FLOOD RECONSTRUCTION OF 1st JANUARY 2020 STORM IN AN URBAN HOUSING AREA OF TANGERANG SELATAN, INDONESIA

Marelianda AL DIANTY[1] [iD], *Frederik J. PUTUHENA [2]* [iD], *Darrien Y.S. MAH[3]* [iD], *Rosmina A. BUSTAMI[3]* [iD], *Fachrian KANAFANI[4]*

ABSTRACT:

The storm in the early hours on the first day of 2020 had recorded the highest intensity of rainfall since 1996. It deluged Jakarta as the capital city of Indonesia and the surrounding satellite cities which including Tangerang Selatan. An urban housing area in Tangerang Selatan, located adjacent to the Ciputat river is selected as study area. The area was affected by floods since the urban housing was established. The United States Environmental Protection Agency's Storm Water Management Model version 5.1 was used for finding out the hydrological and hydraulic problems. The model indicated that the flows from the sub-catchments did not contribute to cause flood. It was discovered that backwater effects occurred in the Ciputat river was the main cause of flooding. Thus, the existing drainage channels were overwhelmed by additional flow from the river.

Key-words: Drainage, Reconstruction, Runoff rainfall, SWMM, Backwater.

1. INTRODUCTION

An extraordinary storm on 1st January 2020, hitting Jakarta city had smashed the rainfall record in the Indonesian capital city for the last quarter-century. The intensity of rainfall was due to monsoon season and a high amount of water vapour in the air. It was recorded at least dozens had been killed and 60,000 displaced. Flash flood had occurred in several urban areas with flood depths ranged at 30-70 cm. The water level reading of the Ciliwung River that passes through the Jakarta city were reaching up to the level of 860 cm that indicated second-level alert status. About 75 percent of the houses close to the Ciliwung riverbanks, and 25 percent in the basin areas were flooded. The occurrence of the flooding was pointed to two factors, likely narrowing of the river and poor urban drainage. This can be proven from the early warning system in the downstream dam did not enter an alert status when the upstream effected area and its surroundings began to be flooded.

Flash floods are generally caused by excessive rainfall in a short and intensive-phase storm (Tarasova et al., 2019; Zanchetta and Coulibaly., 2019). It is relatively little in terms of the number of human deaths (Bryndal et al., 2017). Diakakis et al. (2019) had reported a flash flood in the urban area in Greece, known as a tragic disaster, had caused the loss of 24 people, making it the deadliest flood in a period of 40 years. Subsequently, Paprotny et al. (2018) reported that high flood losses in 37 European countries had prompted the creation of a new database of damaging floods since 1870. Barichivich et al. (2018) had reported that historical extreme flooding in the Amazon region was a combination of Atlantic warming and Pacific cooling. Akter et al. (2020) had reported that Chittagong city in Bangladesh experienced regularly flooding during monsoon seasons. Prior to this, Borga et al. (2014) presented that flash flood in the Italian Alps region, it was more frequent and destructive due to climate change.

[1]*Department of Engineering Project, Geohydra Consulting Group,Jakarta, Indonesia, aldianty@geohydra.com*
[2]*Center Urban Studies, Universitas Pembangunan Jaya, Tangerang Selatan,Indonesia, fj.putuhena@upj.ac.id*
[3]*Faculty of Engineering, Universiti Malaysia Sarawak, Kota Samarahan, Malaysia, ysmah@unimas.my, abrosmina@unimas.my*
[4]*PT. Maju Total Persada, West Jakarta, Indonesia, fachriankanafani@gmail.com*