



Orange County, California Open Pacific Coast Study

California Coastal Analysis and Mapping Project

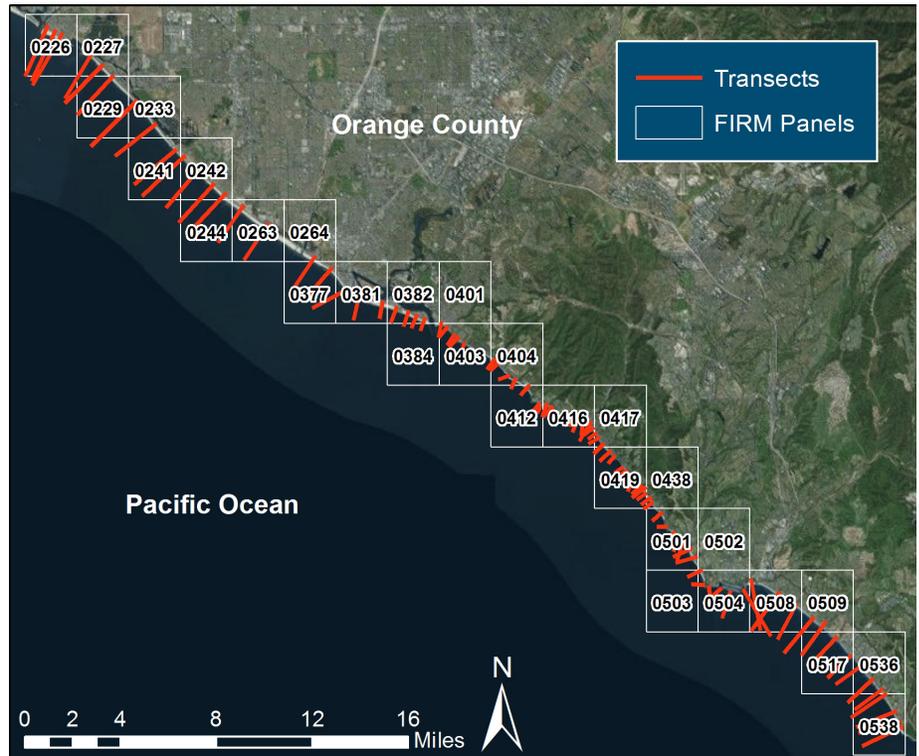
February 2016

The Federal Emergency Management Agency (FEMA) is conducting a coastal flood study for the County of Orange as part of the California Coastal Analysis and Mapping Project (CCAMP). Results from this Open Pacific Coast (OPC) Study will produce flood and wave data for the National Flood Insurance Program (NFIP) Flood Insurance Study (FIS) report and regulatory Flood Insurance Rate Map (FIRM) panels.

Study Methodology

Coastal flooding from the Pacific open coast is a result of local stillwater levels and waves. Stillwater levels include the effects of tides, storm surge, and riverine discharges. Waves impacting the shoreline originate from two sources: 1) locally-generated wind-driven waves and 2) ocean swells travelling from distant storms. When combined, these stillwater level and wave components strongly influence the flood hazards along Orange County's open coast shoreline.

The OPC Study is guided by FEMA's 2005 Guidelines for Coastal Flood Hazard Analysis and Mapping for the Pacific coast of the United States. The stillwater elevation and wave analyses rely on a combination of regional-scale hydrodynamic models and localized one-dimensional (1-D) wave analysis transects. Surf zone processes including wave setup, wave runup, and overtopping are combined with local topographic and coastal structures data to determine the location and extent of coastal Special Flood Hazard Areas (SFHAs) as well as 1-percent-annual-chance Base Flood Elevations (BFEs).



A deepwater wave hindcast was produced in collaboration with Oceanweather Inc. Nearshore wave transformation was performed in collaboration with the Scripps Institution of Oceanography. The effects of the combined regional-scale water levels and wave conditions resulted in a 50-year total water level (TWL) hourly time series along the northern California coast. TWL is the combination of the stillwater level, wave setup, and wave runup at each time step.

Once the full 50-year TWL time series was calculated, extreme value analysis of peak TWLs was used to determine the 1-percent-annual-chance TWL to establish BFEs.

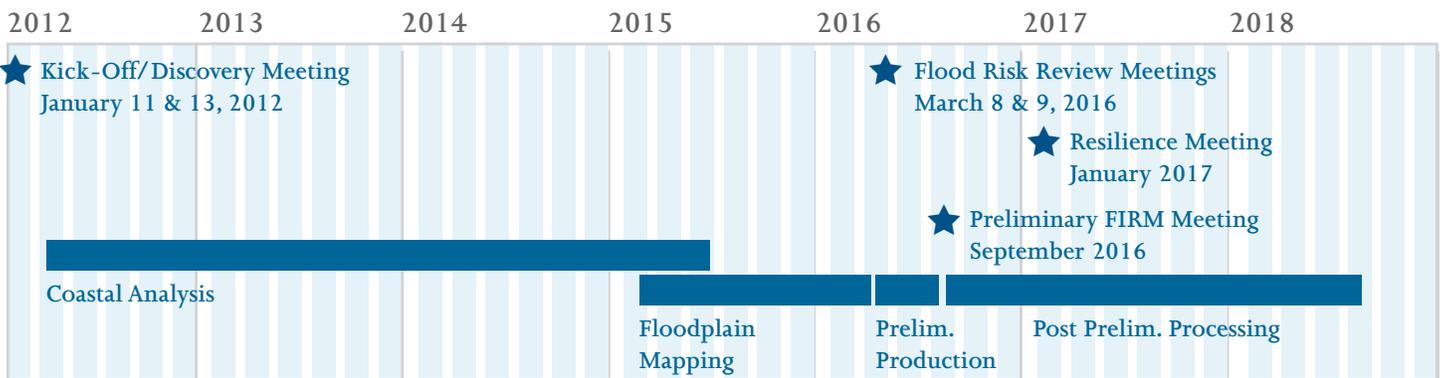


FEMA

California Coastal Analysis
and Mapping Project
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Orange County Study and Mapping Timeline



Mapping Coastal Flood Zones

Within the coastal SFHA, there are two primary flood hazard zones: Zone VE and Zone AE. Zone VE, also known as the Coastal High Hazard Area, has a wave component that is greater than three feet in height. Coastal Zone AE has a wave component of 0-3 feet in height. BFEs will vary in each zone. Flood zones and BFEs can have a significant impact on building requirements and flood insurance costs. Because waves can diminish in size over a short distance, particularly where the ground is steep, BFEs can differ dramatically in adjacent areas of coastal zones.

Community Rating System

The NFIP Community Rating System (CRS) is a voluntary program where communities earn points for activities that address flood risk. California communities benefit from state and regional agency activities that can qualify for up to 700 points - enough to join the CRS Program. Higher scores increase the discount on annual flood insurance premiums paid by community residents so that money can stay in the community. Currently, Orange County and the cities of Huntington Beach and Newport Beach participate in the CRS Program. More information on the CRS can be found at www.fema.gov/national-flood-insurance-program-community-rating-system.



Shoreline types such as dunes, bluffs, and armored beaches respond to storm events differently. Therefore, the Orange County shoreline was separated into representative reaches that account for shoreline type, development density, land use, variations in topography, nearshore bathymetry, and incident wave conditions. 1-D transects oriented perpendicular to the shoreline were placed within each shoreline reach. Depending on the shoreline characteristics, analyses for each transect included wave setup, wave runup, wave overtopping, and overland wave propagation as appropriate. For dune-backed shorelines, dune retreat in response to the base flood event was also considered. The result is the identification of coastal flood hazards associated with a flood event having a 1-percent annual exceedance probability that combines elevated coastal water levels and wave effects.

The resulting coastal flood hazard elevations determine updated 1-percent-annual-chance flood hazard zones which are used to inform the flood hazard mapping on FIRM panels and the FIS report for Orange County.

Next Steps, Stay Informed and Engaged!

The coastal analysis and resulting flood hazard work maps will be presented to Orange County and the cities of Dana Point, Huntington Beach, Laguna Beach, Newport Beach, San Clemente, and Seal Beach local officials during the Flood Risk Review Meetings to inform them of proposed coastal SFHA boundaries, flood zone designations, and BFEs before the preliminary FIRM panels are developed. The goals of the Flood Risk Review Meetings, scheduled for March 8 and 9, 2016, are to enhance the community's understanding of FEMA programs, give an overview of the coastal study process, review the study mapping results, and share outreach and communication information. FEMA will preview the work maps at the Flood Risk Review Meeting using an online work map tool that the community officials will use to provide comments.

To stay up to date with the Open Pacific Coast Study, and the companion San Francisco Bay Area Coastal Study, join one of our webinars or sign up for the quarterly e-bulletin, Coastal Beat, which includes technical articles, facts of interest, and relevant information as the studies progress.



Visit www.r9coastal.org for additional coastal study information.