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## Subway Flooding Simulation with US EPA SWMM: A Case Study of the Tamsui-Xindian Line During Taiwan's 2001 Typhoon Nari

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**There have been frequent reports of subway station flooding incidents in recent years. For instance, on October 30, 2012, Hurricane Sandy in the United States caused a storm surge combined with astronomical tide that submerged seven subway lines in New York City. It was the most severe disaster in the New York City subway system. On July 20, 2021, a flooding incident occurred in Zhengzhou, Henan Province, China, with a record hourly rainfall of 201.9mm. The heavy rain caused severe water accumulation at the Wulongkou yard of Zhengzhou Metro Line 5 and its surrounding areas. The temporary flood barrier was breached, allowing water to flood into the subway, with a maximum water depth of 1.75 meters inside the carriages and the flooding length extending approximately 1 kilometer.**

**In 2001, Typhoon Nari caused flooding at the Taipei Station, with 16 MRT stations also inundated. Surface roads were extensively flooded, and the Taiwan Railways Administration stations in Taipei, Wanhua, and Banqiao were submerged, resulting in a 90-day suspension of the Taipei MRT station. How to quickly evaluate the impacts of subway station flooding is crucial for the extreme weather in the future.**

**Therefore, this study utilized the US EPA SWMM to simulate the flooding situation of the Tamsui-Xindian line during Typhoon Nari in 2001. The SWMM calculations showed varying degrees of flooding at different stations at different times. For example, Guting Station was not affected by human intervention, while the simulated flooding depth at Taipei Station was only 0.09 m different from the actual depth. Additionally, the September 17, 2001 flood profile at 17:34 showed that Taipei Station was submerged, with water flowing to Zhongshan and Shuanglian stations. The National Taiwan University Hospital station experienced minimal flooding due to its higher elevation. The simulation also displayed the water ingress situation at different stations at various times. However, there were some inaccuracies due to the lack of detailed flood progression and inflow data and the use of a simplified station model. Nonetheless, the overall simulation results reflected the related flooding process.**