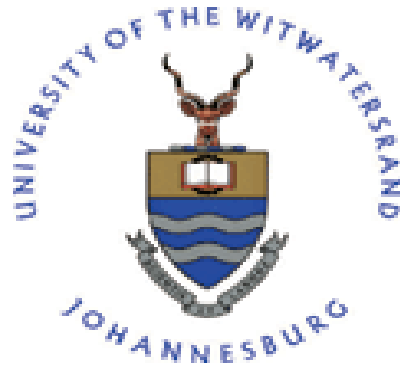




***Sustainable approaches to sludge disposal for the Darvill Wastewater Treatment Works  
(WWTW).***

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## ABSTRACT

The disposal of sludge produced during wastewater treatment, by means of land application, can have negative impact on the receiving environment if not properly monitored. For example, the use of sludge containing excessive amounts of heavy metal, as organic fertilizer, has potential to lead to soil and water pollution and can interfere with plant growth and yield. As a result, the presence of excessive amounts of heavy metals in the sludge may limit the potential use of sludge for agricultural purposes. This study aims to assess the sludge disposal method currently employed at Darvill Wastewater Treatment Works (WWTW) against the future design flow, to establish whether the current sludge disposal method will be sufficient for the new treatment capacity in terms of discharge limits set for sludge disposal by land application. In this study a model which can be used to predict the impact of increasing sludge application on the receiving environment is developed. While the site of the project is the Darvill WWTW, located in Pietermaritzburg in the province of KwaZulu-Natal, knowledge gained from this exercise can be useful to engineers and/or researchers trying to determine the lifespan of sludge disposal lands, using current soil conditions and the anticipated quality of sludge as inputs, in other areas. For the purpose of this model it has been assumed that the disposal of the treated sludge is done on a daily basis and that the sludge is evenly distributed across the sludge disposal land. The soil moisture content and soil bulk density were used to determine the amounts of solutes retained at various depths, with the amount of solutes retained decreasing with increasing soil depth. The concentration of Cd, Cr, Cu and Zn for the top 200mm of soil increases significantly due to the relatively low soil bulk density and high soil moisture content after 1 year of discharge with no removal of grass. The concentration of As, Cr, Pb and Zn exceed the maximum permissible level (MPL) when one models the disposal of sludge over a 10 year period with no removal of grass at the Darvill sludge land. The simple model presented in this research report will enable engineers and/or scientists to predict the concentrations of heavy metals to be expected in the soil based on the mass of solute retained. This approach enables engineers and/or scientists to be able to adopt mitigation measures to reduce the impact of non-compliance with the discharge limits as set out in the guidelines for utilisation and disposal of wastewater sludge.