

**PIMA COUNTY REGIONAL FLOOD CONTROL DISTRICT'S
TECHNICAL POLICY**

POLICY NAME: Acceptable Methods for Floodplain Delineation
POLICY NUMBER: Technical Policy, TECH-016
EFFECTIVE DATE: December 1, 2007

PURPOSE

To standardize the selection of hydraulic models and other methods for delineating regulatory floodplains and assessing encroachments.

BACKGROUND

A hydraulic model or previously accepted delineation may be used when floodplain delineations must be established. The Hydrologic Engineering Center (HEC) HEC-2 and HEC-RAS models are the most widely used hydraulic models for delineating floodplains in riverine systems. This policy describes when HEC-2 and HEC-RAS models or other methods are acceptable for submittal to the Pima County Regional Flood Control District (District). Modeling protocols and accepted parameters are not discussed in the policy. Furthermore, the technical policy does not address FEMA LOMR submittal requirements or models used for purposes other than floodplain delineation or encroachment analysis such as calculating scour depths for utility crossings.

The District supports FEMA's preference for HEC-RAS rather than the older and less functional HEC-2 software (FEMA memorandum, 2001). Where a gradually varied flow or backwater model is needed, new mapping shall be done using HEC-RAS. Revisions or re-studies of HEC-2 models shall be done by converting HEC-2 to HEC-RAS and verifying that the water surface in the effective model and duplicate model have not changed. If differences do occur, the observed differences must be justified or the HEC-RAS model must be adjusted.

POLICY

- A. The HEC-RAS model shall be used under the following conditions (models that include geospatial representation, such as HEC Geo-RAS, are encouraged):
1. ***Floodplain delineations on channels with 100-year discharges > 2000 cfs:*** These are major regulatory watercourses as defined in Title 16 of the Pima County Ordinance.
 2. ***Floodplain delineations where backwater conditions are known to exist:*** Backwater is known to occur under the following conditions:
 - i. *above stream confluences;*
 - ii. *above flow splits;*
 - iii. *above ponded areas such as detention basins;*
 - iv. *above sharp channel bends; and*
 - v. *above crossings, such as bridges, culverts or dip sections.*

Other conditions such as a reduction in slope may also result in backwater conditions.

3. ***Floodplain delineations for all subdivision plats.***
4. ***Encroachment analysis:*** Encroachment into the 100-yr floodplain requires the assessment of profiles with and without the encroachment, which requires the analysis capabilities of HEC-RAS.

B. Other means for determining floodplain limits are as follows:

1. ***Floodplain delineations from District studies:*** Floodplain delineations from approved basin management studies (or other studies conducted for or by the District) are acceptable in lieu of hydraulic modeling. The District will review these delineations to ensure that methods do not conflict with current regulations and parameters and that the methods are in conformance with sound and contemporary engineering practices.
2. ***Floodplain delineations from studies that have been accepted by the District:*** Floodplain delineations from previously-approved studies incorporated in new drainage reports submitted in support of development plans or plats shall be verified and certified as still valid by the engineer of record. The District will review these limits to make sure that methods do not conflict with any current regulations and parameters and that the methods are in conformance with sound and contemporary engineering practices.
3. ***Floodplain delineations on minor watercourses:*** Where the backwater conditions described in Section A.2 and the encroachments described in Section A.4 are absent, floodplain delineations may be performed using Manning's formula normal depth calculations with the approval of the District.
4. ***Floodplain delineations in constructed channels with uniform slope and cross-section:*** Manning's formula may be used.
5. ***Floodplain delineations by other methods:*** Approval to use other models, such as FLO-2D, shall be obtained in writing from the District prior to the submittal of the floodplain delineation. A copy of the written permission must be included with the submittal.

REFERENCES

FEMA Memorandum *Policy for Use of HEC-RAS in the NFIP* from Michael K. Buckley, P.E., Director of Technical Services Division, Mitigation Directorate, dated April 30, 2001

U.S. Army Corps of Engineers. 2002. *HEC-RAS River Analysis System, Hydraulic Reference Manual V3.1*. Institute for Water Resources Hydrologic Engineering Center. 377pp

APPROVED BY:



Suzanne Shields, P.E.
Director and Chief Engineer

10/23/07

Date