

The Great Lakes Coastal Flood Study

WAVE HAZARDS AND VE ZONES ON THE GREAT LAKES

The introduction of VE Zones to the Great Lakes Region is the result of one of the most extensive coastal flood studies to date, encompassing coastal floodplains in the eight States on the Great Lakes. The Federal Emergency Management Agency (FEMA) conducted the comprehensive analysis of storm and high water events within the Great Lakes Basin in consultation with U.S. Army Corps of Engineers (USACE) Detroit District and the Engineer Research and Development Center (ERDC). The analysis uses the latest scientific methods and the best available data to comprehensively depict flood hazards along the lakeshore.

Understanding the Risk from Wave Hazards

The most severe flood events on the Great Lakes occur when high lake levels are combined with strong winds that drive water and waves onshore. When large waves are paired with elevated lake levels, the waves are able to reach farther onshore, eroding the backshore, and potentially reaching developed lakefront areas. Whether wave hazards reach development depends on local conditions—for instance, in many areas the bluffs are high enough to limit the wave effects to the bluff face. However, in other areas, the bluff or shore protection structures may be overtopped or waves may pass over inundated, low-lying areas.

Waves can cause dramatic structural damage to buildings, including splintering walls, floating homes off foundations, and even causing collapse. Understanding the risks posed by elevated lake levels and waves is important. It can help you make more informed decisions about how to make your family, home, business, and community safer and stronger.

What is a VE Zone?

Like Zone A, or AE, Zone VE is a high risk area subject to flood hazards associated with a 1-percent-annual-chance flood. However, the VE Zone designation is used to differentiate coastal high hazard areas from the rest of the Special Flood Hazard Area. The Zone VE designation indicates that during the 1-percent-annual-chance flood, wave hazards are expected to be particularly strong and have the potential to cause structural damage.

GREAT LAKES WAVE HAZARDS



Wave runup occurs when a wave encounters a barrier—be it a beach, bluff, or structure at the shoreline—and produces an uprush of water on the face of the barrier. Wave overtopping is when wave runup exceeds the top of the barrier and flows or splashes into the area beyond.



Elevated lake levels can inundate low-lying lakefront areas, allowing waves to pass over ground that is typically dry. This process is known as Overland Wave Propagation.



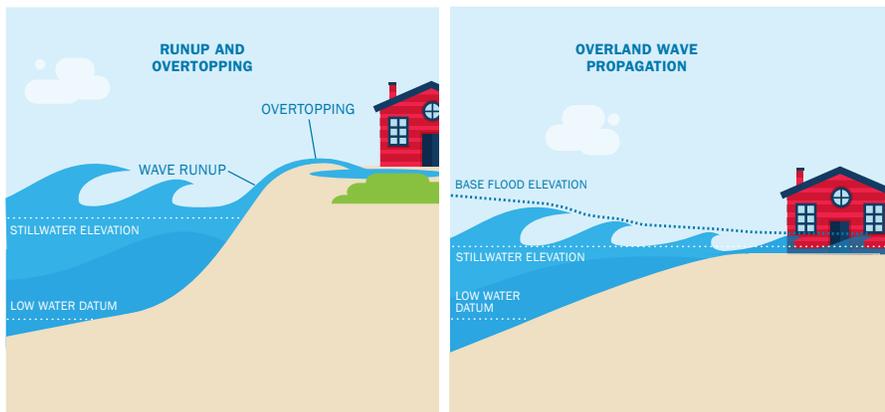
Zone VE Mapping Criteria

Zone VE is mapped for areas that meet one or more of the following criteria:

1. Wave runup depth exceeds 3 feet relative to the (eroded) ground.
2. Wave overtopping rate exceeds 1 cfs/ft.
3. Wave heights exceed 3 feet in areas of overland wave propagation.
4. The primary frontal dune.

The actual Zone VE boundary shown on the Flood Insurance Rate Map is defined as the farthest inland extent of any of the four criteria listed.

For more information on VE Zone mapping please refer to Section 3.9 Identification of Flood Insurance Risk Zones of FEMA's Great Lakes Coastal Guidelines Update (January, 2014). [<http://www.fema.gov/media-library/assets/documents/34953>]



Overtopping is calculated in terms of the amount of water that flows over the barrier crest—the “overtopping rate”

Insurance, Floodplain Management, and Building Requirements in Zone VE

Comprehensive flood hazard mapping that includes wave effects and VE Zones will be new for most Great Lakes communities. Inclusion of this new flood zone designation may require adoption of additional local floodplain management ordinances and building requirements that are intended to help safeguard against damaging wave forces. Insurance ratings will also be affected by changes in base flood elevations and flood zone designations. A multitude of resources are available on the FEMA website at <https://www.fema.gov> that further describe the floodplain management ordinances, building requirements, and insurance ratings for Zone VE. FEMA is committed to helping your community understand, work through, and adapt to these changes.

DEFINITIONS

1-Percent-Annual-Chance Flood:

A flood that has a 1-percent chance of being equaled or exceeded in any given year. It is also referred to as the base flood or 100-year flood.

Base Flood Elevation (BFE):

The computed elevation to which floodwater is anticipated to rise during the base flood with wave effects included in coastal areas. The BFE, flood hazard zone, and a structure's elevation are factors in determining the flood insurance premium.

Special Flood Hazard Area (SFHA):

The area shown as inundated by the floodwaters of the 1-percent-annual-chance-flood on flood maps.

Coastal High Hazard Area (CHHA)

or VE Zone: An SFHA extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high-velocity wave action from storms.

Primary Frontal Dune (PFD):

A continuous or nearly continuous mound or ridge of sand with relatively steep seaward [lakeward] and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high water levels and waves during major storms. PFDs are found only in limited locations on Great Lakes shorelines.

Limit of Moderate Wave Action (LiMWA):

The inland limit of the area expected to have 1.5-foot or larger breaking waves. Coastal construction practices may be required lakeward of the LiMWA for communities that have adopted design standards from ASCE 24 and/ or International Building Code.

Contact:

Ken Hinterlong, FEMA Senior Engineer
Ken.Hinterlong@fema.dhs.gov