding a solution that reflects conditions on the ground. We want to make UNH aware of the issue, so that it can be conveyed to FEMA as necessary. In addition, we want to assure UNH that we are working to identify the best solution that will accurately reflect the flood risk in the study area. To resolve this issue properly, we think it is best to discuss potential resolutions with FEMA before we proceed further.

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