NORTH CAROLINA
Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

Limit of Moderate Wave Action (LiMWA)

Digital Flood Insurance Rate Maps (DFIRMs) for coastal areas currently depict two types of flood hazard areas: **VE Zones** where flood waters include wave heights ≥ 3 feet, and **AE Zones** where the wave height is <3 feet. VE zones are also called **Coastal High Hazard Areas** where traditionally high velocity flow due to waves is thought to cause structural damage to building foundations and other critical elements. It has been long recognized that waves less than 3 feet in height can cause major damage to residential structures. In the aftermath of Hurricane Katrina severe damage was inflicted to properties, located in Zone AEs, by waves less than 3 feet. In December 2008, the Federal Emergency Management Agency Procedure Memorandum 50 issued guidance on the identification and mapping of the 1.5-foot wave height line, referred to as the **Limit of Moderate Wave Action (LiMWA).** The LiMWA will be shown on future DFIRMs by the North Carolina Floodplain Mapping Program (NCFMP).

What is the LiMWA?

The inland limit of the area affected by waves greater than 1.5 feet is called the **Limit of Moderate Wave Action (LiMWA)**. Research and post-disaster damage assessments have demonstrated that waves 1.5 feet in height or greater can induce significant structural damage.

How is the LiMWA determined?

To map the LiMWA, the engineers analyze the full modeled wave profile and plot points along each coastal transect where the wave height crosses 1.5 feet. Then, like a flood zone boundary, the LiMWA is connected via interpolation between transects. In areas where **wave runup** (maximum vertical extent of the wave uprush) dominates, such as steeply sloping dunes or bluffs, the LiMWA is placed immediately landward of the VE to AE zone boundary defined by the runup depth, per the current FEMA guidance, and tied-in with adjacent wave height-dominated zone mapping. An effort is made to keep the LiMWA line as a continuous feature throughout the study area, even when flood zones are at minimum mappable widths in the vicinity. The LiMWA is discontinued in instances when there are no mappable AE Zones (i.e., zones go directly from VE to X500) and is cut-off at the point where the last AE zone ends at the 1% annual chance boundary.

How does the LiMWA affect floodplain management requirements?

FEMA does not impose floodplain management requirements or special insurance ratings based on LiMWA delineations at this time. The LiMWA is being provided by FEMA at this time as informational only. Because the 1.5' breaking wave can potentially cause foundation failure, communities are encouraged to adopt, within the LiMWA zone, building construction standards applicable for VE Zones. For communities that do adopt VE Zone building standards in the area defined by the LiMWA additional community rating system credits are available. In addition, the LiMWA line is a separate DFIRM database feature that can be exported and overlapped with additional digital data. Mapping the LiMWA will help give the DFIRM user more information when thinking about buying/developing, mitigating or enforcing floodplain management regulations in the coastal flood hazard areas.

How will the LiMWA be mapped?

A new line layer will be added to the DFIRM Database to accommodate the LiMWA features. The LiMWA will be identified in the DFIRM legend as "Limit of Moderate Wave Action" (Figure 1). A note will be added to the Notes To Users on the DFIRM panel to explain the LiMWA boundary. The note reads as follows:

*"The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone."*

Figure 1 is an example DFIRM that has the LiMWA delineated. The area in Plot "a" shows the delineation of the LiMWA in an area where the predominant coastal flood hazard is overland wave propagation. Plot "b" shows delineation of the LiMWA in a region where the predominant coastal flood hazard is wave runup.

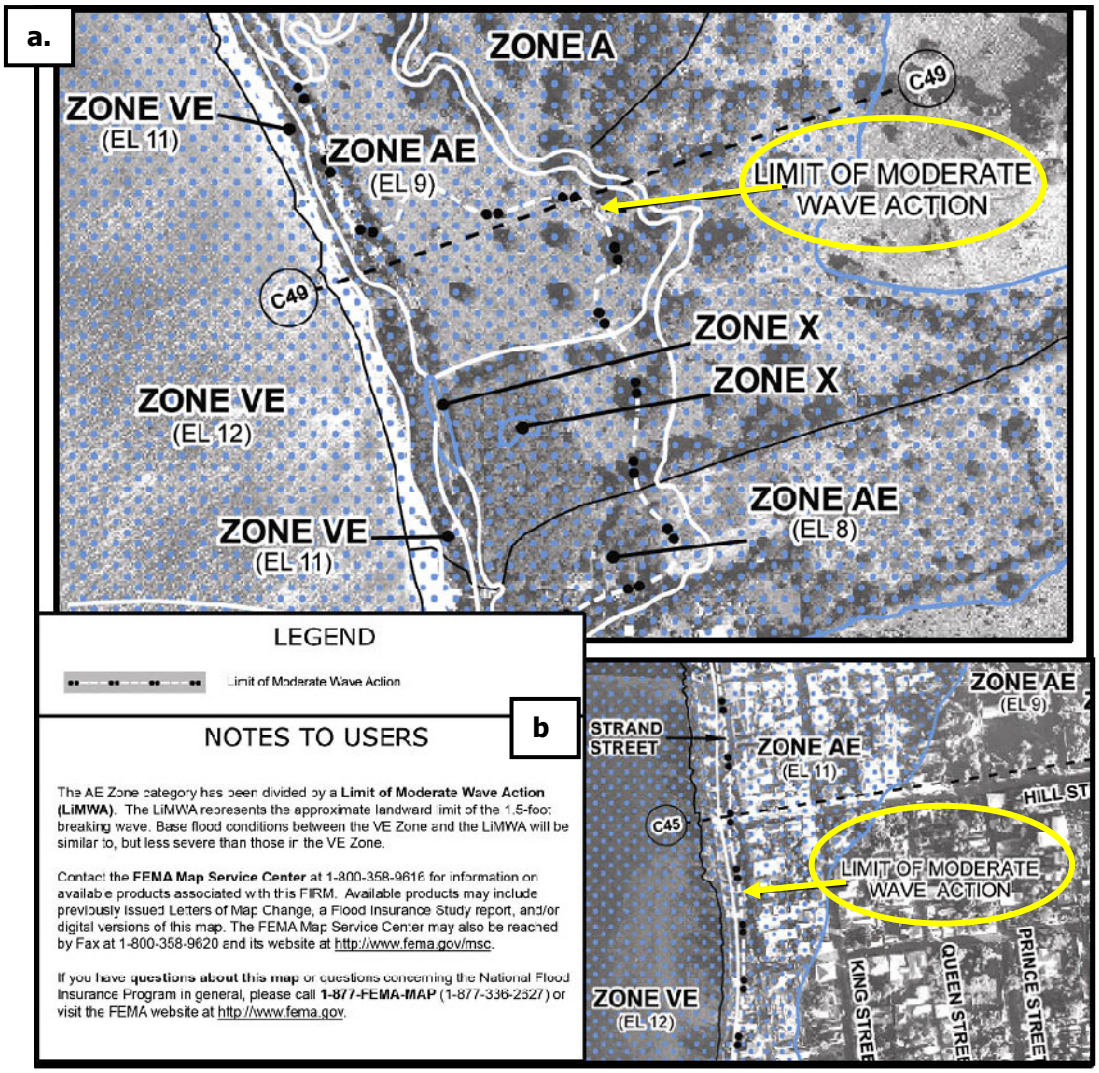

Figure 1. Sample plots of a DFIRM with the Limit of Moderate Wave Action (LiMWA) delineated and relevant entries in the Legend and Notes to Users.

Reference

Federal Emergency Management Agency (2008): Procedure Memorandum No. 50 – Policy and procedures for Identifying and mapping Areas Subject to Wave Heights Greater than 1.5 feet as an Informational Layer on Flood Insurance Rate Maps (FIRMs).