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Pedestrian Tsunami Evacuation Time Maps for Southern Coast of Bodrum Peninsula, Turkey

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Turkey suffered from devastating earthquakes and faced with a considerable number of tsunamis in its past. Although, tsunamis occurred in Turkey are not catastrophic as the ones in Pacific Ocean, they may still cause substantial damage in highly populated and/or touristic coastal areas. On July 21, 2017 at 22.31 UTC, a strong earthquake in the Gulf of Gokova (Mediterranean Sea) with a magnitude (Mw) of 6.6 (KOERI) was recorded. The earthquake caused a tsunami that affected the southern coast of Bodrum, Turkey and the northern parts of Kos island, Greece. The largest tsunami run-up was about 1.9 m and observed at Gumbet Bay, Bodrum (Dogan et al., 2019). Fortunately, there were no causalities as tsunami occurred at night time when there were few people on the coast, despite summer season. However, if the same event had occurred during daytime, its impact to the coastal localities would be much higher and it would cause panic among more people.

After the 2017 Bodrum-Kos tsunami, numerical simulations based on critical worst-case tsunami scenarios are performed with NAMI DANCE numerical model. According to the simulation results, a seismic scenario based on 1956-Amorgos earthquake and a combined scenario of Gokova fault and North Datca landslide scenario which is a possible submarine landslide assumed to be triggered by the seismic mechanism of Gokova scenario, give the maximum inundation distances and flow depth values at Southern coast of Bodrum Peninsula mainly in Central Bodrum town, Gumbet Bay, Bitez Bay, Yahsi Bay and Akyarlar-Karaincir-Aspat Bays where most of the settlements and touristic facilities are located.

In this study, evacuation walk time maps are prepared for the coastal settlements at Southern Coastline of Bodrum Peninsula by using Pedestrian Evacuation Analyst Tool (PEAT) developed by Jones et al. (2014) based on the selected critical scenarios above mentioned. PEAT is a least-cost-distance (LCD) evacuation model that estimates evacuation times throughout hazard zone based

on elevation, land cover, walking speed and direction of movement (Wood and Schmidtlein, 2012). The required data are gathered from international open source databases and data provided by Bodrum Municipality. The resultant pedestrian evacuation maps show time in minutes for pedestrian who aims to reach safety zone from shortest route. According to the maps, longest walk times to the safety are calculated to be 8 minutes for Central Bodrum, 3 minutes for Gumbet Bay, 4 minutes for Bitez Bay, 6 minutes for Yahsi Bay and 5 minutes for Akyarlar-Karaincir-Aspat Bays. The pedestrian evacuation times are also tested by onsite measurements. The results are compared and presented by discussions. The evacuation maps provide a base for emergency managers, planners and local decision makers during the planning of evacuation routes and preparation of emergency response plans.

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