C01

Field Investigation of Stormwater Flows in a Sewerage System and Receiving Stream

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Urban flooding is one of the most challenging problems in the world with the significant change of the global climate as well as the rapid development of economy and urbanization in recent years. In Japan, although many kinds of efforts have been made to prevent/mitigate urban flooding disasters, losses of lives and properties are still frequently reported. For example, during the 2018 Western Japan Floods and the 2019 Floods in Eastern Japan caused by Typhoon Hagibis, many urbanized areas were inundated due to various reasons. In the management of urban flooding, it is important to understand the flow dynamics in the drainage system including both drainage canals/pipes and receiving streams.

The study field is located in the Kochi City (Japan) where a Class B River, the Kuma River and one of its tributary, the Kosui River, join together as shown in Fig.1. The Kuma River, with a length of 9.1km and a catchment area of 31.6km^2, is a tributary of the Kokubu River which flows to the Urado Bay along the Pacific coast. The target area is highly urbanized with a sewerage system capable of clearing rainwater from an hourly rainstorm event of 77mm. Unfortunately, people still suffered from severe inundation in 2014 due to heavy rainstorm induced pluvial flooding as well as fluvial flooding caused by river flows.

In normal seasons, rainwater in the target area is drained through several canals to the Kosui River. While in heavy rainstorm periods, the gates along the Kosui River are closed, rainwater then flows into sewer pipes and is collected in the Mikatsuki Pumping Station (Fig.1). The pumps operate automatically depending on the water levels in the pumping station and the water is finally pumped to the Kosui River.

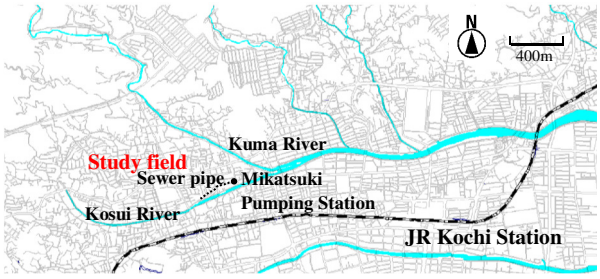

Fig. 1 Location of the study field

Considering the drainage mechanism, a number of water level gauges are installed at representative locations along the banks of the Kuma River and the Kosui River, and inside the manholes of a sewer pipe. The water level gauges are pressure-typed (Rugged TROLL 100 Data Logger, In-Situ, Inc.) and record the water levels every 1 minute in the sewer pipe and every 5 minutes in the rivers. Based on the field data during typical rainstorm events in 2018 and 2019, the relationships among the rainfalls, tides, the water level changes and pump operations are analyzed and possible methods for urban flooding mitigation are proposed.

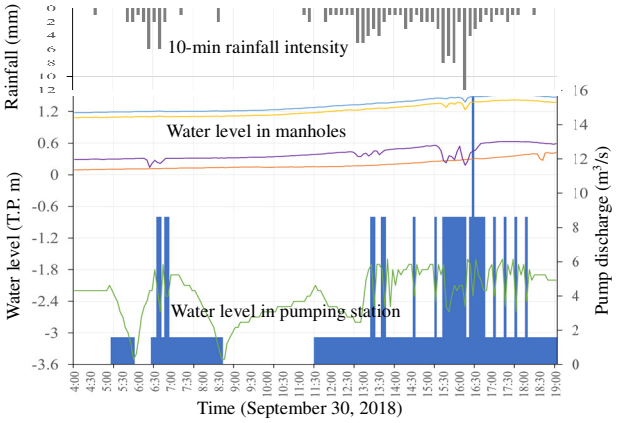

Fig. 2 Rainfall, water level and pump discharge

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