

Wastewater issues, treatment and effluent release for small municipalities

Lauren Halliwell^{1*}, Hamidreza Shirkhani², Geoffrey Hall^{1,3}, Pascale Champagne^{1,3}

1 – Department of Civil Engineering, Queen's University, Kingston ON Canada K7L 3N6

2 - National Research Council Canada, Building M-20, 1200 Montreal Road, Ottawa, Ontario, K1A 0R6, Canada

3 - The Beaty Water Research Centre, Queen's University, Kingston, ON, K7L 3N6

Wastewater is a complex mixture of human biological and environmental waste specific to rainwater effluent and industrial waste (Liu et al., 2018). Research has shown that when this complex wastewater mixture is improperly treated and released into the environment there is a potential for high-risk toxins to be introduced into recreational water and surrounding water sources (Liu, 2018). Consequently, improper wastewater treatment has a negative impact on human health through the potential risk of widespread illness and disease associated with wastewater breach (Weis et al., 2017). Oftentimes smaller scale communities are over-looked yet, they experience wastewater treatment challenges as a result of economic barriers in upgrading facilities and long-term operational strategies. They are also less funded to be researched because their small population. It is therefore essential to have a sustainable wastewater treatment system available for all communities to collect, breakdown and redistribute safe water back into surrounding environments in areas of operative water use. There are two types of classified groups of wastewater treatment: conventional and non-conventional. Conventional wastewater treatment approaches require high- energy inputs and are expensive. Conversely, non-conventional wastewater treatment requires natural energy inputs including activated sludge, rotating biological contractors, aerated lagoons, and trickling filters (Awuah 2006; Wang Pereira and Hung, 2009). Wastewater Stabilization Ponds (WSPs) are an example of a conventional wastewater treatment system that is sustainable for human health, economically feasible and safe for the environment.