

LONG TERM HYDRAULIC CONDUCTIVITY OF BIORETENTION CELLS

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ABSTRACT

Bioretention cells (BRCs), including raingardens and tree pits, are common water sensitive design practices for at source stormwater management; detention, retention and water quality treatment. The infiltration rate of the BRC media is the primary determinant of performance, as it controls the peak flow and volume of stormwater to be treated. Permeability can also influence the effectiveness of the media's contaminant removal processes.

The aim of this research was to assess the post-construction hydraulic performance of BRCs over time. Seven BRCs (six conventional and one proprietary biofiltration systems) were monitored in the field using a double-ring infiltrometer to assess permeability, based on the availability of historical data (2006-2018).

Four of the BRCs had infiltration rates above the minimum design permeability requirements ($K = 12.5 \text{ mm/hr}$). Permeability remained stable for three of the BRCs, and sharply decreased for three BRCs.

BRCs with relatively large footprints (>2-4% of catchment area) and well established vegetation were observed as maintaining satisfactory long term permeability. Vegetation health, coverage, and abundance of plant roots in the top 0-20mm layer were also observed as promoting media infiltration rate.

KEYWORDS

Bioretention, permeability, hydraulic conductivity, water sensitive design, filter media

PRESENTER PROFILE

Troy Brockbank (Te Rarawa, Ngāti Hine, Ngāpuhi) is a civil engineer and the Design Manager with Stormwater360 New Zealand. He has over 10 years professional experience in the stormwater industry across engineering consultancies, civil contractors & suppliers. He has developed specialist skills in investigation, design, manufacture, construction, and project management of stormwater management devices for public and private developments.

He has developed a real passion and ability for water sensitive design, in particular solutions to protect and restore the quality of waterways and the environment.

He considers himself an intermediary, having the advantage of seeing aspects from both an engineering and a Te Ao Māori world view. He is passionate about the widespread adoption of a holistic culturally enhanced water sensitive design approach and will continue working towards raising awareness as a leader in this field both nationally and internationally.