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Liquefaction Potential Mapping Using GIS For Nazilli, Western Anatolia

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Prediction of soil liquefaction potential in earthquake prone areas is an important step for engineering structures. Following disastrous earthquakes in Alaska and Niigata in 1964, the liquefaction of soils has become very important process in engineering studies. After the earthquakes; 1992 Erzincan, 1998 Ceyhan and 1999 Marmara, the liquefaction phenomenon became also important for Turkey.
The study area is located in Nazilli (Aydın, western Anatolia). Turkey is an extremely important country in terms of earthquake hazard. Earthquake is the primary criterion for liquefaction. Nazilli is located in first degree of earthquake zone.
The aim of this study is to determine the liquefaction potential of soils in Nazilli and to prepare the liquefaction potential map using Geographical Information Systems (GIS). Many researchers have identified various methods to determine the liquefaction potential of an area. In this study, liquefaction analysis was applied according to Youd et al. (2001).
To determine the horizontal and vertical distribution of soil layers, borings and in-situ tests (SPT) were performed. During the drillings, disturbed and undisturbed samples were taken from appropriate locations at every 1,5 meters. The various laboratory tests on these samples (natural unit weight, specific gravity, water content, grain size distribution, consistency limits, shear box, ect.) were performed. In order to use SPT data in liquefaction analysis, number of blows need to be corrected (overburden, energy, water, inner tube, rod, shaft diameter corrections). In this study, these corrected values (N1)60 were used in liquefaction analysis.
Alluvial fan, stream-flood and plain-swamp deposits represent vertical and lateral transitions in all Nazilli settlement area. Groundwater depth is also very low. Based on these data, the region is susceptible to liquefaction. The liquefaction potential map was prepared based on the data obtained from the analysis using ArcGIS 9.3.1. According to this map, almost all Nazilli settlement area has a liquefaction potential in a possible earthquake.
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