

Assessment of a roughing filtration as a pre-treatment for slow sand filtration of canal water with highly variable feed water turbidity

Mohammad Yassin^a, Nidal Mahmoud^{a,*}, Kebreab Ghebremichael^b, Branislav Petrusevski^c

^a*Institute of Environmental and Water Studies (IEWS), Birzeit University, P.O. Box 14, Birzeit, West Bank, Palestinian Authority, Tel./Fax + 970 2 2982120, email: nmahmoud@birzeit.edu (N. Mahmoud)*

^b*Patel College of Global Sustainability, University of South Florida, 4202 E Fowler Ave, Tampa, FL, 33620, USA, email: kebreab.afewerki@yahoo.com*

^c*UNESCO-IHE Institute for Water Education, Westvest 7, 2601 DA Delft, The Netherlands, email: b.petrusevski@unesco-ihe.org*

Received 14 August 2016; Accepted 9 March 2017

ABSTRACT

The slow sand filtration plant (SSF) that produce drinking water for the refugee camp at Aqbat Jaber in Jericho (Palestine) is taken out of operation frequently during the rainy season due to the excessively high feed water turbidity. To allow continuous operation of SSF, the suitability of a pre-treatment process based on 4 layer upflow roughing filters (RFs), with optional coagulation using ferric chloride, was assessed at filtration rates of 0.5 and 1.5 m/h. The RFs without coagulant addition, at both filtration rates, effectively reduced turbidity of feed water from about 90 NTU to <20 NTU. Lower filtration rate resulted in lower filtrate turbidity. The major turbidity removal was attained in the bottom 20 cm layer of the filter column. Very high turbidity of feed water (800–1000 NTU) could be reduced to values acceptable for SSF (<20 NTU) with coagulation supported RF (Fe³⁺ dosage 9 mg/L) that operated at filtration rate of 0.5 m/h.

Keywords: Roughing filter; Pre-treatment; Slow sand filtration; High turbidity; Coagulant

*Corresponding author.