

Jeff Rice

From: Robinson, KC <kc.robinson@aecom.com>
Sent: Friday, October 27, 2023 6:09 PM
To: Jeff Rice; terri.fead@state.co.us
Cc: sarah.houghland@state.co.us; stevenjacobsen@elpasoco.org; Mikayla Hartford; marta.blancocastano@state.co.us; Christina Prete; Marroquin, Leylin; Benenati, Tim
Subject: RE: Additional Data LOMR 22-08-0383P - Monument Hill Road Crystal Creek C

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Jeff,

We have had some time to reivew the hydrology in the draft 2023 Jimmy Camp Creek Drainage Basin Planning Study (2023 DBPS). The large reductions in existing peak flows in the 2023 DBPS, when compared to previous studies (2015 Kiowa, 2003 City of Fountain, 1987 Wilson & Company, etc.) can be of concern that the risk of flood hazard may be under represented.

The 2023 DBPS uses data and hydrologic methods that are reasonable for this location, including but not limited to: NOAA Atlas 14 precipitation depths, NRCS SSURGO soil survey data, LiDAR topographic data, existing stormwater infrastructure data, future land use data, and others. The use of EPA-SWMM's Runoff Method is a reasonable approach to estimating peak flows for a DBPS type study. As with any hydrologic method, the choice of model and assumed parameterized data can lead to wide variations in results unless compared to secondary sources of information. The 2023 DBPS compares results to those of previous studies and the USGS Flood Frequency Analysis (FFA) at the Jimmy Camp Creek stream gage (07105900) as reported in the SIR 2016-5099 publication. The USGS 2016 report used the recorded peak flows from water years 1976-2013 in addition to the extraordinary 1965 historic flood. The USGS report also reported using a regional skew value to weight the results of the at-station skew. The 1% annual-chance peak flow was reported to be 33,940 cfs. Using the regional regression equation from the same 2016 USGS report, an estimated 1% annual-chance peak flow of 18,200 cfs (+/-88% SEP) is approximated at the Jimmy Camp Creek outlet. The 2023 DBPS results from the SWMM model are approximately 8,715 cfs at Ohio Ave (near the gage site). Other previous DBPS values are also reported in the draft report. Reductions ranging from -79% to -118% for the main stem of Jimmy Camp Creek are substantial.

It follows that the 1965 event is quite extraordinary and indeed drives many local and regional "envelope curves" for extreme events from watersheds with drainage areas of 50 square miles and above. The 2023 DBPS chose to remove the 1965 event from their FFA which results in a much lower peak flow of 9,022 cfs (1%) and a negative skew to the fitted flow-frequency curve. Bulletin 17C does not treat high flow events that do not follow the trend of other data as "outliers". They are typically kept in the analysis with more effort used to characterize their rarity with non-exceedance information or other historic thresholds over long periods of time to better characterize how rare the event may have been, resulting in a better fit to the trend of the other measured data. Such paleo data or non-exceedance threshold information may not be available.

One option recommended in USGS 2016 to improve estimates of annual exceedance-probability discharge is to weight different results based on their estimated variances. Equation 6 in SIR-2016-5099 is the method that the authors of USGS 2016 suggest to use to combine Bulletin 17C results with Regression results at the stream gage. In the absence of the 1965 event, it would be easy to assess the reasonableness of the 2023 DBPS results as the peak flows are closer to what would be expected if only the last 40 years of records were known. But having an extreme event in the not too far

past does give pause for thought on whether the risk is adequately conveyed. The methods and parameters used in the 2023 DPBS do appear to be defensible. It is the reasonableness of the final flows that is hard to assess with much confidence. (It may remain for a while until future stochastic/probabilistic modeling methods are available that could better place the historic 1965 event in perspective, statistically. The US Army Corps of Engineers and other researchers are working on just this type of analysis using Stochastic Storm Transposition and Monte Carlo methods.)

One common source of error that we have seen in the past is a unit error when using the Innovyze InfoSWMM software. The Horton infiltration method takes 3 inputs and one of them, the Decay rate factor of infiltration as reported in MHFD's Urban Storm Drainage Criteria manual is in values of 1/second whereas InfoSWMM often expects the factor to be 1/hour and states that this factor typically ranges between 2 and 7 (1/hour). The SubWatersheds table in the file "Modeling_Dbse_ElPasoCnty_JCC_DBPS_051021.mdb" lists values of either 0.0007 or 0.0018 which match those reported in Table 6-7 in MHFD's manual (1/second). Check to make sure the correct units are being used in the InfoSWMM model.

In the end, I guess I would say I can definitely understand the methods and results that are in the 2023 DBPS. Whether I would be comfortable using those computed peak flows for regulatory or planning purposes is difficult to say, in my opinion. Others may differ. While probably beyond the scope of the DBPS, the existence of an active USGS stream gage on JCC leads well to a site specific hydrologic study using developing stochastic methods that hopefully point to a future with less uncertainty around 1% annual-chance peak flows.

We did not perform any detailed review on the inputs, parameters, etc. that would typically be done as part of an in-depth Quality Control review.

Please reach out if you would like to discuss any of my thoughts in more detail.

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From: Jeff Rice <JeffRice@elpasoco.com>
Sent: Monday, October 9, 2023 9:25 AM
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Terri / KC,

Here is a link to the current Jimmy Camp Creek documents: <https://www.epcjimmycampcreek.com/drainage-basin-study>

The draft calculated DBPS floodplain maps, which also show the current floodplain, are here: <https://www.epcjimmycampcreek.com/stream-corridor-mapping>

Has AECOM had a chance to check the hydrology and model for any concerns?

Thanks!