U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

Operating Guidance No. 9-13

For use by FEMA staff and Flood Hazard Mapping Partners

Title: Operating Guidance for Designation of Zone VE based on Wave Runup Height

Effective Date: May 6, 2013

Approval: Luis Rodriguez

Chief, Engineering Management Branch
Federal Insurance and Mitigation Administration

Operating guidance documents provide best practices for the Federal Emergency Management Agency's (FEMA's) Risk MAP program. These guidance documents are intended to support current FEMA standards and facilitate effective and efficient implementation of these standards. However, nothing in Operating Guidance is mandatory, other than program standards that are defined elsewhere and reiterated in the operating guidance document. Alternate approaches that comply with program standards that effectively and efficiently support program objectives are also acceptable.

Background: Coastal High Hazard Areas (CHHAs), which are designated Zone VE on Flood Insurance Rate Maps (FIRMs), are Special Flood Hazard Areas that are subject to wave action and/or high-velocity flows from storms or seismic sources. CHHAs are identified based on the severity of the wave hazards and the presence of the primary frontal dune. Wave hazard severity criteria are defined for the following physical processes:

- Wave runup;
- Wave overtopping;
- High-velocity flow resulting from wave overtopping; and
- Overland wave propagation.

Issues: There have been issues with implementing the wave runup criterion for Zone VE in areas with low wave energy. The current criterion states, "The wave runup zone occurs where the (eroded) ground profile is 3.0 feet or more below the 2-percent wave runup elevation" (Figure 1). As written, this criterion is based on depth and does not distinguish between the depth of runup and the depth of inundation.

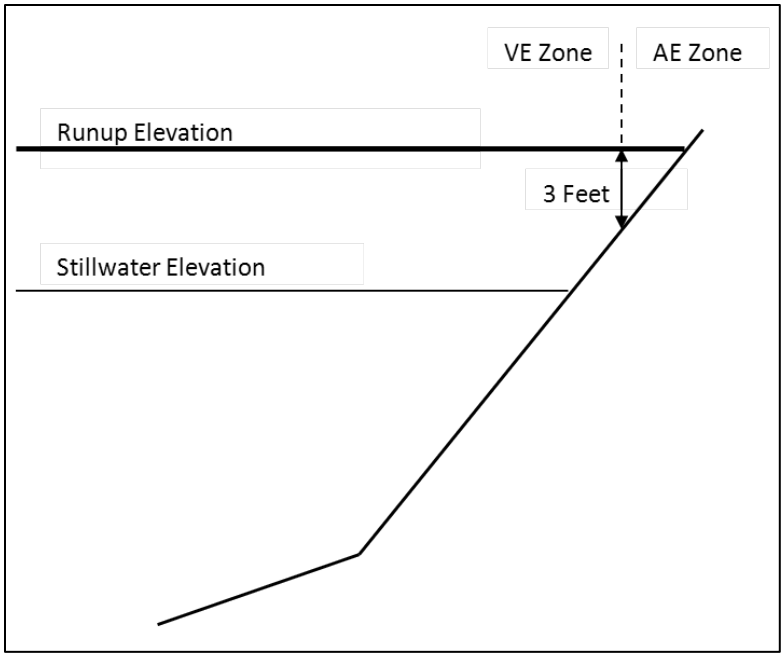

Figure 1. Mapping of wave runup as Zone VE and Zone AE, based on depth, according to current guidance.

The limitation of this criterion is apparent in areas where wave runup heights (the difference between the stillwater elevation and the limit of wave runup, or the runup elevation) are relatively small. For example, an area with a wave runup height of 1 foot and a stillwater elevation of 10 feet would yield a runup elevation of 11 feet. Using the current wave runup zone criterion, the area would be mapped as Zone VE to the point where the eroded ground profile is 3 feet below the runup elevation (in the example in Figure 2, to a ground elevation of 8 feet). However, with only 1 foot of runup, a Zone VE designation is not considered appropriate, since the wave hazard severity is low and 1 foot of runup is not expected to result in structural damage. Therefore, a wave runup *height* criterion must be developed to establish a minimum runup height that warrants a Zone VE designation.

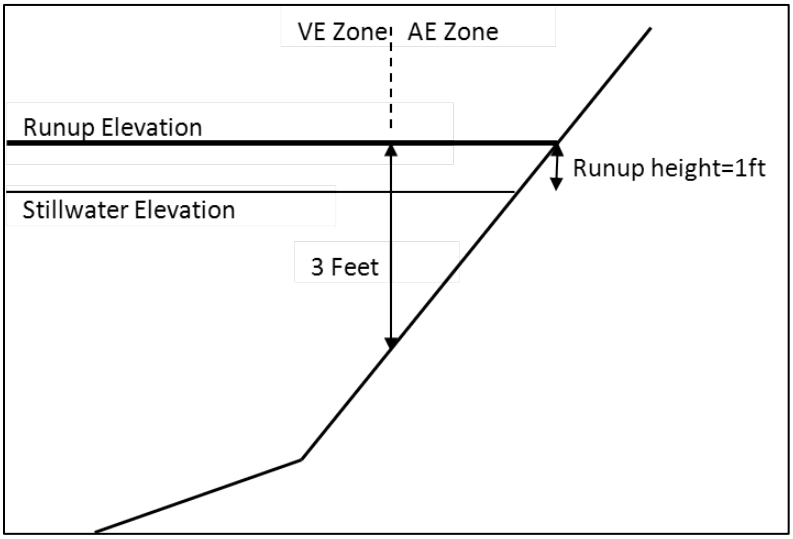

Figure 2. Current mapping guidance results in the mapping of Zone VE, even for runup heights as small as 1 foot.

In general, the energy associated with the uprush of water from a broken wave (wave runup) is less than that associated with a breaking wave. Therefore, the runup height criterion should be equal to or greater than the 3-foot overland wave propagation wave height criterion. For consistency with other Zone VE criteria, and in the absence of data supporting a larger value, 3 feet was considered a reasonable value to use as the wave runup height criterion for mapping Zone VE.

Actions Taken: For all new detailed coastal studies started in Fiscal Year 2011 or later, it is recommended that Zone VE only be mapped for areas subject to wave runup where the 2-percent wave runup elevation is at least 3 feet higher than the stillwater elevation. Where runup heights are less than 3 feet, the runup zone should be mapped as Zone AE. The existing depth criterion for wave runup zones should continue to be used to determine the inland limit of Zone VE if the runup height criterion for Zone VE is met.

Supersedes/Amends: This Operating Guidance document amends Sections D.4.1.2.7.1 and D.4.9.2.1 of the *Final Draft Guidelines for Coastal Flood Hazard Analysis and Mapping for the Pacific Coast of the United States,* January 2005, and Sections D.2.1.2.7.1 and D.2.11.2.1 of the *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update, Final Draft,* February 2007.

Attachment[s]: None

Distribution List (electronic distribution only):

Office of the Assistant Administrator for Flood Insurance and Mitigation

Director, Risk Analysis Division

Director, Risk Reduction Division

Director, Risk Insurance Division

Regional Mitigation Division Directors

Regional Risk Analysis Branch Chiefs

Regional Support Centers

Regional Program Management Liaisons

Congressional Affairs

Office of Chief Counsel

Cooperating Technical Partners

Program Management Contractor

Customer and Data Service Contractor

Production and Technical Services Contractors