RiskMAP

Increasing Resilience Together

NEW ENGLAND COASTAL MAPPING

Analyzing coastal hazards is a high priority for FEMA because of high population and dense development in most coastal areas. Advances in data collection and out-of-date effective maps are also reasons why FEMA is conducting new coastal studies.

Why is FEMA conducting new coastal flood hazard studies in New England?

The data and methodologies used in producing Flood Insurance Rate Maps (FIRMs) in New England coastal areas (CT, ME, MA, NH, RI) date back to the mid-to-late 1970s. Since that time, the science of coastal risk analysis and the data to support it have improved. Land use and coastal development have evolved and changes to the National Flood Insurance Program (NFIP) have created the need for FIRM updates to reflect more detailed and complete coastal flood hazard information.

How does FEMA determine the coastal flood hazard risk, flood insurance rates and other requirements for communities?

FEMA works with scientists and engineers from other Federal agencies; State, regional, community, Tribal, non-profit, nongovernmental, and private-sector partners; and contractors to analyze flood hazards for coastal communities using scientifically credible methodologies. By building on data that reflects current conditions and working with local community officials, FEMA produces new hazard mitigation tools and updated coastal maps. The results are more accurate FIRMs, risk assessment tools, and outreach support for communities. The effective FIRMs for each community drive flood insurance requirements, flood insurance premiums, and the requirements for new and improved buildings.

The coastal flood hazard analyses being applied in New England are the result of a decade-long effort by FEMA and national experts from academia, government, and the private sector to incorporate advances in coastal hazard analysis into recommended approaches for improved coastal flood hazard mapping.

FEMA

Benefits of Coastal Flood Hazard Mapping Studies

- Updated flood hazard data and maps to help coastal communities understand their risk
- Improved risk assessment tools and hazard mitigation planning assistance to help communities reduce their risk
- Compiled data, tools, and resources for coastal outreach and mitigation

Additional Resources

FEMA maintains a variety of resources to assist coastal communities and property owners in better understanding their flood risk and taking steps to protect themselves from loss of life and property.

For more information, please visit FEMA's Coastal website:
www.FEMA.gov/coastal-flood-risks

For answers to questions about new FIRMs, the status of a request, or other mapping issues:

FEMA Map Information eXchange
1-877-FEMA-MAP (1-877-336-2627)

FEMA Map Service Center
www.msc.fema.gov

For answers to questions about flood insurance:
The NFIP Call Center
1-888-379-9531

FloodSmart
www.FloodSmart.gov

For general information on FEMA and its programs: www.FEMA.gov

What methodologies did FEMA select for the coastal flood hazard mapping studies in New England and why?

FEMA employed the following methodologies for coastal flood hazard analyses and mapping in New England.

Storm Surge Analysis – Storm surge analysis is performed to determine the 1-percent-annual-chance stillwater elevation. For coastal flood insurance studies in New England, storm surge analyses were determined through statistical analyses on long-term historical storm data and local tidal information throughout the study area. This methodology was selected based on the prevalence of long-term observed historical records for the coastal New England area and is consistent with methodologies previously used by FEMA in New England. By working with other Federal agencies, FEMA's statistical analysis incorporates an additional 20+ years of storm records since the previous storm surge analysis.

Wave Setup Analysis – Wave setup analysis is performed to simulate waves as they travel from deep water offshore to the nearshore and to account for the increase in water levels as waves break. Wave setup, which can be a factor in determining coastal flood elevations, is affected by the height of the waves, the speed at which waves approach the shore, and the slope of the ground near the shore. For coastal flood insurance studies in New England, wave setup was calculated using the Direct Integration Method (DIM).

The DIM is an equation designed to determine the wave setup based on wave characteristics and ground (or bathymetric) profile. Although the DIM was initially developed for application in the Pacific coast environment, research and sensitivity analysis performed by experts in the field of coastal engineering determined that the DIM was appropriate for application along the Atlantic and Gulf of Mexico coastal environments. Therefore FEMA incorporated this methodology into the Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update (2007) guidance document.

Overland Waves, Wave Runup, and Overtopping – For coastal flood insurance studies and FIRM updates in New England, overland wave modeling has been performed using FEMA's Wave Height Analysis for Flood Insurance Studies (WHAFIS) model. Determining the wave height is a function of many factors including water depth, topography, vegetation, and storm characteristics. In New England, wave runup is a dominant hazard that FEMA assesses using methods based on the nature of the landform, such as vertical wall, steep sloping shore protection structure, or gently sloping beach. The impacts of waves and runup throughout the flood hazard areas are used in combination with the storm surge to determine the flood elevation during the 1-percent-annual-chance flood.

Coastal Flood Hazard Mapping – After the appropriate storm surge and wave analyses are completed, FEMA begins the coastal flood hazard mapping process. The Base Flood Elevation (BFE) is the elevation of the 1-percent-annual chance storm surge, plus wave setup, plus overland wave heights or runup elevations (whichever is greater). The Special Flood Hazard Area (SFHA) is determined based on the elevation of the land in relation to the BFE (areas below the BFE are included in the SFHA). Flood hazard zones are determined based on the wave height, wave runup, and other factors such as the presence of coastal protection measures or primary frontal dunes. VE Zones, or Coastal High Hazard Areas, are areas where waves are 3-feet or greater, the depth of wave runup is 3-feet or greater, or where the primary frontal dune (PFD) is present.

Glossary of Terms

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 is the minimum regulatory requirement for the elevation or floodproofing of structures. The flood hazard zone as well as the relationship between the BFE and a structure's elevation determines the flood insurance premium.

Flood Insurance Rate Map (FIRM): The official map of a community on which the National Flood Insurance Program (NFIP) has delineated the BFEs, Special Flood Hazard Areas (SFHAs) and the flood insurance premium zones applicable to the community.

Special Flood Hazard Area (SFHA): The area shown as inundated by the floodwaters of the base flood on FIRMs where floodplain management regulations must be enforced and mandatory flood insurance purchase requirements apply.

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 or tsunamis.

Storm Surge: The rise of water generated by a storm, over and above the predicted astronomical tides.

Wave Setup: The increase in the stillwater surface near the shoreline, due to the presence of breaking waves. Wave setup is affected by the wave height, the speed at which waves approach shore, and the nearshore slope.

Overland Wave Modeling: The process of simulating a wave as it travels inland during a storm event.

Wave Runup: The rush of water up a barrier, such as a dune, seawall or other steep shoreline feature that occurs when waves come ashore. If the wave runup exceeds the elevation of the barrier, overtopping will occur.