



Which WSUD assets are most financially sustainable?

Mr Jarrod Gaut¹, Mr Kanagaratnam Baskaran, Mr Lloyd Chua

¹*City of Greater Geelong & Deakin University, Geelong, Australia*

Overview:

The recent growth in the number of Water Sensitive Urban Design (WSUD) assets across Victoria which are managed by local Councils is set to continue, as a result of new developments requiring installation of developer funded wetlands and/or bioretention systems to treat stormwater runoff with regard to current legislation. To assist asset management planning and review of functional designs, an investigation was conducted into whether published industry rates reflect the actual cost of the construction and maintenance of WSUD assets, and whether certain types or scales of WSUD assets provide a clear advantage in terms of life cycle costs to be borne by the ultimate asset owner (ie Council), where the construction cost is borne by third parties (ie the Developer). The data available was limited to Geelong, and additional data will be required from more local Councils to determine if the industry rates are accurate, particularly in non-metro locations. Based on these industry rates, a comparative financial model showed that over a 30 year analysis period, the total life cycle costs excluding construction for wetlands were on average double those for bioretention basins for the equivalent benefit, being defined as Total Nitrogen (TN) removal in kilograms. The model also showed that WSUD assets sized for 2Ha catchments are likely to have more than twice the life cycle cost (excluding construction) per kg of TN removed, than those sized for 20Ha catchments.

Objectives:

An investigation was conducted into:

- i) whether published industry rates reflect the actual cost of construction and maintenance of WSUD assets, particularly in non-metro Councils where resources and skill sets may not reflect those of metro based catchment authorities; and consequently
- ii) whether certain types or scales of WSUD assets provide a clear advantage in terms of life cycle costs to be borne by the ultimate asset owner (ie Council), where the construction cost is borne by third parties (ie the Developer)

Method:

A comparative financial model was proposed to assess the lifecycle cost of developer funded WSUD assets for the ultimate asset owner (Council) with regard to type and scale, assuming the construction is funded by others (the Developer) Catchment pollutant loads and required treatment size to achieve 45% reduction of TN were calculated using MUSIC v6.2, in accordance with the MUSIC Guidelines produced by Melbourne Water (2016) and 6min rainfall data for the North Geelong BOM station from 1985-1991. Local maintenance and construction cost data from Geelong was used in conjunction with industry reference rates to determine likely maintenance cost over the asset lifecycle.

Results:

The results indicated that developer funded bioretention basins present a lower LCC for Councils per kg of total nitrogen removed, when compared to developer funded wetlands. This could be largely a result of the very small required footprints of bioretention basins (0.4% of the impervious catchment area) modelled within this analysis. The scale of the treatment asset also has a strong influence, with an asset sized for a 20Ha catchment having a nominal treatment to life cycle cost ratio more than double that for a 2Ha catchment, meaning routine and non-routine maintenance is twice as expensive over the 30 year life cycle for an equivalent benefit.

Conclusions:

It is anticipated that the comparative financial analysis tool can be provided upon request to Council staff and Developer's agents, to inform decision making with regard to functional design and asset management planning regarding WSUD asset type and scale, and could be used alongside the life cycle costing tool already available within MUSIC. Where developers are presenting different treatment options in Greenfield Development, the results of the analysis can be used within the broader decision making process, to inform outcomes that minimise lifecycle costs per kg of nitrogen removed once the asset is handed over to Council.