INVESTIGATION OF FLOOD HAZARDS ON ALLUVIAL FLOODPLAINS

ABSTRACT

Investigations were carried out to delineate the 100-year flood hazard for a project area located in the upper Coachella Valley of Southern California (Figures 1 and 2). A multi-disciplinary approach was adopted, integrating elements of geologic mapping, mapping of geomorphic features, detailed topographic mapping, hydrologic inputs, and numerical simulations of flood propagation. The San Andreas fault dominates the geology, groundwater conditions, landforms and surface water hydrology in this area (Figures 3 and 4).

Active uplift and a shift to intermittent stream flow during the Holocene resulted in incision of Morongo Wash into the alluvial plain. As a result, most of the flooding in this area is confined to the existing channels, particularly Mission Creek and Morongo Wash. In contrast, the alluvial fan at the mouth of the neighboring Long Canyon watershed is the result of a typical desert watershed dominated by occasional flash-flood type activity. Historical aerial photo coverage of three floods that struck the area between 1974 and 1991 indicated that flooding on the Long Canyon fan follows typical alluvial fan flooding patterns (Figure 5), and that associated with Morongo Wash and Mission Creek follow typical incised channel flooding patterns (Figures 6 and 7).

A two-dimensional flood routing model was applied to assess the potential risk of future 100-year flooding at the subject property from Morongo Wash, including a forced overflow scenario. To adequately characterize flood propagation and flood routes, it is critical that subtle topographic features be accounted for in the modeling. During the course of the investigations, the USGS DEM data are generally a good source of topographic information (Figure 8). However, the relatively coarse resolution of the USGS DEM data and the significant age of the source survey measurements suggested the need for more accurate topographic data. Elevation data from Light Detection and Ranging (LiDAR) technology were therefore used (Figure 9). Model simulations were evaluated to predict the maximum discharge entering the project area as a result of temporal flood inflows from Morongo Wash, as well as the maximum water depths and extent of flooding in the impacted zones.