



DEPARTMENT OF THE ARMY

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CESPD-PDP (FRM-PCX)

20 December 2024

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Certification of the Hydrologic Engineering Center's Flood Damage Reduction Analysis Software Version HEC-FDA v2.0

1. References:

- a. Engineer Circular (EC) 1105-2-412, Assuring Quality of Planning Models, 31 March 2011
- b. Planning Bulletin (PB) 2013-02, Assuring Quality of Planning Models (EC 1105-2-412), 31 March 2013
- c. Memorandum, CECW-P, Delegation of Model Certification, 11 May 2018

2. The Flood Risk Management Planning Center of Expertise (FRM-PCX), in accordance with references 1.a, 1.b, and 1.c, has completed the certification review process for HEC-Flood Damage Reduction Analysis model (HEC-FDA) v2.0. HEC-FDA v2.0 is the latest iteration of HEC-FDA software and the first in the 2.0 version series.

3. HEC-FDA v2.0 is a major version update and a significant improvement from the currently certified version 1.4.3, aggregating more than a decade's worth of improvements into a single overhaul of the currently certified version. HEC-FDA v2.0 is a modern risk analysis software with a contemporary user interface and incorporates several changes to the Flood Damage Reduction Analysis software. The primary changes are discussed below.

- a. HEC-FDA v2.0, like previous versions, generates the aggregated stage damage function through a Monte Carlo process where for any given stage (x-axis) there will be thousands of associated damages generated through random sampling on the y-axis. Previous versions of HEC-FDA would fit a normal distribution to the aggregated stage damage function computed through this process. HEC-FDA v2.0 represents the uncertainty as an empirical uncertainty distribution, or as the aggregated stage damages at that given stage would be.
- b. Occupancy type level sampling in previous versions was sampled independently from structure to structure. That would allow for two structures in the same neighborhood, with the same dimensions and materials, to receive two different stage percent damage curve samples in the same model realization. HEC-FDA v2.0 accounts for correlation in the occupancy type level sampling and in the scenario above, these structures would receive the same stage percent damage curve samples for each model realization.

- c. HEC-FDA v2.0 enforces monotonicity in cases where a sampled curve is initially not monotonically increasing. Previous versions included monotonicity testing and would alert the user if a curve was not monotonically increasing in the mean but would allow samples of a curve with uncertainty (with a monotonic mean) that were themselves not monotonically increasing.
- d. HEC-FDA v2.0 is compliant with *Guidelines for Determining Flood Flow Frequency Bulletin 17C*.

For a complete discussion of the new software, see the release notes available here:

<https://www.hec.usace.army.mil/confluence/fdadocs/fdareleasenotes/version-2-0-111840004.html>

4. The transition to HEC-FDA v2.0 will take place immediately. A transition plan is enclosed with this memorandum that describes the specifics of the migration depending on where a study is in the feasibility phase. The HEC-FDA v2.0 Support Team (comprised of HEC personnel and field experts) and the FRM-PCX are available to support study teams during the transition. Coordinate HEC-FDA v2.0 support needs with Dr. Richard Nugent (Richard.J.Nugent@usace.army.mil) at HEC and until 21 February 2025 with Ms. Susie Byrd (Susannah.E.Byrd@usace.army.mil) at the FRM-PCX; after 21 February 2025 coordinate with Mr. Jesse Morrill-Winter (Jesse.E.Morrill-Winter@usace.army.mil). Other support resources are available during this transition and include:

- a. At least one Planning CoP Webinar
- b. Two iterations of PROSPECT #209 in Fiscal Year 2025
- c. FRM CoP Spotlight Webinar

5. HEC conducted an investigation to compare HEC-FDA v2.0 results with ten HEC-FDA v1.4.3 studies. Through an iterative process that included quality assurance from a subject matter expert several data input issues were discovered in HEC-FDA v1.4.3 models that had gone through the Agency Technical Review (ATR) process. This key finding highlights the need for continued emphasis on the importance of effectively executing our internal review processes to support critical study decisions. The FRM-PCX and HEC will share lessons learned and best data input practices with the field in 2025.

6. The FRM-PCX hereby certifies HEC-FDA v2.0 for a period of seven years. This memorandum supersedes the September 2021 HEC-FDA v1.4.3 certification memorandum. HEC-FDA v2.0 replaces HEC-FDA v1.4.3 as the latest certified version of HEC-FDA, although HEC-FDA v1.4.3 certification remains active.

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7. The point of contact for this memo is Ms. Susie Byrd, Acting FRM-PCX Economics and Risk Analysis National Technical Specialist, 412-735-0037 and Susannah.E.Byrd@usace.army.mil.

Encl:
FDA Transition Plan

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Planning Center of Expertise

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