# A COUPLED WETLAND BIOFILTER : THE BEST OF BOTH WORLDS

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**ABSTRACT**

This paper describes an innovative stormwater treatment solution that combines the low head loss, large catchment properties of a treatment wetland with the high treatment efficiencies of a biofilter to achieve as smaller footprint solution.

The future of our cities will see development creeping into more and more constrained areas as we regenerate and intensify. The application of this solution is expected to be of considerable interest in highly urbanised areas where there are the twin challenges of high contaminant loads from catchments with high imperviousness from intensification combined with limited space for stormwater infrastructure. The paper describes installations currently in operation in Australia, describing learnings from design, construction and operational phases. It then sets out the design, assessment and consenting phases of a New Zealand brownfield application to demonstrate how the solution could be applied in a local context.

In the devices, forebays and wetlands provide some treatment as well as ponding volume that allows head to build up and drive water through biofilters. This allows filtration treatment to be achieved in areas that do not have enough hydraulic grade for a more conventional filtration approach. This aspect is particularly helpful when considering a future where climate change induced sea level rise is reducing the head available for treatment in coastal areas. The other advantage of having biofilters above and separated from the wetlands is that it prevents them from being subject to constant low flows that would see algae growth reducing infiltration rates. This can provide for better long-term performance and lower maintenance requirements for future asset operators.

The New Zealand application presented in this paper is a retrofit solution designed to treat some 600 hectares of commercial development discharging to the Mangere Inlet in Auckland. According to the MUSIC modelling undertaken, the coupled wetland and biofilter devices can achieve 75%TSS removal in in an area equivalent to 0.9% of the contributing catchment. This is less than half the space required for a conventional wetland treatment system using current Auckland guidelines. Further, the devices can treat a range of other contaminants, including intercepted leachate from adjacent landfills and they have been designed to integrate into a landscaped environment. The proposed application was designed as part of the NZ Transport Agency's East West Link project in collaboration with Auckland Council. It was part of a successful application for resource consents with the Board of Inquiry decision noting that the stormwater measures incorporated for the wider catchment would be *"expected to enhance the mauri of this water body and help to restore the mana of the wider area".*

**KEYWORDS**

**Water quality, MUSIC, wetlands and biofiltration,**