PIMA COUNTY REGIONAL FLOOD CONTROL DISTRICT
TECHNICAL POLICY

POLICY NO: Technical Policy, TECH-015 **EFFECTIVE DATE:** October 1, 2007
REVISION DATE: **DRAFT 1/27/20**

POLICY NAME: Acceptable Methods for Determining Peak Discharges

PURPOSE
To standardize the selection of hydrologic models and other methods to be used to determine peak discharges.

BACKGROUND
When peak discharges need to be established or revised, a computer-based hydrologic model or previously-accepted discharge value may be used. Different hydrologic models may be appropriate for different applications. This policy describes when different hydrologic models ~~may or shall~~should be used for submittals to the Pima County Regional Flood Control District (District), and what other methods of determining peak discharges are acceptable. Modeling protocols and accepted parameters are ~~not~~ discussed in ~~the policy~~Technical Policies TECH 018 and TECH-033.

POLICY

A. Peak discharges may be computed as follows:

1. ***For non-distributary watersheds < 1 square mile with negligible detention or retention structures:*** The Pima County Hydrology Procedures (e.g., PC-HYDRO~~ydro~~) should~~all~~ be used.

2. ***For non-distributary watersheds < 1 square mile with detention or retention structures:*** HEC-1 or HEC-HMS may be used.

3. ***For non-distributary w~~W~~atersheds > 1 square mile~~ and < 10 square miles~~:*** HEC-1, HEC-HMS ~~(including Geo-HMS) or the Pima County Hydrology Procedures may be used. If the Pima County Hydrology Procedures are used, the Time of Concentration must be < 180 minutes and detention and retention must be negligible. HEC-1 or HMS (including Geo-HMS) is preferred~~should be used.

~~4. **For watersheds > 10 square miles:** HEC-1 or HEC-HMS (including Geo-HMS) shall be used.~~

~~6.~~4.~~**For outlying watersheds:** Where watershed information is sparse or unknown, and the development impact on the floodplain is minimal (e.g., not subject to subdivision requirements, or to determine erosion hazard concerns), the USGS Regression~~

~~Equation 13 (Thomas et al, 1997) or Eychaner equations (Eychaner, 1984) may be used.~~***with distributary flow:*** Two dimensional modeling such as FLO-2D or HEC-RAS 2D should be used.

B. The use of other methods for determining peak discharge shall be as follows:

1. ***For watersheds where the District has conducted studies:*** The use of peak discharges from previously-approved Basin Management Studies (or other studies conducted for or by the District) is acceptable in lieu of hydrologic modeling. The District will review these discharges to make sure that methods do not conflict with any current regulations and parameters, and methods are in conformance with sound and contemporary engineering practice.

2. ***For watersheds where previous studies have been accepted by the District:*** Peak discharges may be used from studies that have been previously accepted by the District (i.e., Drainage Reports). Peak discharges incorporated into new Drainage Reports submitted in support of development plans or plats shall be verified and certified as valid by the engineer of record. The District will review these discharges to ensure that methods do not conflict with any current regulations and parameters and methods are in conformance with sound and contemporary engineering practice.

3. ***Return-period analysis:*** If measured flow data are available, return-period analysis may be performed and analyzed using the methods described in the most-recent guidance provided by the United States Geological Survey (Bulletin 17C; England et al, 2019). The District will consider the uncertainty of the estimate for a given return period in determining whether to accept the value.

4. ***Regional Regression Analysis:*** In rare cases, the District may accept peak flood estimates from the most recent regression analysis by the United States Geological Survey (Paretti et al, 2014; Kennedy and Paretti, 2014). These methods can be valuable to evaluate reasonableness of peak discharges determined by hydrologic models. Application of the regional regression analysis is provided under Technical Policy 018.

5. ***Other Models:*** Approval of the use of other models, such as FLO-2D, shall be obtained in writing from the District prior to the submittal of the peak discharge analysis. A copy of the written permission must be included with the submittal.

6. ***FEMA Map Revisions:*** Hydrologic analyses must be supported by a numerical model meeting the minimum requirements of the National Flood Insurance Program (NFIP) requirements for flood hazard mapping activities, administered through the Federal Emergency Management Agency (FEMA).

REFERENCES

England, J.F., Jr., Cohn, T.A., Faber, B.A., Stedinger, J.R., Thomas, W.O., Jr., Veilleux, A.G., Kiang, J.E., and Mason, R.R., Jr., 2019, Guidelines for determining flood flow frequency—Bulletin 17C (ver. 1.1, May 2019): U.S. Geological Survey Techniques and Methods, book 4, chap. B5, 148 p., https://doi.org/10.3133/tm4B5.

Kennedy, J.R., and Paretti, N.V., 2014, Evaluation of the magnitude and frequency of floods in urban watersheds in Phoenix and Tucson, Arizona: U.S. Geological Survey Scientific Investigations Report 2014–5121, 29 p., *http://dx.doi.org/10.3133/sir20145121*.

Paretti, N.V., Kennedy, J.R., Turney, L.A., and Veilleux, A.G., 2014, Methods for estimating magnitude and frequency of floods in Arizona, developed with unregulated and rural peak-flow data through water year 2010: U.S. Geological Survey Scientific Investigations Report 2014-5211, 61 p., *http://dx.doi.org/10.3133/sir20145211*.

~~Eychaner, James H. 1984. *Estimation of Magnitude and Frequency of Floods in Pima County with Comparisons of Alternative Methods*. USGS Water Resources Investigations Report 84-4142, 69pp.~~

~~Thomas, B.E., Hjalmarson, H.W. and Waltemeyer, S.D. 1997. *Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States*. USGS Water Supply Paper 2433. 195pp~~

APPROVED BY:

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