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CONVENTIONAL DESIGN AND WATER SENSITIVE URBAN DESIGN (WSUD) WITHIN A SOUTH AFRICAN GREENFIELDS DEVELOPMENT

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science in Civil Engineering

Johannesburg 2020

ABSTRACT

Rapidly urbanizing areas present unique opportunities to implement alternative approaches to conventional water management as the Republic of South Africa (RSA) is a water-stressed country. An integrated systems approach that takes into account the different water users, sanitation and drainage have the potential to make urban areas more 'water-sensitive'. Some of the challenges facing RSA include inadequate supply, lack of accountability by those put in charge, failing of existing infrastructure, unsynchronized planning and environmental challenges brought about by climate change (e.g. drought). The main objective of 'water-sensitive' design is to decelerate runoff as well as reduce the quantity of surface water runoff. This is to allow for the effective management of downstream flooding, pollution risk, and potable water demand reduction. These objectives are achievable by harvesting, infiltrating, decelerating, storing, conveying, and treating runoff on site and, where possible, on the surface rather than underground.

In this research, the conventional design of storm water and potable water systems is compared to Water Sensitive Urban Design (WSUD) systems within a greenfield township development in South Africa. The key goal of this study is to determine if the benefits of applying WSUD methods to a greenfield urban development in South Africa is likely to outweigh the benefits of conventional design methods.

Prior to the detail design, an overview to the many conventional and WSUD interventions are provided. The study then focuses on the design of the water systems using the two approaches. Following the design of both systems, the cost of implementation is determined by measuring the quantities of the different elements of the solutions and applying the applicable market related costs.

The runoff generated in the post-development WSUD scenario is 30% less than the value of the post-development no control scenario. The cost benefit ratio is used to determine if the WSUD is economical as compared to the conventional design. A benefit cost ratio of 1.07 is calculated. As such the WSUD is considered better than the conventional design alternative. The study concludes that the implementation of WSUD within new developments is a starting point in achieving water sensitivity in greenfield developments in RSA.