CITY OF NEWPORT BEACH
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November 22, 2016

Ed Curtis, P.E., CFM
Risk Analysis Branch
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

Re: City of Newport Beach Draft Flood Insurance Rate Maps (FIRMs)

Dear Mr. Curtis:

Thank you for providing the City of Newport Beach an opportunity for to review the draft proposed Flood Insurance Rate Maps (FIRMs) and accompanied technical studies for Orange County. We would also like to thank Ms. Karin Ohman who has been very helpful in providing us with the data used for the City of Newport Beach in the technical studies.

We understand that two different methods have been used to revise the Base Flood Elevations (BFEs) and corresponding flood zones for the City of Newport Beach. For Newport Harbor, which is sheltered from waves, the BFE and corresponding flood zones were designated using a statistically determined Still Water Elevation (SWL). For City areas along the open coast, the BFEs were derived from the Total Water Elevations (TWLs), which consider the combined effects of high tides, ocean waves, and wave runup. Based on our review of the technical study reports and data used for the study, we identified several issues and concerns regarding the method and data used for mapping the flood extent for Newport Bay, including the very high BFEs that are being proposed for the Newport coastline and the method to map the flood extent along the coastline. Included below is a summary of our concerns, including our proposed approach for addressing these concerns.

Newport Bay

The two major issues we have with the method and data used in establishing the flood extent for Newport Bay are:

1) The topographic data used in mapping the flood zone, which did not incorporate the seawall elevations of Newport Bay, especially those along Newport Peninsula and Balboa Islands.

2) The use of the "bathtub" model to map the flood extent.

Researchers at the University of California, Irvine (UCI) have been studying urban coastal flooding for years. In one of their studies (Gallien et al. 2011), they compared the "bathtub" approach with the use of a hydrodynamic model for flood mapping, using the City of Newport Beach as a test case. The two methods were compared to the observed flood extent caused by an extreme high tide (7.72 ft NAVD) on January 10, 2005. The study also examines survey

accuracies of seawall elevations in flood mapping. Their major findings are: (i) the "bathtub" approach over-predicted the flood extents in Newport Bay, and (ii) it is important to include accurate survey data of the seawall elevations in urban flood mapping.

Based on UCI's work, we believe that accurate mapping of the flood extent for Newport Bay requires 2D hydrodynamic modeling and inclusion of accurate seawall elevations in the model. We have accurate survey data for these seawalls at the Balboa Islands (Everest, 2011) and have also obtained the seawall elevations data used in Gallien's study from UCI. We have incorporated the seawall data into the topographic and bathymetry data for Newport Bay and conducted similar 2D hydrodynamic modeling of Newport Bay as UCI using the FEMA approved HEC-RAS model, which recently has been updated to include the capability to simulate 2D flows. We first conducted 2D hydrodynamic modeling of Newport Bay using the same tide conditions used in Gallien's study and found that the HEC-RAS model-predicted flood extents of Newport Bay are similar to those presented in Gallien's paper. This validates that the HEC-RAS model can be used for flood modeling of coastal urban areas. We then used the HEC-RAS model to simulate the flood extents of Newport Bay using the one-percent Still Water Elevation established for Newport Bay. The predicted flood extents of Newport Bay using 2D hydrodynamic modeling are *significantly less* than those shown in draft proposed FIRMs using the "bathtub" approach.

We believe that the incorporation of the seawalls and the use of 2D hydrodynamic model are crucial for accurate mapping of the flood extents of Newport Bay. Hence, we request FEMA to revise the proposed FIRM based on the use of 2D hydrodynamic modeling incorporating the available accurate seawall elevation data for Newport Bay.

Newport Coast

For Zone VE along the Newport coastline, we have identified the following concerns:

1) There is an eight foot difference in the BFEs of two adjacent areas. While the BFE established based on Transect 19 is 12 ft, the BFE based on the adjacent Transect 20 is 20 ft. Why is there such a great difference between these values?

   The Stockdon Method used in calculating wave runup in the determination of the TWL is sensitive to the beach slope. We believe that the large difference in wave runup for these two adjacent areas is due to the large difference in beach slopes for these two transects. Based on our review of the data used for Transect 20, we found that the condition for this transect is outside the range of applicability of the Stockdon Method.

2) Based on the data provided to us, in addition to Transect 20, the conditions for Transects 21 through 24 are generally outside the range of applicability of the Stockdon Method. Specifically, the wave periods of the annual maximum events are much longer than the wave periods reported in the Stockdon experiments (Stockdon et al., 2006, Table 1). A recent study by Senechal et at. (2011) indicates that saturation of the vertical runup conditions may occur for extremely long wave periods. Hence, for coastal areas where the conditions are outside the range of applicability of the Stockdon Method, an alternative wave runup method should be considered.

3) We understand that extensive wave modeling has been conducted to transform the offshore wave conditions to the nearshore to establish the wave conditions along the coastline. However, the water depths used to extract the nearshore wave conditions from the model are too shallow to be used for the Stockdon Method, which requires the use of deepwater wave parameters. Hence, an equivalent deepwater wave height was calculated based on the wave model result for the nearshore for each of the beach transect locations. Since extensive wave modeling has been conducted, we recommend using the model to directly output the wave conditions at each transect for direct application with the Stockdon Method.

4) Most of the BFEs established along the Newport coastline are unrealistically high. Based on the annual maximum wave runup elevations, areas along Transects 20, 21, and 22 would have been flooded every year between 1960 and 2009 (simulation period); and areas along Transects 18, 23 and 24 would have been flooded over 30 times for the year between 1960 and 2009. However, our maintenance records indicate that areas along the majority of the Newport coastline have rarely been flooded in past decades. For the last decades there were only five to six reported flooding at isolated areas along the coastline.

5) The mapping of flood extent is based on applying the TWL projected from the foreshore across the width of the beach to the backshore, then use the Cox-Machemehl Method to calculate the overtopping extent. This method is unrealistically conservative for the Newport coastline since along the Newport coastline, the beach width between the foreshore berm and backshore is in general over 200 feet and some areas even more than over 400 feet. In addition, the choice of the backshore locations was not consistent. For example, for the area along Transect 20, the chosen backshore locations in general follows the edge of the beach berms; however, for areas along Transects 23 and 24 which has similar beach berms, the backshore locations were chosen along the seawall instead of along the edge of the beach berms.

Since wave runup is very sensitive to beach slope, we plan to compare beach slopes calculated from surveyed transects with beach slopes calculated from the study terrain model. In addition, additional beach profile data can also be used to better define the wave runup along the coastline, since only eight transects have been used to establish the BFEs for the entire Newport coastline. We plan to determine if the beach slopes of the eight transects accurately represent the slopes of adjacent areas. We would also like to mention that the City has been actively managing the beach berms for many decades to minimize potential flooding along the Newport Coast in anticipation of major storm events. The mapping of the flood extent should consider the presences of these beach berms.

The City has retained a consultant to conduct hydrodynamic modeling for Newport Harbor and provide technical support on the flood issues. We would like to share with you their findings and work with FEMA on improving the accuracy of proposed draft FIRMs for the City of Newport Beach. Please let us know when would be the earliest convenient time for us to meet.

Should you have questions concerning this matter, please contact me at (949) 644-3277.

Very truly yours,

Community Development Department
BUILDING DIVISION

By: _____
Samir Ghosn, P.E., Principal Plan Check Engineer

SG:ds

c: Seimone Jurjis, Assistant Community Development Director | Chief Building Official

References:

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