Earthquake Damage Estimations of Byblos Potable Water Network

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Abstract

Potable Water in Byblos City is provided mainly from Nahr Ibrahim River by the mean of a very old network. Moreover, since Lebanon region is considered to be a moderate to high seismic area, the aging water infrastructure needs to withstand earthquakes threat. Therefore damage estimations need to be assessed in order to mitigate seismic threat faced by the potable water infrastructure. To that purpose; data for the existing water network was gathered, files were prepared through the Geographic Information System, and then ingested and modeled through Ergo Platform using the adequately assigned lifelines fragility functions. The earthquake Potable water network damage of Byblos City was assessed in terms of three likely earthquake scenarios, and final results were offered. Possible strengthening solutions were investigated in order to recommend mitigation strategies.

Keywords: earthquakes; damage estimations; potable water; pipelines; sustainability; rehabilitation.

1 Introduction: Byblos potable water system

Potable Water in Byblos City, named Jbeil in the local language, is provided mainly from Nahr Ibrahim River by the mean of a very old network. However since 1996 some efforts were done in order to rehabilitate the potable water network and utilities. Three projects were developed to improve Byblos water supply system [1]. They were implemented and supervised by the Lebanese Council for Development and Reconstruction, CDR. Most of Lebanon potable water system projects were developed mainly during the period extending from 1992 until 2015, and the last project is scheduled to finish in 2017.

The first project was Nahr Ibrahim water conveyor – Jbeil plant, which was financed locally and amounts to about US$ 2 million. As noted in [1], this project was part of the «*Rehabilitation and expansion of potable water treatment plants, pumping and chlorination stations in the regions: The program covered projects for the rehabilitation and expansion of seven main potable water treatment plants in Zahle, Kfar Halda, Tripoli, Jbeil, Kousba, Ras el Ain and al-Bass (Sour). It also covered rehabilitation of 200 pumping stations located in all Lebanese regions. This program started in August 1996, its cost amounted to approximately US$ 54 million*».

The second project was part of the Mount Lebanon Governorate, named «Improvement of Jbeil district potable water supply». The cost of this project is estimated to about US$ 25 million. Execution works started during May 2013 and finished during December 2015.

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